Crewing and the decision to use TASER in the Police Service of England and Wales: A mixed methods approach to examining impacts and drivers

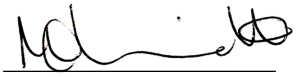
Submitted by Hannah Mary Louise Elliott-Davies to the Department of Criminology and Law at Royal Holloway University London, as a thesis for the degree of Doctor of Philosophy.

January 2022.

Declaration of Authorship

I, Hannah Mary Louise Elliott-Davies, hereby declare that this thesis and the work presented within is entirely my own.

Where I have consulted the work of others, this is always clearly stated.

Signed:  Date: 25.01.22

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THESIS ABSTRACT

Police use of TASER and single-crewing are both controversial areas of police practice and, despite much debate, surprisingly little is known about the operational and individual impacts of these practices. A small number of studies, however, suggest that single-crewing might be related to increased violence against officers and could impact on operational judgements, including the decision to use TASER.

This thesis is one of the first attempts to draw these two under-explored areas of police practice together by investigating the impact of officer crewing on the decision to use TASER. A systematic literature review was conducted to gather the existing evidence, identify common themes, detect gaps within the evidence base, and shape the formation of the remaining research.

To mitigate some of the limitations of the extant literature a multi-staged, digital, mixed methods diary study was designed and administered; gathering primary data from 151 serving police officers about their crewing practices, and the ways in which these practices affect how they think, feel, and act.

Exploratory statistical and thematic content analyses indicated that crewing practices have a wide range of consequences, and that single-crewed officers are more likely to use TASER during use-of-force incidents. The results also indicated that officers were more likely to use TASER as their first tactical option if they were alone when they began to use force, and that this is potentially due to officers perceiving higher levels of incident threat when single-crewed.

The evidence presented herein has implications for practitioners and academics alike by contributing to the wider debates around the use of force, crewing and officer decision-making; as well as ratifying the relevance of biological, psychological, and sociological approaches within these domains. Finally, this thesis not only highlights

several potentially fruitful areas upon which future research could focus, but also identifies some tentative recommendations for policy and practice.

CHAPTER ONE: INTRODUCTION

The aims of the first chapter in this thesis are threefold. First and foremost, Chapter One endeavors to acquaint the reader with the core concepts that characterise this thesis via a brief introductory literature review. Following on from this précis, the chapter seeks to further elucidate the area of enquiry by defining and exploring several key terms and constructs, as well as presenting the theoretical framework adopted for understanding human decision-making. Finally, this chapter intends to clarify and convey the overall thesis aims and objectives by providing a short description of the two empirical studies contained herein, along with their associated research questions, before concluding with an overview of the remaining chapters that comprise this thesis.

1.1 INTRODUCTORY LITERATURE REVIEW

Making decisions is an unavoidable but oft overlooked part of everyday life. This fundamental yet quiet process punctuates our moments from morning until night without rest: peppering the very fabric of our existence with opportunities, outcomes, and, depending on your disposition, an unremitting stream of 'what ifs.' Our decision-making processes influence almost everything we think, say, and do, from the most basic of human behaviour, to the most byzantine of activities. Perhaps it is no surprise then, that decision-making continues to be an ever-expansive area of investigation; generating an increasing multitude of research papers each year and spanning a wealth of disciplines including Philosophy, Psychology, Sociology, and Economics, to name but a few (McFall, 2015).

Whilst the origins of rational decision-making theory can be traced all the way back to the seventeenth century, current theories regarding this complex and multifaceted function can, for the most part, be separated into three broad approaches: normative, descriptive, and prescriptive. Whilst normative theories concern themselves

with how decision-making agents *ought* to choose when faced with a particular decision task, descriptive theories focus on evaluating the *patterns* displayed by decision-making agents, their underlying mechanisms, and how one might begin to predict these patterns and their associated outcomes (Elliott, 2019). Prescriptive theories sit somewhere between these two approaches however, and concern themselves with how decision-making agents *can and should* make decisions (McFall, 2015).

Despite being able to loosely group modern decision-making theories into these three broad categories, classifying the decisions themselves would be a much more challenging endeavour. This is because each and every decision varies across a multitude of factors relating to both the structure of the decision, and the context within which the decision sits (Dror, 2007). This includes, but is certainly not limited to: the complexity of the decision; the number of available alternatives (or choices), the relative similarity of the alternatives, the degree of certainty in regard to the related outcomes of each alternative; the gravity of any potential consequences; the quantity and quality of information available to the decision-maker; time pressures, and; social accountability (Dror, 2007; Tetlock, 1992).

Or, to simplify the above: not all decisions are equivalent in their structure nor their constituent parts. The decision to have coffee with your morning breakfast, for instance, could not be considered as qualitatively, nor quantitatively, similar to the decision to fire a gun in self-defence. Whilst somewhat over-dramatised, this illustration exemplifies some of the different decision factors listed above, and how these attributes may change the very nature of the decision itself. The potential consequences of firing a gun, for example, are distinctly weightier than the potential outcomes of missing your morning injection of caffeine – as is the degree to which the decision might be scrutinised by others after the fact.

Given that not all decisions are created equal, it would, perhaps, be understandable if scholars and practitioners were motivated to examine certain types of decisions more than others. Though these preferences are likely to be partially driven by the discipline within which the individual works and the type of decision-making approach they subscribe to, they may also be influenced by the perceived *importance* of the decision or decision outcomes. Some scholars, for instance, may pay attention to a particular type of decision because the decision, or the decision outcomes, may be able to contribute significant insight towards our understanding of the cognitive processes that drive our decision-making; whilst others may take a more pragmatic approach and concentrate on decisions that have more immediate and severe real-world repercussions, such as those with direct 'life or limb' implications e.g.; medical, military, or critical incident decision-making.

One such high-stakes decision that has recently come under much scrutiny is the use of TASER by the police in England and Wales; and whilst there has historically been a dearth of research into this type of decision-making, this paucity is beginning to be redressed. The burgeoning interest in TASER research, though long overdue, is unlikely to have been inspired by the absence of a robust evidence base, however, but by a number of societal pressures instead. This includes escalating public concern over the increasing frequency in TASER use (Independent Office for Police Conduct, 2021), increasing evidence of disproportionate use against vulnerable and minority populations such as children, people with disabilities, and/or those from Black and ethnic minority communities (Home Office, 2020c; Independent Office for Police Conduct, 2020, 2021; National Police Chiefs' Council, 2020a; Quinton et al., 2020), and a number of high profile cases where TASER has been linked to serious injury or death (such as Marc Cole, Darren Cumberbatch, Adrian McDonald, Jordan Begley and Dalian Atkinson: British Broadcasting Corporation, 2015, 2017; Busby, 2021; Independent Office for

Police Conduct, 2020).

TASER is classed as an incapacitation device and is not intended to be used as a pain compliance tool, however being subjected to a TASER discharge causes extreme pain as well as physical incapacitation. As such, even the threat of TASER can result in compliance due to fear of pain or injury alone, especially as TASER is associated with a range of potential side effects. Although a review conducted by the Defence Scientific Advisory Council Sub-Committee on the Medical Implications of Less-Lethal Weapons (DOMILL) in 2008 concluded that *'the risk of death or serious injury from use of the M26 and X26 Tasers within ACPO Guidance and Policy is very low,'* (p.19), TASERs have been linked to a number of harmful side-effects, including: Muscular contraction or strain related injuries (including bone fractures, hernia rupture, and dislocation); puncture wounds and other probe related injuries (particularly to soft or sensitive structures such as eyes or genitals); adverse effects on the heart, circulation and respiratory system; burns from electrical discharge; seizures; spontaneous abortion in pregnant subjects; risk of thermal burns from discharge-induced ignition of flammable substances, including incapacitant spray, and; secondary injuries caused by uncontrolled falls or other uncontrolled movements associated with neuromuscular incapacitation and the subsequent loss of posture (DOMILL, 2012; TASER International, 2013; Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons, 2016).

Given the above, it is perhaps of little wonder that Amnesty International identified over 300 deaths associated with the use of TASER in the United States between 2001 and 2008 (Amnesty International, 2008), and several high-profile UK deaths have been linked to the use of TASER over the last few years, including the former footballer Dalian Atkinson (British Broadcasting Corporation, 2017). Consequently, it is perhaps understandable that the use of TASER by law enforcement has remained a somewhat controversial topic, and has been placed under increasing

scrutiny over time.

Since 2016, there have been two key explorations into TASER use within English and Welsh police; the studies by Dymond in 2016 and 2018, and the 2020 study by Quinton et al; both of which explored and identified several factors that were significantly related to the use of TASER by examining mandatory use of force records generated from English police forces. Mandatory use of force records are generated when an officer, or member of police staff, uses force against a member of the public[1] and aims to formally document a number of key characteristics about the incident. This includes staff information (e.g. officer warrant number, rank, and role), situational characteristics (e.g. date, time, location, and crewing levels), interactional elements (e.g. subject resistance and the reason for use of force), subject characteristics (e.g. perceived gender, ethnicity, and any disabilities), and any resulting injuries (to the subject and/or officers).

Whilst all the above are important factors to examine, those that can be easily modified and that are within the Police Services' sphere of operational control may be of particular interest, as these could offer valuable opportunities or mechanisms for moderating the use of TASER. Given that subject characteristics and, to a large extent, officer characteristics, are either fixed (e.g. gender and ethnicity) or outside the normal control of police operations (e.g. incident location), situational and organisational characteristics may be the most promising and practical areas to explore for potential modifiers. The only situational factor that was examined by these British scholars (Dymond 2016, 2018; Quinton et al., 2020) and that sat squarely within the Police Services' sphere of operational control, was the number of officers present during the incident. However, when inspecting their findings, the authors' results were in conflict;

[1] Including (but not restricted to): Handcuffing, unarmed skills, dog deployment or dog bite, batons, irritant spray, limb / body restraints, spit and bite guards, shields, TASER, or firearms.

with Dymond (2016, 2018) finding no association between the number of officers present and TASER use, whilst Quinton et al. (2020) found that officers were more likely to discharge their TASER when they were single-crewed (i.e. working alone).

Whilst crewing practices have been a matter of much debate within the policing sector, the evidence-base from which these discussions stem is fairly limited, often dated, and tends to evaluate the practice by examining specific outcomes within a limited context (please see Anderson & Dossetor, 2012 or The Police Federation of England and Wales: PFEW, 2021 for a review). Though the academic literature in regard to the impacts of single-crewing is fairly limited, there is some available evidence that might help us to understand the impacts of crewing on individual officers, and, perhaps consequently, their decision to use TASER.

Officer safety is one of the most commonly examined officer-centric impacts of crewing, however the overall findings from the extant literature are by no means analogous; with some finding that single-crewed officers are more likely to experience violent victimisation from the public (Houdmont et al., 2019; Quinton et al., 2020), others finding that double-crewed officers are more likely to be subject to resistance or assault then their single-crewed counter parts (Wilson & Brewer, 1993, 200; Dart, 1989 as cited in Houdmont et al., 2019), and a few concluding that there is no discernible difference in such risks (Decker & Wagner, 1982; Kaplan, 1979; Wilson et al., 1990).

Although such incongruent findings might seem puzzling, they may just be an expression of how complex the association between crewing and officer assault is; a relationship which is most likely moderated by any number of additional operational and personal components (Houdmont et.al, 2019). For example, the relationship between crewing and officer assault may be moderated by an officer's ability, or willingness, to engage with a high-risk incident. Indeed, there is some evidence to suggest that greater prudence or restraint is used by single-crewed officers while

deciding when and how to engage with a situation (Decker & Wagner, 1982; Elliott-Davies et al., 2016; Wilson & Brewer, 1993, 2001). Another potentially moderating factor is an officer's ability to physically defend themselves, as some evidence suggests that whilst officers are less likely to be assaulted when single-crewed, they are more likely to suffer an injury (Wilson et al., 1990); perhaps indicating that while the rates of assault may appear to be similar between single and double-crewed officers, the *severity* of injury could be greater for those working alone.

Perhaps then, it is possible that crewing practices impact on the use of police force as the potential increase in officer vulnerability that accompanies being single-crewed may be considered explicitly by officers when making use of force decisions. For instance, single-crewed officers might be *more likely* to use TASER because they are, or perceive themselves to be, at higher risk of assault when alone; and thus, feel that they need additional armaments to bring the situation to a close whilst keeping the risk to their own safety as low as possible. However, it is also possible that single-crewed officers are *less likely* to use TASERS than their double-crewed counterparts as they are less likely to engage in a violent situation until another officer arrives.

Explicit consideration, however, may not be the only route by which crewing might impact the police use of force; it is possible that crewing practices may also affect an officer's decision to use TASER via more implicit means. Work by Highways Agency in 2011, for example, indicated that single-crewed Traffic Officers[2] performed less well at driving than their double-crewed colleagues in relation to elements of judgement, compliance to operational guidelines, as well as planning and awareness (Highways Agency, 2011a, 2011b): perhaps indicating that other areas of officer performance, such as use of force decision-making, may also be affected by the impacts

[2] Please note, Traffic Officers employed by Highways England (previously known as Highways Agency) are not warranted police officers with police powers but work alongside officers on motorways owned or managed by Highways England.

of crewing practices on officers' *cognitive processes*. Whilst there is little, if any, published evidence on the physical and psychological impacts of crewing outside of officer assaults and their associated injuries, the idea that an officer's decision-making could be indirectly and implicitly influenced by their crewing levels may not be as large a leap of logic as one might first presume. Whilst there is a dearth of research on the impacts of crewing on officer cognition, the wider academic literature has long-since linked decision-making to internal mechanisms that could be affected by crewing levels. Anecdotally, for instance, officers have often linked single-crewing with increased levels of fatigue (Hutber, 2018), also there is some nascent evidence indicating that being single-crewed may increase levels of officer stress (PFEW, 2021); and whilst the demonstrative evidence is far from comprehensive, these two constructs have previously been linked to decision-making in a number of ways.

Whilst there is still no universally accepted model of stress, many modern conceptual frameworks have moved away from the simplistic stressor-reaction concept posited by early theorists, and towards a more multifactorial or transactional approach (Howard & Scott, 1965; Lazarus & Folkman, 1984; Mechanic, 1963; Mechanic, 1978; Selye, 1976). Whilst these modern approaches are by no means homogenous, there are several similarities in the way that they conceptualise stress which highlights that not all stress is negative; that stressors can be acute (i.e., those that are severe, sudden in their onset, and are resolved relatively quickly, e.g. an exam) and/or chronic (i.e., those that are not resolved easily and continue over a longer period of time, e.g. marital discord); and, that psychological appraisal is a key factor in an individual's stress response.

It is clear from most of the current frameworks that the stressors themselves are considered to be inherently neutral, and that only the cognitive appraisal and response to the stressor can be positive or negative (Simmons & Nelson, 2007). Individual differences, personality traits, and previous experiences all affect the way in which

situations are appraised, and thus the relationship between the stressor and the response for any given individual. This can explain why some individuals would find public speaking extremely stressful, whilst others may enjoy the experience. Nonetheless, some 'types' of work-related stressors have been found to be associated with negative outcomes overall. For example, research has found 'hindrance stressors' to be negatively associated, and 'challenge stressors' to be positively associated with engagement, motivation, performance, and job satisfaction (Crawford et al., 2010; Lepine et al., 2004; Podsakoff et al., 2007).

Activation of the physiological stress reaction is of particular interest to this thesis due to the subsequent impact this could have on an individual's overall cognitive functioning and, ultimately, their decision-making. When an individual experiences acute stress, two major biological systems respond; the first being the sympathetic nervous system which engages the 'fight or flight' response and directs energy towards preparing the body for strenuous physical activity (McCorry, Laurie, 2007); the second being the Hypothalamic–Pituitary–Adrenal (HPA) axis, which releases cortisol to increase glucose availability so that energy resources are easily accessible (Besedovsky et al., 2008; Thau & Sharma, 2020). Crucially, numerous studies have found the activation of these physiological responses and subsequent cortisol release to impact a range of cognitive and affective processes linked to decision-making, including; working memory, threat-selective attention, anxiety, and fear (Het & Wolf, 2007; Putman et al., 2007; Putman, Hermans, et al., 2010; Soravia et al., 2006; Wolf, 2003). Interestingly, the impacts of cortisol on working memory appear to be particularly powerful when individuals are experiencing high cognitive loads (Lupien et al., 1999), meaning that stress might make individuals especially vulnerable to distractions when their cognitive load is high. These internal physiological changes may go some way towards explaining the relationship found between acute stress and human decision-

making, although it must be noted that the impact of stress and cortisol are not always negative (Starcke & Brand, 2012; Wolf, 2003; Oei et al., 2009). This means the effect of acute stress on decision-making is likely to be derived from several complex and moderating processes involving a variety of internal factors.

Job-related stress and overall shift stress are also of particular interest within the context of this thesis as consistently high levels of job-related stress may represent an example of chronic or repeated episodes of acute stress; conditions which can cause a number of negative and accumulative physiological effects referred to as 'allostatic load' (McEwen & Stellar, 1993). More importantly, high allostatic load not only has the potential to negatively impact an individual's physical and psychological functioning (Guidi et al., 2020) but it may also dampen the body's response to a critical incident, resulting in sub-optimal performance (Giessing et al., 2020).

Whilst fatigue is similar to stress in that it has no universally recognised definition (Chalder et al., 1993; National Institute of Clinical Excellence, 2020), it is generally accepted to describe a level of mental or physical exhaustion that stops a person from being able to function normally (Health and Safety Executive, n.d.). Whilst poor sleep, acute physical fatigue and tiredness are associated with a number of poor health outcomes (e.g. obesity, heart disease, high blood pressure, diabetes, burnout, and even increased mortality rates: National Health Service, 2018; Söderström et al., 2012; Hafner et al., 2016; Dembe et al., 2005), they are also known to increase the likelihood of errors, accidents, and poor judgement – especially in tasks requiring vigilance and monitoring, decision-making, awareness, fast reaction times, and memory (Dembe et al., 2005; Guo et al., 2018; Harrison & Horne, 2000; Health and Safety Executive, 2006); all of which may be imperative during potentially violent encounters between the police and the public.

Stress and fatigue, however, are not the only internal decision-making factors that could potentially influence officer decision-making processes. Indeed, Dror (2007) highlighted that there are a number of other decision-factors that specifically relate to the officers and their internal state, rather than the decision itself. For example, officer decision-making is likely to be influenced by the individual beliefs and values of the officer in question, their prior learning and experience, their cognitive abilities and the availability of cognitive resources during the decision-making task (e.g. working memory), as well as individual personality traits and situational affect (Dror, 2007). These internal factors may not only account for why individuals facing the same decision factors can ultimately end up differing in their decision outcome, they can also account for why a single individual might choose a difference decision outcome if faced with the exact same decision at a later point in time.

Given that officers are often unlikely to have the luxury of unlimited time in which to assess all the possible choices before selecting their preferred course of action, existing research suggests that officers may also have to use a more intuitive, implicit type of decision-making process. More specifically, when making decisions out in the field, officers may well be relying on what Stanovich and West (2000) refer to as System One processing. Stanovich and West's (2000) dual process theory of reasoning distinguishes between decision-making that is: fast, automatic, associative, intuitive, implicit and unconscious (System One), and that which is: slow, deliberate, rational, explicit and conscious (System Two). It has been hypothesised that, due to evolutionary development, the features of System One processes are thought to be closely aligned with increasing the likelihood of successful reproduction (and thus self-preservation). Therefore, System One processing may well be prominent in emotionally charged or high-risk decisions where an individual’s fight or flight response is triggered.

Indeed, Skolnick (1966; as cited in Crow & Adrion, 2011) suggests that police officers have developed a heuristic (a perceptual shorthand that is considered to fall under the System One type of decision processing) for identifying *symbolic assailants* who may represent danger to the police and community. Crow and Adrion (2011) expanded on this work in 2011, by adapting and applying the Focal Concerns Perspective from judicial research to the use of police force. The Focal Concerns Perspective suggests that, due to time or informational constraints, judges make sentencing decisions based on a tripartite heuristic that covers the following three concerns (Steffensmeier et al., 1998): (i) the perceived blameworthiness and culpability of the offender; (ii) their need to protect the community, and; (iii) concerns about practical constraints and consequences involving the offender or their circumstances. Crow and Adrion (2011) were particularly interested in whether police officers used a similar collection of indicators, or heuristics, when deciding to use TASER, and found support for two focal concerns similar to those listed above: (i) the subject's dangerousness and their need to protect themselves and the community (measured by the level of subject resistance and stereotypical assessments of race and gender), and (ii) the practical constraints and consequences of using TASER (measured by local policy). Whilst the analysis by Crow and Adrion (2011) used the type of incident call (e.g. traffic offence, violent offence etc.) to assess whether the perceived blameworthiness of the offender also impacted on an officer's use of TASER, no significant relationships were found. At face value, these results indicate that the potential dangerousness of the subject may be more important than their perceived culpability when officers are deciding whether or not to use TASER; possibly lending more support to Skolnick's (1966, as cited in Crow & Adrion, 2011) symbolic assailant heuristic rather than the Focal Concerns Perspective.

Although System One processes, like those discussed above, are thought to have the advantage of being faster and less cognitively demanding than System Two processes, they are often accused of leaving the decision-maker vulnerable to cognitive bias and the associated errors in judgment. For example; stereotyping (a System One type process) is often used in policing literature to explain racial bias in firearms and TASER incidents (Crow & Adrion, 2011; Fridell, 2016; Hall et al., 2016; Kahn & McMahon, 2015).

However, it is important to note that although the two systems are thought to be optimised for different situations and goals, they are not considered to be mutually exclusive and, in some cases, are theorised to work in parallel. For example; System Two can override System One in the interest of achieving an individual's explicit goals (Stanovich & West, 2000). Nevertheless, given that System One is assumed to be the default cognitive position, this 'override' is likely to be cognitively costly. The Recognition Primed Decision Model developed and presented by Klein, Calderwood, and Clinton-Cirocco in 1986 (Ross et al., 2004), suggests that the relationship between System One and System Two processes may also work in a more integrative fashion when the decision-making agent wields expertise. According to this approach, the acquisition of associative knowledge over time allows experts, military experts in this instance, to build a mental repository of patterns between specific events, decisions, and their associated consequences. This then allows the expert to use the following two-step process to make rapid decisions without the need to evaluate all the potential courses of action (Klein, 1989):

Step one – Recognition: The expert compares the situation at hand with their mental repository for similar previous experiences from which they can draw procedural guidance. This stage is, in essence, a type of intuitive pattern matching akin to a 'System One' process (Hine et al., 2018a).

Step two – Mental simulation: The expert then uses serial evaluation of strategies and/or mental simulation to analyse the likely outcome(s) if they use the same course of action from the 'matched' situations; a process that is more aligned with 'System Two' type processing. According to Klein (1989), experts use a sort of satisficing technique where they work through the potential courses of action, one by one, in order of typicality (starting with the most conventional) and accept the first option that meets their requirements for success. In the late 90s, this particular descriptive account of decision-making was developed into a prescriptive decision-making model called the 'Recognition Planning Model' by Schmitt and Klein in 1999 (Ross, K. G. et al., 2004). This model eschews the normative convention of generating several alternatives during the decision-making process, and instead concentrates on providing the tools for assessing a situation quickly, continuous evaluation, and augmenting any subsequent courses of action as part of a dynamic and ongoing decision-making process.

Although each of the decision-making models described above can be considered as laudable attempts at explaining everyday decision-making, there are still several decision-making factors that have been omitted thus far. None of the models above have, for instance, considered the decision-maker's cognitive preferences or affect, nor the sociological context within which the decision-maker and the decision task sit. Internal factors, such as cognitive preferences, are important aspects of decision-making to consider, and it has even been asserted by some researchers that individuals have an inherent and definitive decision-making style. According to Scott and Bruce (1995), this can be defined as "*the learned, habitual response pattern exhibited by an individual when confronted with a decision situation"* (p.820).

The Motivational Decision-Making Model championed by Strough et al. (2011) is one of the few theories that attempts to move towards a more holistic approach by

integrating internal factors into their model. This particular paradigm conceptualises human decision-making as an inter-related network between three core internal processes that sit within the immediate decision-making context as well as the wider socio-cultural and historical contexts. These three core processes are described as; deliberative, experiential, and affective. Deliberative processes refer to the *cognitive mechanics* of decision-making, or the individuals' abilities and skills, such as processing speed, memory functions and executive functioning. *Experiential processes* refer to the cognitive pragmatics of decision-making such as domain-specific knowledge or expertise; and *affective processes* refer to emotion. This model, perhaps, more accurately describes the multifaceted nature of decision-making by combining external decision factors with those that are internal to the decision-maker and subsequently identifying underlying drivers for individual differences in performance.

Though this decision-making model may be more rounded than those that came before, it still does not account for all potentially influencing factors. For example, none of these models, including the Motivational Decision-Making Model by Strough et al. (2011), explicitly accounts for transient biological states that may impact on an individual's deliberative processes, such as stress or fatigue. Another important internal factor left unaccounted for by the models above is the decision-maker's cognitive resources. As previously mentioned, System Two processing is more cognitively demanding and is theorised to require more mental resources than System One. Given that mental resources can be depleted and impacted by countless factors and functions, the reservoir of our mental resources can rise and fall significantly throughout the day; depending on what we are doing, what is happening around us, and what has been happening over the recent past. One such resource is our working memory. If an individual is multitasking and trying to attend to more than one thing at a time, this can increase the cognitive load (the amount of working memory being used; Sweller, 1988)

and thus reduce the amount of working memory available for decision-making processes. Perhaps then, those experiencing high cognitive loads are more likely to use System One processes due to their relative ease of use compared to System Two. As discussed earlier in this chapter, an individual's mental resources (e.g. such as the amount of working memory available) might also be diminished by internal biological factors, such as the physiological responses to acute stress and fatigue (Gärtner et al., 2014; Guo et al., 2018; Het & Wolf, 2007; Moore et al., 2012; Putman et al., 2007; Putman, Antypa, et al., 2010; Putman, Hermans, et al., 2010; Sandi, 2013; Soravia et al., 2006; Wolf, 2003; National Health Service, 2018), or psychological factors such as affect (e.g. anxiety; Derakshan & Eysenck, 2009). These are perhaps key issues when evaluating high-risk decision-making such as the use of TASER, which could trigger an officer's hypothalamic–pituitary–adrenal axis (the neuroendocrine system controlling the physiological response to acute stress).

In practice, this means that factors such as fatigue, stress and affect could prohibit the use of System Two processes by limiting the available mental resource regardless of time pressures or process integration. If this is the case, and there is an imbalance between the demands being placed on an officer's cognitive resources and their capacity to meet them, this may mean that they may have to rely purely on System One processes.

Although decision-making is a complex and multifaceted process, it is also a corner stone of the human condition with the capacity to impact upon every aspect of our own lives, and the lives of those around us. Police officers are compelled, as part of their day-to-day role, to use their best judgment and make countless decisions efficiently and effectively; many of which may have life-changing consequences for those involved – such as the decision to use TASER. Given the gravity and potentially

serious consequences of using TASER, it is imperative for the underlying process(es) driving this decision to be unearthed and placed under robust scrutiny.

Whilst the human cost of using TASER is undeniably a principal outcome to consider, there are there are also potential reputational risks to high levels of TASER use for the Police Service of England and Wales (PSEW: Independent Office for Police Conduct, 2021). Consequently, it could be argued that there is a functional imperative, as well as a moral one, to gain a better understanding of how and when officers decide to use TASER, and to identify potential avenues for moderating use. Dymond's work from 2016 and 2018, along with the subsequent study by Quinton et al., (2020) highlighted that crewing practices may well be one such potential avenue; not only has this been explored within the context of TASER use (with varying results), but it is one of the few incident characteristics that would be within the PSEW's sphere of operational control. Therefore, this thesis will endeavour to achieve what other studies into the police decision to use TASER have not yet attempted. More specifically, this thesis aims to not only consider the relationship between officer crewing and police use of TASER as the primary research focus, but also to identify the potential mechanism(s) that might underpin such a relationship, including those that are internal to the officer themselves.

1.2 DEFINING KEY TERMS, CONSTRUCTS AND THEORETICAL FRAMEWORKS

The aim of Section 1.2 is to define and briefly explore the key terms and concepts being used in this thesis. This includes the following three key terms '*single-crewing*,' '*TASER*,' and '*use of force;'* two key constructs that are relevant to the main theoretical framework and core research questions of this thesis, i.e. '*stress*,' and '*fatigue*;' and a theoretical framework for understanding human decision-making – which sits at the centre of this thesis.

1.2.1 Key Term: Single-crewing

Definition

Single-crewing (or being single-crewed) refers to a police officer being deployed to attend an incident or going on patrol alone. Essentially, it is an occupationally specific term that refers to a police officer who is lone working. It is important to note that whilst there are some similarities, this is both qualitatively and operationally different, from a situation where a police officer has been deployed in a team, who then finds themselves dealing with a situation alone due to how an incident unfolds (for example two officers attending a burglary where there are two suspects, and subsequently splitting up to chase the suspects individually as they have made-off in different directions).

Prevalence of single-crewing in England and Wales

The prevalence of single-crewing is difficult to ascertain as there are currently no official national figures on the frequency of this type of practice in the Police Service of England and Wales (PSEW), nor is there any national police policy in relation to its application. However, recent self-report results from a survey of over 12 thousand police officers found that amongst respondents for whom single-crewing was applicable, over half (58%) reported being *always* or *often* single-crewed (Elliott-Davies, 2021b). These figures also dovetail with the results from a research project conducted on behalf of the College of Policing (CoP) in 2011 which found that 68% of shifts, from a sample of 194 across two separate Forces, were single-crewed (McLean & Hillier, 2011). Although evidence is scarce, there is some indication from the same self-report officer survey mentioned above, that the single-crewing of police officers in the PSEW is not only common, but may have also recently increased due to changes in normal operational practices caused by the implementation of social distancing (in accordance with UK COVID regulations; Elliott-Davies, 2021b).

1.2.2 Key Term: Use of Force

Definition

Police officers are sometimes required to use force to achieve a lawful objective such as; acting in self-defence, making an arrest, or protecting others. Whilst the use of 'legitimate violence,' granted by the state to the police is often considered to be a necessary, albeit often contentious, power (Weber, 1919 as cited in Cojean et al., 2020) there is still some discussion of what actually constitutes 'force' amongst international policing literature (Cojean et al., 2020; Garner et al., 1995). Whilst some authors argue that the traditional approach to defining 'force' requires an officer to have made physical contact with a member of public (Garner et al., 1995), others indicate that the mere presence of a police officer or symbols of police force (such as visible firearms or dog units) can represent the potential, or threat, for force to be used and as such, can influence behaviour and be considered as a type of coercive control (TNS-BMRB, 2015a; Skolnick and Fyfe as cited in Lawton, 2007; Terrill & Reisig, 2003).

Nevertheless, within England and Wales, the National Police Chiefs' Council have defined a 'use-of-force incident' as a situation which a police officer uses any manoeuvre listed in the predefined glossary of tactical actions (Home Office, 2020f; National Police Chiefs' Council, 2018) found in Appendix 1. Given that the core focus of this thesis is the use of force within the PSEW, use of force will also be defined, categorised, and referred to using the list described in Appendix 1.

Prevalence of police use of force in England and Wales

Although there have been numerous calls for consistent and comparable data on the different types of force the police use, and the frequency of their use with the UK (Shaw, 2015; Independent Police Complaints Commission, 2014), these figures had not been collected and published on a national basis until December 2018 (Home Office, 2018b). This new requirement was introduced by the National Police Chiefs' Council

and was intended to '*hold police forces to account and to provide the public with greater information on the different types of force used and the context in which this occurs*.' (Home Office, 2018c, p.3). Since then, police forces have been required to record a core range of data via 'use-of-force forms' every time the police deploy a tactic categorised as a use of force (as per the bespoke tactical list described in Appendix 1); with a subset of this data being submitted to the Home Office through their Annual Data Requirement returns, which are then made publicly available on government websites.[3]

According to these figures (Home Office, 2020b), between April 2019 and March 2020 there were 492,000 recorded incidents in which a police officer used force against an individual member of the public. These uses of force were predominantly applied to individuals that police officers perceived to be over 18 years old (90%), males (83%), and White (69%). The most reported reason for an officer's use of force was to protect themselves (68%) followed by the need to protect other officers (58%).

1.2.3 Key Term: TASER

Definition

A TASER is a battery operated less-lethal pistol-like conducted energy device sold by the American company AXON Enterprise, previously known as TASER International Incorporated. TASERs that are currently approved and available for officers to use in England and Wales are the TASER X26®, the TASER X2® (Lewis, 2017), and more recently, the TASER 7® (Home Office, 2020a). The TASER X2® and TASER 7® are intended to compliment and subsequently replace the use of the TASER X26® as Axon Enterprise has ceased production of this model (National Police Chiefs'

[3] The Annual Data Requirement is a list of data that police forces are compelled to provide the government as per the Home Secretary's statutory powers. For more information on the ADR, please see: https://www.gov.uk/government/publications/home-office-crime-and-policing-research-and-annual-data-requirement-adr-data-privacy-information-notices/home-office-annual-data-requirement-adr-data-privacy-information-notice

Council, 2017). As such, any references to TASER devices in in this document are specifically in relation to the TASER X26®, TASER X2® and TASER 7® manufactured by Axon Enterprise only.

When fired effectively and accurately, the TASER generates up to 50,000 volts and discharges two dart-like electrodes called 'probes' from the cartage attached to the front of the hand unit. These electrodes stay connected to the TASER via conductor wires and if both successfully attach to the subject, a circuit is created; delivering an electric current of approximately 1,500 volts in extremely short pulses (National Police Chiefs' Council, 2017). This electrical current inhibits voluntary movement and produces severe muscle contractions via 'neuromuscular incapacitation,' for as long as the electronic pulses are applied (College of Policing, 2013a; Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons, 2016).

Although TASER was designed to cause incapacitation of a subject, the PSEW recognise that TASER can be used in several ways that could be considered a 'use of force,' without actually discharging the device. As such, the PSEW consider the following seven ways to utilise TASER as a use of force, ranging from the physical presence of a drawn TASER, through to discharge (Home Office, 2020f):

i. **Drawn (non-discharge use):** The device is taken out of the holster (de-holstered) in circumstances where any person could reasonably perceive the action to be a use of force.
ii. **Aimed (non-discharge use):** Deliberate aiming of the device at a target.
iii. **Red-dot (non-discharge use):** The device is deliberately aimed and then partially activated so that a red laser dot is placed onto the target, but the device is not discharged.
iv. **Arced (non-discharge use):** The cartridge has been removed to expose the two contact points on the front of the device, and the trigger squeezed so that an arc

of electric current flows between these contact points; demonstrating the electric current to the target.

v. **Fired (discharge use):** The device is fired with a live cartridge installed. When the trigger is pulled, the probes are fired towards the target with the intention of completing an electrical circuit and delivering an incapacitating effect.

vi. **Angle drive stun (discharge use):** The officer fires the device with a live cartridge installed. One or both probes may attach to the target. The officer then holds the device against the target's body in a different area to the probe(s), to complete the electrical circuit and deliver an incapacitating effect. However, if the front of the TASER is placed against the target less than 10 inches from the successfully placed probe, neuromuscular incapacitation is unlikely to occur.

vii. **Drive stun (discharge use):** The device is held against the target's body and the trigger is pulled with no probes being fired. Contact with the person completes the electrical circuit which causes pain but does not deliver an incapacitating effect. Utilising the TASER in this manner could be considered to be a pain compliance technique due to causing localised pain without neuromuscular incapacitation.

Prevalence of TASER use by the Police Service of England and Wales

Due to their potential to cause injury and pain, TASERs are a prohibited weapon in the UK under the Firearms Act 1968 (section 5). However, since 2003 they have been available to some specifically trained police officers in England and Wales as 'work related equipment' (College of Policing, 2013a). TASERs were first trialled in 2003 across five police forces within England and Wales;[4] during which time, they were only available to Authorised Firearms Officers (AFOs) and were only authorised for use

[4] Lincolnshire Police, Metropolitan Police Service, Northamptonshire Police, North Wales Police, and Thames Valley Police

within operations where firearms authority had been granted (Independent Police Complaints Commission, 2014). These trials culminated in the Parliamentary Under-Secretary of State for the Home Department authorising TASER to be rolled out across the remaining 38 police forces in England and Wales in 2004 (Houses of Parliament, 2004) under the same restrictions to that of the pilot scheme (i.e. authorised use of TASER was reserved for AFOs within operations where firearms authority had been granted).

In 2007, TASER restrictions were relaxed and AFOs were given permission to use TASER in incidents *without firearms authorisation* if they were facing a potentially violent incident where they would need to use force to protect the subject, the public, or themselves (Houses of Parliament, 2007). In 2008, the PSEW further relaxed the restrictions and piloted the use of TASER by non-firearms officers. Whilst these officers were not AFOs, they were provided with specialist TASER training, and are referred to as Specially Trained Officers (STOs; Houses of Parliament, 2008). The authority to carry and use TASER by these STOs was then rolled out across the 43 forces in England and Wales and was fully completed by the end of 2013 (Home Office, 2018c; National Police Chiefs' Council, 2017).

Since the arrival of TASER in the early 2000s, the number of TASERS and the number of officers who have been trained to use them, have increased consistently and considerably. Unsurprisingly, this also means that the use of TASER has increased. Figure 1.1 shows the use of TASER by the police in England and Wales between 2011 and March 2020 and was created using publicly available data (Home Office, 2016, 2020b). As mentioned in the previous section on use of force (Chapter One, Section 1.2.2), the PSEW has been required to record data on all uses of police force against the public, including statistics on TASER, since the year 2017. Regardless of this development, each of the 43 territorial police forces in England and Wales had already

been collecting and submitting data to the Home Office on TASER use. Unfortunately, due to differing recording methods, data on police TASER use from 2017/18 onwards are not directly comparable with previous figures; however, they do show a similar pattern, with the majority of TASER uses being non-discharge.

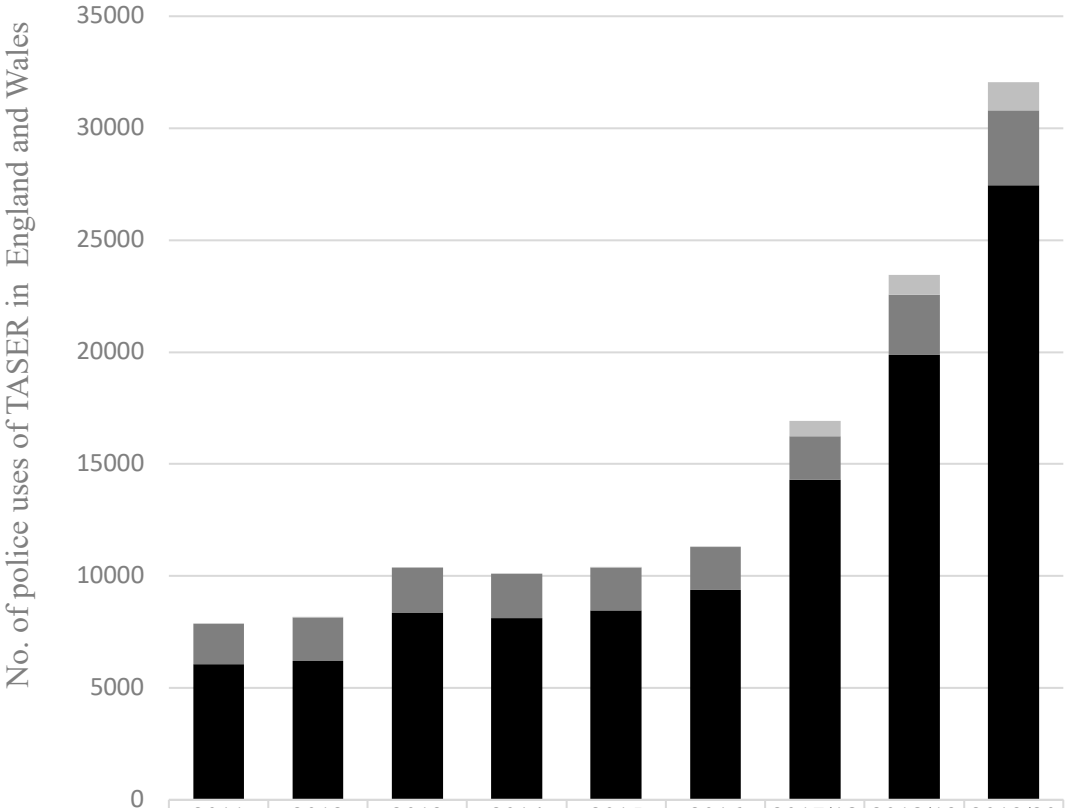
When looking at TASER as part of the wider use of force data, it appears that over the year 2019/20 TASER was used in 7% of use-of-force incidents (Home Office, 2020b) and the vast majority of these incidents were non-discharge uses. Whilst this is a small proportion overall, it still amounts to over 32 thousand uses in one year, and according to this particular report, the most commonly recorded reasons for an officer to use TASER was to protect themselves (84%) followed by the need to protect other officers (74%).[5] However, it must be noted that the vast majority of these incidents were non-discharge uses (86%).

According to the Home Office data for 2019/20, there were 32,057 incidents involving TASERs and when comparing these figures to the 2011 census data, incidents involving TASER have occurred at a much higher rate when the subject is perceived as being from a Black ethnic group, than a White ethnic group (just over 8 times higher to be exact; Home Office, 2020c). In light of these figures it is perhaps unsurprising that in May 2020, the Independent Office for Police Conduct (IOPC) called for greater scrutiny of the use of TASER by the police in England and Wales after claims that a range of stakeholders had raised concerns over the "*disproportionate use of Taser against Black people and those with mental ill health"* (IOPC, 2020). This led to additional scrutiny of TASER use by key stakeholders, including the Home Office, the College of Policing, and the National Police Chiefs' Council (NPCC). An Independent Review into Disproportionate Effects of Use of TASER was subsequently established to commission

[5] Please note that officers can select more than one reason for the use of force in standard reporting forms, as such the responses will not add up to 100%.

and review an extensive and independent programme of social research, to explore the causes and consequences of racial disparities in the police use of TASER. The project formally launched in January 2021, and will run for an initial period of around 12 months (National Police Chiefs' Council, 2020a).

Figure 1.1 *Police use of TASER in England and Wales 2011- 2020* (Home Office, 2016, 2020b)



	2011	2012	2013	2014	2015	2016	2017/18	2018/19	2019/20
Not stated	14	5	0	1	3	5	680	890	1267
Discharge	1818	1940	2020	1989	1920	1910	1951	2693	3334
Non-discharge	6045	6216	8360	8105	8467	9379	14282	19868	27457

1.2.4 Key Concept: Stress

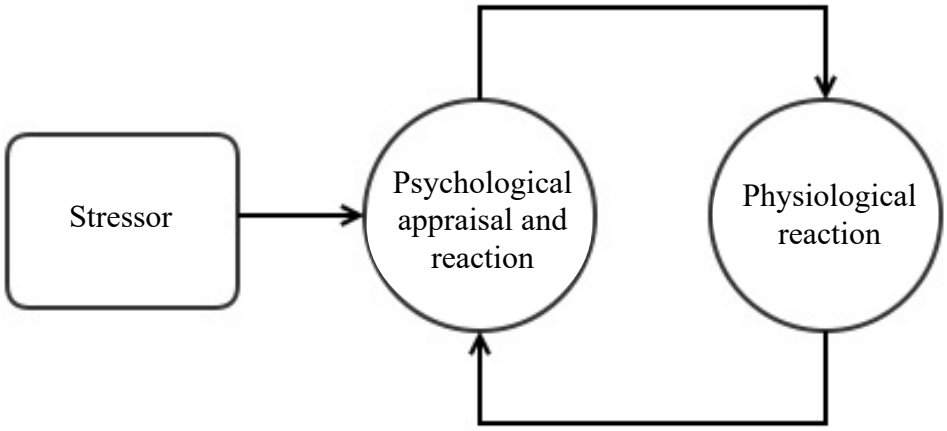
Definition within the context of this thesis

As discussed previously, the concept of 'stress' has been defined in a number of different ways and can refer to a biological, as well as a psychological state (Fink, 2010; Robinson, 2018). Moreover, many of the more modern conceptual frameworks have

moved away from a simplistic stressor-reaction model and towards multifactorial (Howard & Scott, 1965; Mechanic, 1963; Mechanic, 1978; Selye, 1976) or transactional approach (Lazarus & Folkman, 1984). Given that this thesis is, in part, focussing on the potential link between crewing levels, stress and the potential short-term impacts on decision-making, 'stress' will be viewed as a relational process (depicted by Figure 1.2) between the following three key components and will be concerned predominantly with *acute stressors* and *job-related stress* only:

- **Stressors:** Changes to the environment or the presentation of stimulus that can cause 'stress.'
- **Psychological appraisal and reaction:** The perception of any given stressor and the subsequent psychological response.
- **Physiological stress reactions:** Physiological responses to stressors and/or the psychological appraisal and reaction to a stressor.

Figure 1.2 *Relational Model of Stress*



Prevalence of stress within Policing

Acute stress: Although limited research has been conducted on the causes of acute stress within policing, some self-report research has found officers to be divided over whether the additional dangers of their job causes stress (Verhage et al., 2018). Other authors, using more tangible data (such as heart rate or respiration levels), have confirmed critical incidents involving an element of danger or unpredictability, can cause significant stress reactions which could potentially impact on decision-making (Anderson et al., 2002; Arble et al., 2019; Mark et al., 1997). Though the UK Home Office and the Office for National Statistics does not currently collect any annual data on the number of critical incidents that officers attend, they do collect data on the number of assaults made on police officers per year; and given that the Home Office also consider incidents that may cause serious harm to any individual as a 'local critical incident,' (Home Office, 2018a) it is arguable that these incidents of assaults could be considered as critical incidents.

Data released by the Home Office (2020e) indicates there were over 30,000 assaults on police officers in England and Wales between 2019 and 2020, the equivalent of almost one in every four rank and file officers being assaulted.[6] Moreover, self-report survey data indicates that many officers are frequently exposed to incidents that place them at risk of physical and/or psychological harm. For example, in 2020, over 12 thousand officers responded to a survey by the PFEW (approximately 10% of all federated police officers in England and Wales), the results of which highlighted that 55% of respondents said they had been the victim of an unarmed physical attack over the previous 12 months; a figure which increased to 83% when examining responses from officers working in key frontline roles (i.e. Response, Neighbourhood policing,

[6] Based on federated officer headcount figures from the Home Office for March 2020 (130,093 officers; Home Office, 2020d)

Custody and Roads policing; Elliott-Davies, 2021). Though it is difficult to ascertain the exact prevalence of acute stress within the police force, the figures above indicate that many officers have been placed in a situation where they might suffer serious harm (i.e. a critical incident involving an element of danger) and thus, potentially have suffered acute stress as a result.

Job related stress: Job-related stress within policing has, over the last few years, become a topic of much debate within the UK. In 2016, the PFEW surveyed over 16,000 officers and found that 39% of their respondents rated their job as *very* or *extremely* stressful (Houdmont & Elliott-Davies, 2016). These respondents were also more likely to experience fatigue that interfered with work duties, have poorer overall mental wellbeing, as well as poorer self-reported ability to think clearly, and to deal with problems effectively (Houdmont & Elliott-Davies, 2017); perhaps supporting the notion that job-related stress may be positively correlated with allostatic load and could subsequently impact on officers' physical and psychological functioning. The PFEW re-ran the same survey in 2018 and 2020, and found that the proportion of officers reporting that their job was *very* or *extremely* stressful increased by five percentage points from 39 to 44 per cent in 2018, before falling by 11 percentage points between 2018 and 2020 to one in three officers (33%; Elliott-Davies, 2019, 2021).

1.2.5 Key Concept: Fatigue

Definition within the context of this thesis

Whilst there are many different definitions used for the term 'fatigue,' in this instance we are concerned with what the Collins English Dictionary defines as: '*physical or mental exhaustion due to exertion,*' (Collins English Dictionary, 2019, p.280), or, more specifically, to what the UK Health and Safety Executive define as "*a decline in mental and/or physical performance that results from prolonged exertion, sleep loss and/or disruption of the internal clock.*" (Health and Safety Executive, n.d.).

However, fatigue is far more complex and dynamic than the above descriptions suggest. For example, fatigue can be psychological, emotional, physical, or general in nature; it can also be chronic or acute, and it can be pathological (i.e., due to an underlying medical condition), or experienced as part of normal day-to-day life (Chalder et al., 1993). General fatigue can be an outcome of continued exertion, poor quality sleep and disruption of the internal body clock, but it can also be related to job demands and workload, for instance; high workloads and work that requires consistent attention, is machine-based or very complex, can increase feelings of fatigue (Health and Safety Executive, n.d.).

Given that this thesis, in part, is focussing on the potential links between crewing levels, fatigue and their potential short-term impacts on decision-making; both acute physical and mental fatigue will be considered within.

Prevalence of fatigue within Policing

Given that Police Officers are exposed to several risk factors for developing sleep problems, including shift work (Åkerstedt, 2003; Barnes & Watson, 2019; Härmä et al., 2019; Health and Safety Executive, 2006; Hulsegge et al., 2019; Shen et al., 2006), occupational stress, and exposure to dangerous or traumatic events (Elliott-Davies, 2018; Houdmont & Elliott-Davies, 2016, 2017; Kompier et al., 2012; Socci et al., 2020; Strahan et al., 2008), sleep and fatigue have continued to be areas of concern within the policing sector. In 2020, the National Police Wellbeing Survey conducted by Durham University received over ten thousand responses and found that almost a third of police officers indicated experiencing extremely high levels of fatigue (29%), and 40% reported having less than six hours sleep (Durham University, 2021). Maybe even more importantly, however, results from another self-report survey in 2018 (with over 18,000 responses) found that 68% of respondents agreed with the statement '*Current*

levels of fatigue amongst my colleagues pose a significant risk to officer safety' (Elliott-Davies, 2018).

1.2.6 Theoretical Framework: Decision-Making

Similar to decision-making in everyday life, police decision-making can take any number of different forms and can cover a vast array of subject matters, stretching from the decision to use force, to seeking a charging decision from the Crown Prosecution Service (CPS), and everything inbetween. This extended spectrum of potential decision-making tasks poses a significant challenge when considering a single police decision-making model, as decisions factors may differ vastly from one type of decision to another. For example, the relatively fast-paced, high-risk, dynamic decision-making used when an officer is faced with a dangerous situation, is likely to be qualitatively very different to the slower-paced, more static decision-making used when an officer decides whether to seek a charging decision from the CPS. This renders the creation of a normative model of police decision-making that holds universal utility no matter the decision-task, nigh on impossible. As such, the College of Policing (CoP) have opted for a broad-based prescriptive approach towards police decision-making; called the National Decision Model (NDM). The NDM was introduced in 2011 by the Association of Chief Police Officers of England, Wales and Northern Ireland (ACPO)[7] and is promoted as a values-based tool to provide a simple, logical, and evidence-based approach to making any and all policing decisions. The NDM has six core elements; five of which are part of a cyclical decision-making processes, whilst the remaining element represents the PSEW's 2011 Statement of Mission and Values (listed in Appendix 2) which sits at the heart of all policing decisions in England and Wales (Lewis, 2017; CoP, 2014b).

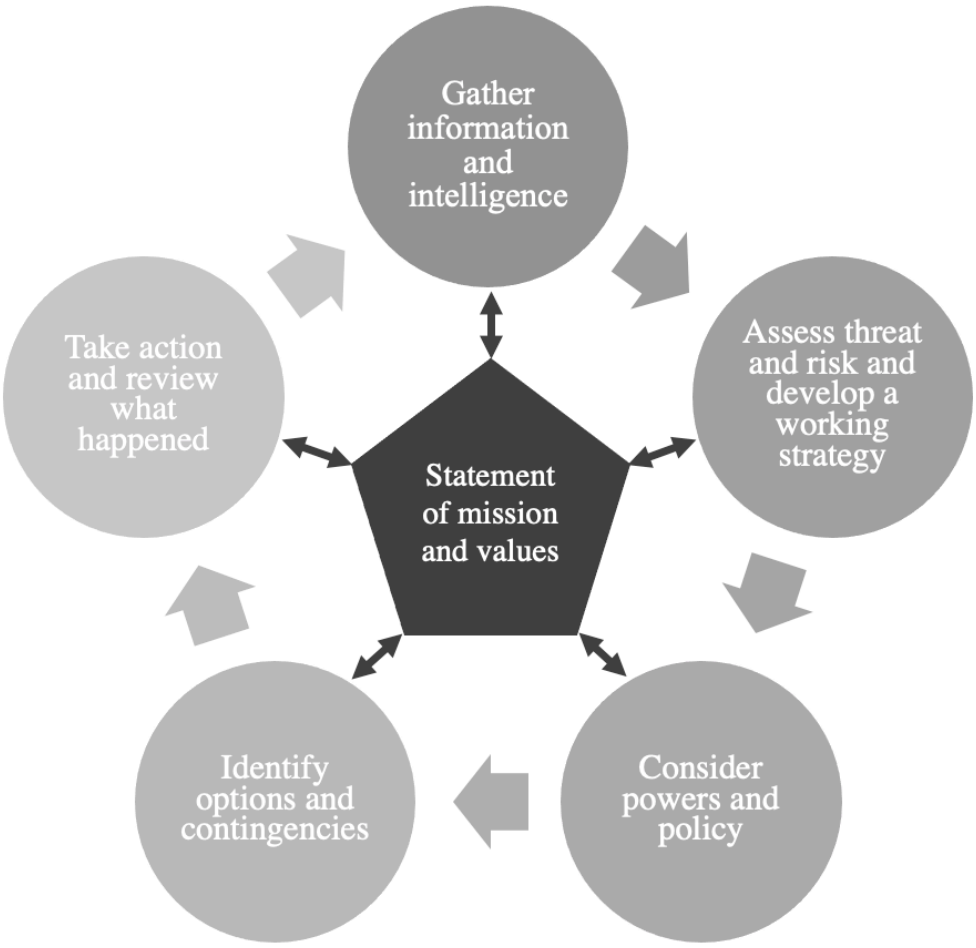
[7] ACPO was replaced by the National Police Chiefs' Council (NPCC) in 2015.

The five-step process, detailed by Figure 1.3, follows a similar route to the Recognition Planning Model (described previously in Section 1.1); whereby officers are encouraged to first gather all the information needed to define and assess the situation (paying particular attention to threat and risk), and then develop a working strategy by identifying the goal(s) they are trying to achieve. The third stage encourages the officer to consider the powers, policies, and legislation that might be applicable before identifying potential courses of action and selecting the most appropriate for application. The fifth, but not necessarily the final, stage of the NDM process is actioning the chosen alternative and reviewing the outcome of these actions. The NDM is a dynamic and ongoing process, and officers are encouraged to continue working through the steps in the cycle until the incident is resolved (a process which is sometimes colloquially referred to as 'spinning the wheel').

Though designed to be 'suitable for all decisions' (Association of Chief of Police Officers, 2012), the five-step process described above may be difficult to apply in fast-paced and dynamic situations, due to the amount of cognitive resources that might be required and the amount of time that officers have in order to 'spin the wheel.'

Whilst the NDM might give officers a useful framework to structure a decision-making rationale (pre and post incident), it does not easily support officers to weigh-up the threats and risks they are facing, nor evaluate which course of action might offer a an ideal (or even satisfactory), solution. This is left to the decision-maker, their own techniques, and their own best judgement. Arguably, this signifies that officers themselves are the crucial element in any police decision-making, as they have to interpret the situation appropriately, correctly identify the relevant policies and guidance for the situation, generate courses of action and select the most appropriate; meaning that internal factors (such as officer perception, cognition and affect) are likely to be important drivers in officer decision-making.

Figure 1.3 *The National Decision Model (CoP, 2013a)*



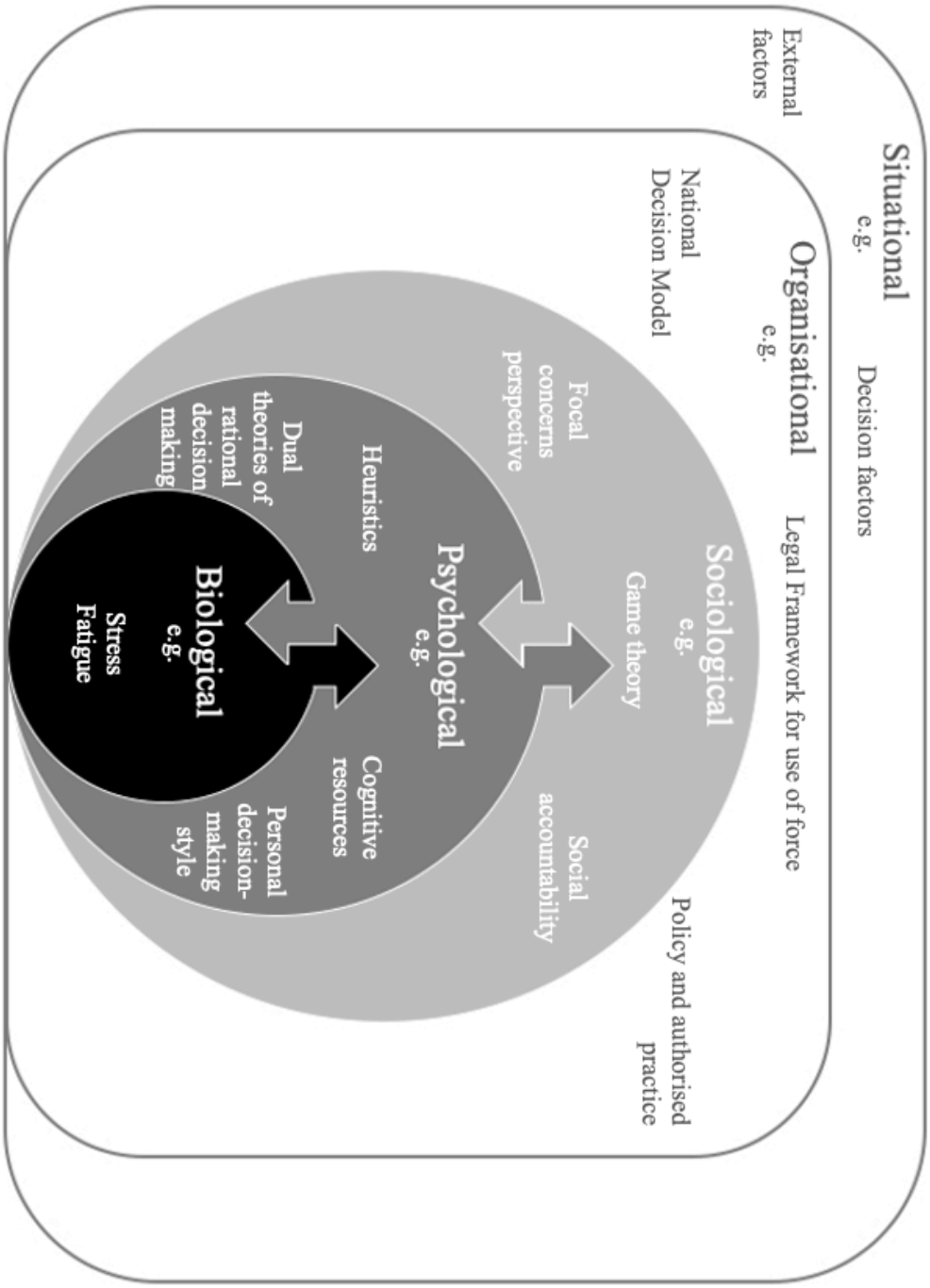
Given that this thesis is not concerned with prescribing how officers should make decisions, and instead is focused on unveiling the elusive secrets of officer decision-making, the NDM by itself would not be an appropriate framework to apply herein. As described in Section 1.1, decision-making is a complex and multifaceted phenomenon, and currently there is no single descriptive decision-making model to explain the use of TASER by the PSEW whilst encompassing these components in a holistic way. As a result, this thesis will take a new approach by integrating a number of broad and pre-existing concepts from the established literature on descriptive decision-making into a single, panoptic, biopsychosocial framework in order to explain officer decision-making within the structured and limited scope of TASER use by the PSEW (please see Figure 1.4 for a conceptual diagram).

This panoptic biopsychosocial framework was developed by analysing several descriptive decision-making models and associated literature, alongside the NDM, and searching for commonalities. Whilst all of the descriptive decision-making models included some reference to decision factors and factors that are external to the decision-maker (e.g. situational factors, time pressures, the number of alternatives available to the decision-maker and practical constraints) a large proportion of the latterly developed models also include psychological elements by focussing on factors that Dror (2007) referred to as 'internal factors.' As mentioned in Chapter One, these are, in essence, factors that are internal to the decision-maker and include considerations such as an individual's beliefs, values, personality traits, cognitive ability, prior learning, previous experience, availability of cognitive resources, and affect of the decision-maker. Examples of these within the extant literature include heuristics such as 'Satisficing' (Simon, 1956) or Tversky's 1972 'Elimination-by-aspects' model; Dual processing theories (please see Stanovich & West's seminal article from 2000 for a summary), the Motivational Decision-Making Model by Strough et al. (2011), or personal decision-making theories, such as Scott and Bruce's General Decision-Making Style (1995). In addition, there is also evidence within the existing literature to indicate that transient biological states, such as the physiological responses to acute stress and fatigue, may also impact on individual decision-making by reducing the cognitive recourses available to the decision-maker (Gärtner et al., 2014; Guo et al., 2018; Het & Wolf, 2007; Moore et al., 2012; Putman et al., 2007; Putman, Antypa, et al., 2010; Putman, Hermans, et al., 2010; Sandi, 2013; Soravia et al., 2006; Wolf, 2003; National Health Service, 2018). Finally, a number of models also included aspects of decision-making that could be considered as social or organisational in nature, such as; interactional elements between two individuals (e.g. Game Theory; Dimand & Dimand, 1996), the opinions of others, cultural expectations and the wider social context, and organisational restraints (e.g. the

NDM, the Focal Concerns Perspective, the Motivational Decision-Making Model, and Social Accountability Theory: ACPO, 2011; Crow & Adrion, 2011; Strough et al., 2011; Tetlock, 1992).

These unmistakable commonalities within the descriptive decision-making literature led to the inclusion of the five following factor groupings and guided their composition into the structure portrayed in Figure 1.4: Biological decision factors, psychological decision factors, sociological decision factors, organisational decision factors and situational decision factors. By developing and organising the panoptic biopsychosocial framework in this fashion, this thesis intends to apply decision-making theory to the problem at hand in a more authentic and holistic manner.

Figure 1.4 *The Panoptic Biopsychosocial Framework*



1.3 STUDY AIMS AND RESEARCH QUESTIONS

This section briefly sets out the aims and research questions of the two studies that comprise this thesis. The overarching objective of this thesis was to examine the potential impacts of crewing on the decision to use TASER by the Police Service of England and Wales (PSEW), and to explore the potential underpinning mechanisms of any such impacts. This objective was achieved by examining a series of smaller research questions that were developed using a self-generating stepwise approach. More specifically, the findings from the Study One were used to focus and inform the research questions for the succeeding study. A brief description of each study is presented below along with their associated research questions.

1.3.1 Study One: The Systematic Literature Review

Study One aimed to gather the extant literature regarding the impact of officer crewing on the use of TASER by the PSEW in order to identify common themes and establish gaps or limitations in the current knowledgebase regarding the relationship between the two concepts. The rationale for the systematic review was to help refine and direct research questions (Petticrew & Roberts, 2008); and, as poetically articulated by Isaac Asimov in 1964:

> *"There is not a discovery in science, however revolutionary, however sparkling with insight, that does not arise out of what went before"* (Asimov, 1964, p.7).

Though one can never know what one does not know, carefully and systematically searching the current evidence base is a prudent step to take before embarking on any primary research. Given that the principal objective of this thesis was to explore the potential impact of single-crewing on the decision to use TASER, and the aim of the systematic review was to gather and evaluate the existing literature to address the following question:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*

A second research question was devised in order to identify potential mediators, moderators, covariates, and/or confounding variables that should be considered when designing Study Two:

- ***Research Question Two:*** *What other factors are known to be associated with, or effect the decision to use, TASER?*

1.3.2 Study Two: The Diary Study

The aims of Study Two were primarily driven by the findings from Study One, which could not definitively provide an answer to research question one (outlined above) and highlighted a paucity of UK-centric research along with a distinct lack of psychological and biological approaches to the exploration of the relationship between officer crewing and TASER use. As such, research question one was retained for Study Two. Three additional questions were developed to close the gaps in the current knowledgebase by examining decision-making factors that are internal to the officers themselves:

- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Four:*** *If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?*
- ***Research Question Five:*** *Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?*

Study One also discovered that the majority of research that examined the potential relationship between TASER and crewing were primarily quantitative. Though crewing

levels emerged from Hine et al.'s (2018b) qualitative exploration into TASER use by officers (in the form of office subject ratios), they had not specifically sought to examine the impact of officer crewing. As such, the following two research questions were added with the intention of exploring officers' experiences of crewing practices and making use of force decisions to augment the findings from the earlier research questions which focus on behavioural outcomes only:

- ***Research Question Six:*** *How do officers think crewing impacts them, and how they do their job?*
- ***Research Question Seven****: How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

1.4 THESIS OVERVIEW

Chapter Two is concerned with the overarching methodology of the empirical work contained herein and begins by discussing the rationale for selecting pragmatism as the central research paradigm underpinning this thesis and the associated methodologies applied across the two constituent studies. The chapter subsequently describes the research design and data collection methods used for Study One and Study Two in succession; presenting the research questions that the studies seek to address, and the methods by which they seek to do so.

Chapter Three provides a rigorous description of the methods and techniques used for data collection and analysis within Study One. The results of the systematic literature review (Study One) are then presented in detail, providing a synthesis of the currently available evidence regarding the effects of officer crewing practices on the use of TASER with the PSEW, and which other factors are potentially associated with this decision. The chapter concludes by discussing the findings in relation to the research

questions and overall aims of the thesis, before considering the potential implications for current practice and future research.

Chapter Four presents a rigorous description of the methods and techniques used for data collection within Study Two, i.e. the diary study, which aimed to explore the impact of crewing practices on how police officers think and feel, and, in what manner this might relate to the factors that drive the decision to use TASER. Due to the complicated and multi-staged approach utilised by the diary study, particular attention is paid to the research questions, study design, sampling strategy, study procedure, participant management, study materials, and analytical approaches. Data cleaning strategies are also discussed within this chapter and are followed by a description of response rates and participant demographics.

Chapter Five delivers a comprehensive description of the quantitative results from the diary study; starting with the descriptive results fromn the three distinct data collection stages, followed by an in-depth account of the findings from a battery of exploratory inferential analyses, and concluding with a summary of the resulting evidence. Similarly, Chapter Six presents a detailed account of the qualitative results from five focal areas of enquiry before concluding with a summary of the key findings.

Chapter Seven considers the results from Chapter Five and Six together, discussing them in relation to the research questions associated with Study Two and the overall aims of the diary study. Given the pragmatic approach adopted herein these empirical works, this chapter pays particular attention to potential implications for policing policy and practice, as well as the strengths and limitations of Study Two.

The final chapter, Chapter Eight, is a discussion of the main findings from the two studies that comprise this thesis in light of the overarching thesis aims, and the wider literature within which it sits. Theoretical and applied contributions to the extant

knowledge are laid bare, key points of originality are identified, and directions for future research are outlined before ending with a concise conclusion.

CHAPTER TWO: RESEARCH METHODOLOGY

This chapter describes the methodology and method for the two separate studies that comprise this thesis. After discussing the central research paradigm that underpins the methodological approach across these studies, the research design and data collection methods for each study are presented sequentially. Given that a self-generating stepwise approach to the development of research questions was adopted, for each of the two studies, the reader is first provided with a rationale for the research questions that the study seeks to address, and the method by which they seek to do so; followed by a detailed description of the study method before concluding with an examination of any key considerations relevant to the study design.

2.1 THE RESEARCH PARADIGM

2.1.1 The extant literature

The term 'research paradigm,' has been described in numerous ways over the past few decades (Kivunja & Kuyini, 2017; Mackenzie & Knipe, 2006; Morgan, 2007), with some applying the term to describe an all-compassing 'worldview' held by the researcher; whilst others use it to conceptualise the epistemological stance of the research, to describe a set of shared beliefs within a specific field of research, to model illustrations that serve as "exemplars" for how research is done in a given field (Morgan, 2007). The most common usage of the term within the field of Social Science, however, is it to describe the epistemological and ontological framework being used to study the phenomenon in question (Morgan, 2007). As such, this is the description adopted and utilised by this thesis. However, given that the ontological and epistemological stance of a researcher exerts significant influence over the development of their research questions and the methodological approaches used to answer them, these will also be discussed.

TASER use within the Police Service of England and Wales (PSEW) is a relatively under-researched phenomenon and few of the existing studies have overtly described or defined the overarching theoretical perspective, or research paradigm, used to guide their explorations. However, those that have, seem to examine this particular phenomenon predominantly through a sociological lens (please see the results from Study One in Chapter Three for more information).

Actor Network Theory, for example, has previously been used to explore TASER use (Dymond, 2016) and is based on the understanding that nothing exists in isolation, and all things within the social and natural world sit within a constantly shifting network of relationships between 'actors'. The term 'actors' in this theoretical framework constitutes anything and everything that may affect the production of knowledge including (but not limited to); the social, organisational, and institutional context in which the research is being carried out; the core beliefs and background assumptions of the researcher; the research methodology; the measurements being used; the instruments and tools being utilised, and environment in which they are being used. A group of actors are considered to be part of a network when the relationships between them are stable enough to determine the place and function of the actors within the network (Detel, 2001). Given that the approach purports that scientific knowledge is assembled within various 'actor networks' this approach can be located within a social constructivist paradigm; which assumes there to be no objective external reality but that instead, there are multiple potential realities that are socially constructed and that *context* is the key in the systematic pursuit of knowledge and understanding (Detel, 2001). Other sociological theories used to explore the relationship between TASER use and crewing pattern include consensus theory (Dymond, 2018), focal concerns theory (Crow & Adrion, 2011), prospect theory (Escalante, 2020), and conflict theory (Delone & Thompson, 2009).

The remainder of the studies examining the relationship between crewing and TASER use, however, did not overtly describe or define the paradigm within which their research was couched (Bishopp et al., 2015; Boehme et al., 2021; Brandl & Stroshine, 2017; den Heyer, 2020; Gau et al., 2010; Hine et al., 2018b; Kuzik, 2019; Lin & Jones, 2010; Mesloh et al., 2005; Quinton et al., 2020; Ready & White, 2011; Sierra-Arévalo, 2019; Sousa et al., 2010; Thomas et al., 2010; White & Ready, 2007). These studies typically also used methodologies that are traditionally aligned with the scientific method (systematic observation and experimentation using quantitative approaches), and as such, one could potentially argue that these papers have taken a more positivist approach. Contrary to social constructivism, positivist paradigms assume there to be an objective and external 'truth' or reality that can be empirically observed (Kivunja & Kuyini, 2017; Mackenzie & Knipe, 2006; Park et al., 2020; Ponterotto, 2005). Research located within a positivist approach tend to focus on the verification (or nullification) of an a priori hypotheses through the search for causal relationships between variables.

This thesis, however, will not be located within either of these research paradigms. Rather, an integrative and practical approach that sits somewhere between the positivist and constructivist perspectives – pragmatism – was adopted.

2.1.2 Conceptualising the research paradigm of pragmatism

What is pragmatism?

Pragmatism, as a philosophical tradition, was developed in the 1800s by Charles Sanders Peirce (1839–1914) and considers knowledge of the world to be inseparable from our own agency within it (Legg & Hookway, 2020). More specifically, this particular paradigm originally labelled metaphysical considerations – such as the ontological perspective of 'truth' and 'reality' – as '*more curious than useful,'* (Peirce,

1878, p. 32). The crux of this belief is based in the assertion that unless changing the ontological stance (e.g. from realism to relativism) would result in a meaningful shift in practical outcomes, then the ontological stance is, for all intents and purposes, irrelevant. This unique stance towards ontology and epistemology has resulted in the pragmatic tradition focussing on real-world problem solving and "what works," rather than using assumptions about reality and the nature of knowledge to drive research (Creswell & Creswell, 2020; Kivunja & Kuyini, 2017; Shannon-Baker, 2016). This orientation towards action may be one of the reasons that the pragmatic paradigm is often characterised by the creation of shared meaning-making in order to create practical solutions to social problems (Shannon-Baker, 2016).

In essence, pragmatism is not committed to any one type of ontology, epistemology, nor methodology, and seeks to utilise the best approaches and methods for the situation at hand (Creswell & Creswell, 2020; Kivunja & Kuyini, 2017; Shannon-Baker, 2016). This means that the pragmatic researcher is freed from the methodological constraints typically associated with one or another ontological framework and can view the truth as both objective *and* subjective. For example, the pragmatist paradigm allows a researcher to maintain both objectivity in data collection and analysis, and subjectivity in their own reflections about the research and their interpretation (Shannon-Baker, 2016).

Why choose pragmatism?

Overall, this thesis has chosen a pragmatic research paradigm for the following three reasons: The focus on practical import of the research, the flexibility of ontological locus, and the methodological freedom associated with this particular research paradigm. Each of these will be explored in more detail below.

Focus on practical import: Though the overarching objective of this thesis is to examine the potential impact of crewing on the decision to use TASER by the PSEW;

the underlying driver for such exploration is to help inform practical and operational decision-making within the PSEW. As such, the focus of the pragmatic paradigm on 'what works,' and the assignment of value based on practical outcomes was considered to be a good fit with the thesis aims and reflective of the '*highly pragmatic nature of policing*' itself (Wood et al., 2018, p.154).

Flexibility of ontological locus: Although some scholars consider the lack of commitment to one or another ontological doctrine to be a core criticism of the pragmatic paradigm (Maarouf, 2019), one could also consider this to be one of the paradigm's key strengths. The wild and varied beauty of the universe and all that sits within it cannot be viewed in absolute unity and nor, in the opinion of the author, can it necessarily be explained through one ontological perspective alone. Ontological domains are vast and varied and apply to a range of subject matters: From beliefs to knowledge, Mathematics to morals, the concrete to the abstract, and everything inbetween. Given the breadth and scope of ontology, it is perfectly within the realms of possibility that an individual might subscribe to one ontological viewpoint within one domain but endorse the opposite doctrine in another. Take positions over concrete versus abstract objects for example. It is possible that an individual might take a realist stance in relation to the existence of concrete objects from within the physical world (such as people and equipment), meaning that they are considered to exist independently of an observer's knowledge or thought – i.e. that there is an 'objective truth' that can be discovered; but a relativist stance to abstract objects (such as moral judgements), meaning that they are believed to only exist relative to an observer and the context within which they sit, i.e. that there is no one single reality, but that there may be multiple 'subjective truths.' By allowing a researcher a level of duality in their ontological locus, it provides them with the scope to examine broader research questions that span ontological domains, and to take wider contextual issues into

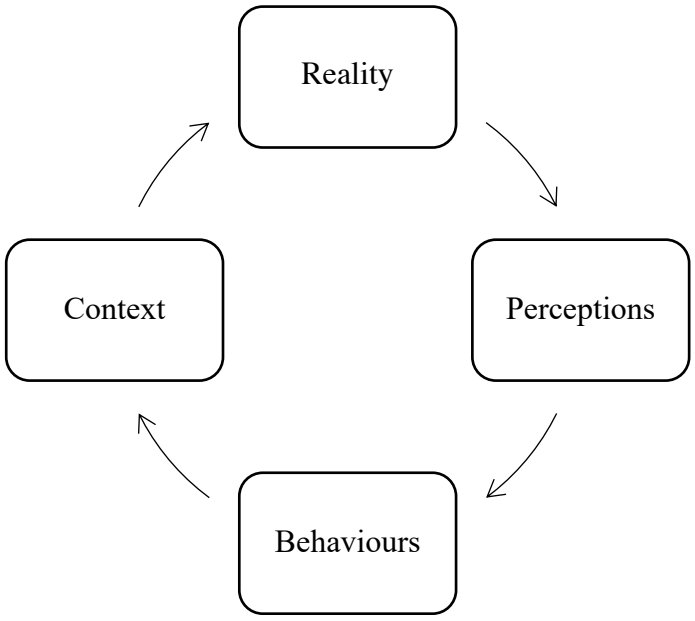
account. For example, within the current thesis, a realist approach could be taken towards the existence and physiological effects of TASER, but a relativist view towards the decision-making and individual judgements of threat and risk made by police officers.

A flexible ontological locus does not just allow for variance across ontological domains (as described above), but it also allows for both static and dynamic dual locus perspectives. For example, in some instances, it could be perfectly reasonable to assert that reality is both an objective and subjective *at the same time*; and if this is the case, surely it is vital to understand both the objective and subjective truths. To illustrate this point within the context of this thesis, let us examine an example of police use of force. If an officer attends an emergency call and upon arrival sees a member of the public threatening others with a knife, they may take appropriate physical action to neutralise the threat (perhaps including the use of TASER). However, once the subject is restrained and the officers can inspect the weapon, they could discover the knife to be nothing more than a harmless but realistic looking replica. Although the objective reality in the example above may be that the subject was not armed with a weapon, the officer's honestly held belief (i.e. their subjective reality) was that the subject *was* armed with a weapon and as such, both realities are extremely important for understanding exactly what happened and why. However, it is also possible that in some instances, that reality can be both 'objective' and 'subjective' as part of a *dynamic and sequential interaction*. One example of this is described by Maarouf's Reality Cycle (Maarouf, 2019), which posits that although only one reality exists in a particular context at any given point in time, reality depends on context to exist and continue existing, which means that "*changing the context changes the reality and the existence of multiple contexts means the existence of multiple realities."*(p. 7). More specifically, according to this model of reality, the external 'truth' is perceived by social actors

differently and their actions (and reactions) are controlled by their own perception of reality. The interactions among those differing behaviours and interpretation can then, subsequently, drive change and construct a new context over time, causing a new reality to emerge.

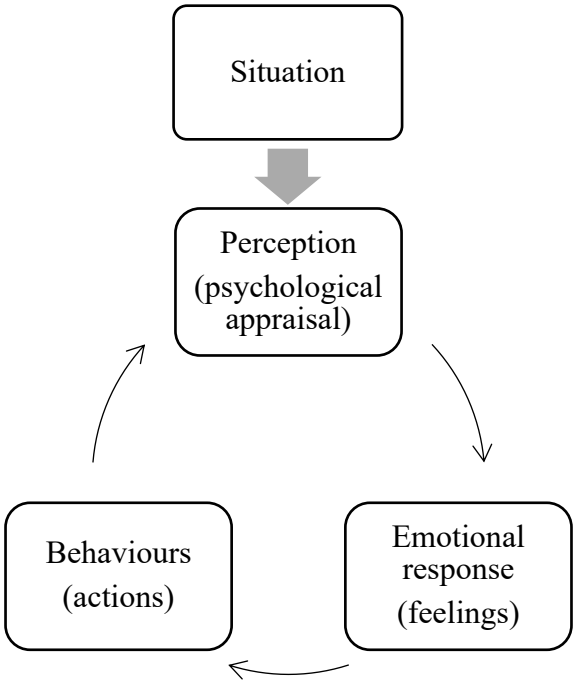
One could consider the slow roll-out of TASER across England and Wales (as described in Chapter One) an example of how the reality cycle may work in practice. When TASER was first introduced, its use was limited to very specific contexts (i.e. within operations where firearms authority had been granted; Independent Police Complaints Commission, 2014), and as such the frequency with which it was used appropriately within the context of UK policing – an arguably 'objective' reality – was low. But, over time, perceptions of the use of TASER shifted – resulting in a relaxation of these restrictions and the continued roll out of TASER across the 43 police forces in England and Wales. In turn, this more permissive context slowly changed what was considered to be an appropriate use of TASER (i.e. in what circumstances TASER could and should be used).

Figure 2.1 *The Reality Cycle by Maarouf (2019)*



Although Maarouf (2019) conceptualised this model as a slow moving cyclical change overtime with no direct impact on reality, one could argue that in some instances a similar premise could be applied to rapidly changing dynamics at an individual level. Consider, for example, the classic psycho-social intervention of cognitive behavioural therapy (CBT). This particular intervention is built around a fundamental belief that an individual's thoughts and feelings directly affect their behaviour, and that these '*moment-to-moment appraisals or interpretations of current experience are shaped by more enduring beliefs that we hold about ourselves, other people and the world around us'* (Dudley & Kuyken, 2013, p. 20). A simplified characterisation of the classic CBT model illustrates that the psychological appraisal of a situation has a direct impact on an individual's emotional response and ultimately, their subsequent behaviour (please see Figure 2.2).

Figure 2.2 *A Simplified Characterisation of the Classic CBT Model*

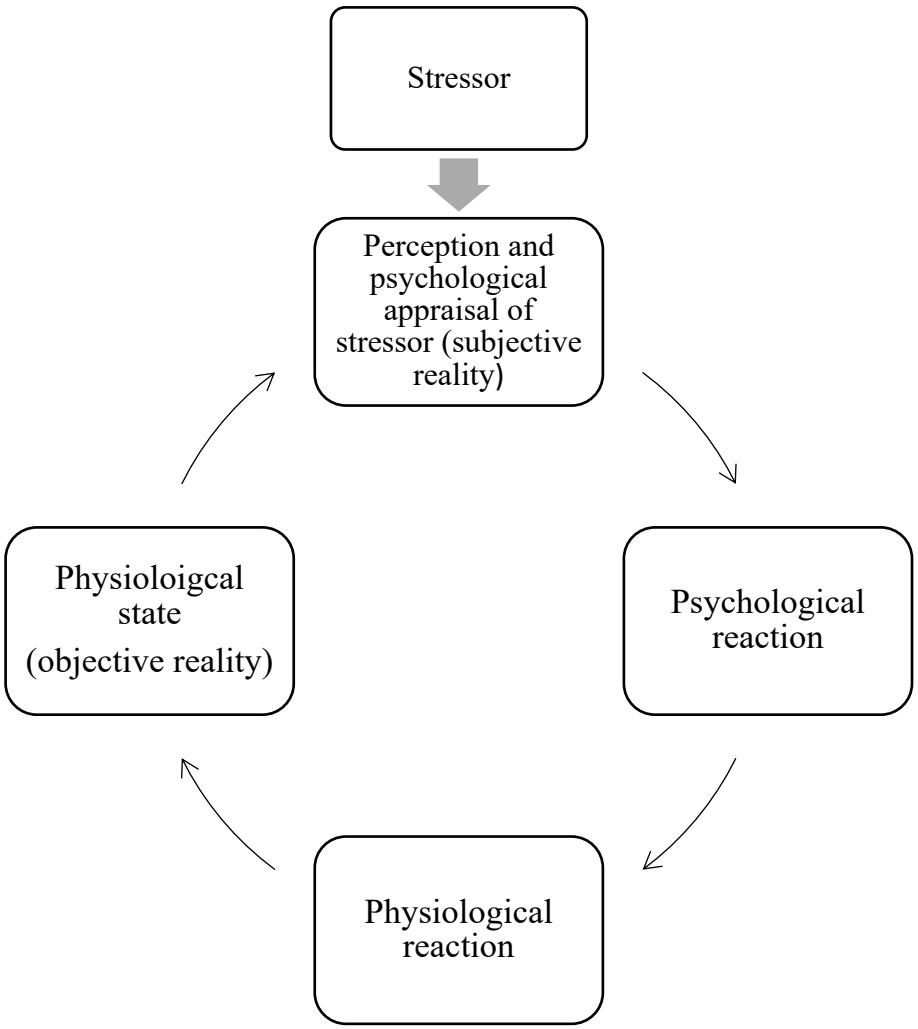


To illustrate this point within the context of this thesis, let us examine the relationship between the objective and subjective 'truth' using the relational model of

stress (please see Chapter One for more details). If one considered the production and existence of a physiological stress reaction (characterised by a release of cortisol) as an 'objective' reality and the production of the cortisol is controlled by the psychological appraisal of an external stressor – than the dynamic and inextricable nature of 'objective' and 'subjective' reality is an unavoidable conclusion.

To demonstrate this further, and perhaps with more clarity, let us use the same vignette previously used to illustrate static dual realities: i.e. an officer is called to an emergency situation where a member of the public is threatening others with a realistic looking imitation knife. In this example, the mere presence of the imitation knife cannot directly cause a change to the officer's physiological, and arguably 'objective,' state. For the imitation knife to affect the officer's physiological state, the officer must first be aware of its presence; they then must interpret the presence of the imitation knife, and the subsequent *meaning* of its presence, in relation to the broader context. If the officer is not aware of the imitation knife, or if they have correctly identified it as a facsimile, their appraisal of the situation may not result in psychological arousal high enough to trigger the physiological stress response. However, if the officer mistakes the imitation knife for a real knife and interprets its presence in the situation as being high risk – their 'subjective' reality may trigger a psychological stress reaction which could, in turn, trigger a physiological stress reaction; changing the 'objective' reality of the officer's physiological state from 'un-stressed' to 'stressed' (please see Figure 2.3).

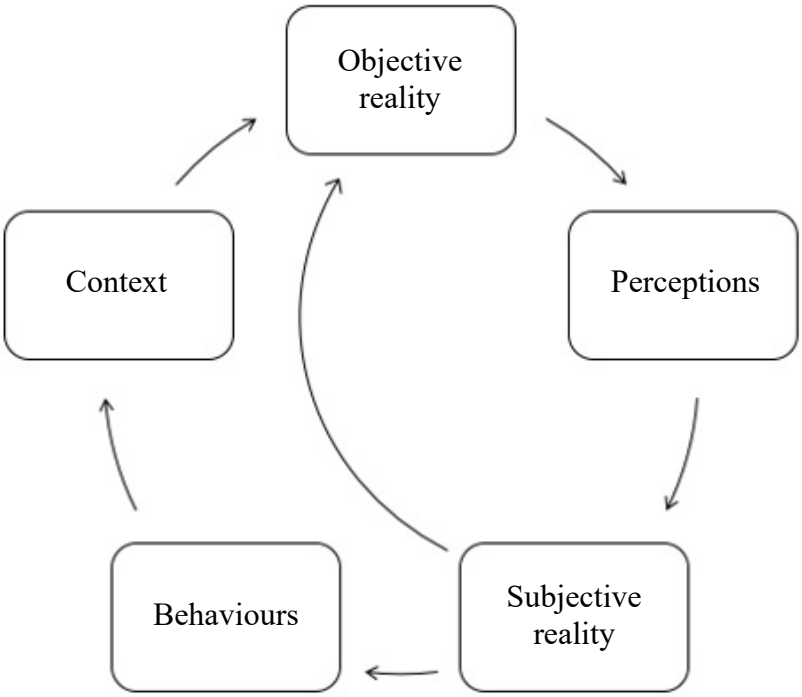
Figure 2.3 *The Dynamic Reality Cycle: As Applied to the Relational Stress Model*



Given the above, an updated version of Maarouf's (2019) reality cycle is proposed here, dubbed the *dynamic reality cycle,* which can account for the dynamic nature between objective and subjective reality described above and thus can be used to explain shifts in reality caused by both slow and rapid contextual change (Figure 2.4). Whilst some authors consider the pragmatist paradigm to embody both an 'anything goes' attitude and wilful ontological evasion (Maarouf, 2019), it could be argued that this particular paradigm can, when utilised appropriately, encourage deeper ontological consideration. By allowing static and dynamic dual locus perspectives, such as those outlined above, it provides

researchers with an appropriate framework to explore topics that cross ontological domains and/or span varying timeframes more systematically and with greater thoughtfulness.

Figure 2.4 *The Dynamic Reality Cycle: A Dynamic Dual Ontological Perspective*



Methodological freedom: The ontological flexibility described above not only allows a researcher to accept and utilise different ontologies within a single framework, it subsequently also allows the researcher to take a multi-epistemological stand-point. More specifically, this paradigm allows the researcher to assert that true knowledge can – depending on the ontological perspective taken towards the phenomenon in question – be drawn from more than one epistemological stance. For example, if a static dual ontological perspective is being taken (as described in the section above), where the researcher believes that there is an objective *and* subjective reality, a researcher could take both a positivist view and a constructionist view towards knowledge. This free-

form and integrative expression of epistemology provides the methodological freedom for a researcher to use and combine the methods, techniques and procedures that are best placed to accomplish the research aims.

Overall, the methodological freedom offered by the ontological and epistemological flexibility of the pragmatic paradigm not only enables the notably broad scope of this thesis to be considered as a whole, but it also draws together the previous polarised approaches used within previous TASER research (please see Chapter Three) and the action-orientated nature of the pragmatic maxim (i.e. "what works") helps to maintain the focus of the research on practical outcomes.

2.2 METHODOLOGY

2.2.1 Study One: The Systematic Literature Review

As discussed in Chapter One, the main aims of Study One was to gather the extant literature regarding the impact of officer crewing levels on the use of TASER and to identify other potential mediators, moderators, covariates, and/or confounding variables. This was to identify common themes, and establish gaps or limitations in the current knowledgebase regarding the relationship between the two variables, by focussing on the following two research questions:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*
- ***Research Question Two:*** *What other factors are known to be associated with, or effect the decision to use, TASER?*

A systematic review was chosen to ensure the comprehensive identification, appraisal and synthesis of all relevant studies in a clear, transparent and repeatable way (Petticrew & Roberts, 2008). The use of the systematic review began in the 1970s as a tool for medical sciences to evaluate the efficacy of health-care interventions. Since

then, systematic reviews have become renowned for being a more rigorous and transparent form of literature review than the traditional narrative style (Mallett et al., 2012). The notoriety of the systematic review has, over recent years, encouraged a wide range of other disciplines to adopt their use (Petticrew, 2001). This popularity may well have stemmed from the resulting rigour, transparency and replicability of the results that stem from the rigid process followed by all such reviews. Or more specifically, the 'systematic' element of any the systematic literature review.

This systematic literature review followed the process outlined below, which was based on the steps identified in Mallett et al. (2012):

- Research questions were identified and deconstructed.
- A search protocol was produced, including definitions of terms, search strings, the search strategy, inclusion and exclusion criteria, and the approach to synthesis that the review would take (please see Appendix 3).
- The systematic search was conducted, and studies were retrieved.
- All retrieved studies were screened on relevance of title, abstract and full text by using the inclusion and exclusion criteria listed in the research protocol, and duplicates were removed.
- All remaining studies were characterised on a range of factors, including study quality, outcomes, research design and type of analysis.
- The final stage was to extract the relevant data and synthesise the evidence.

2.2.2 Study Two: The Diary Study

As previously discussed in Chapter One, the main aims of Study Two were driven by the findings from Study One, which highlighted a paucity of UK-centric research and distinct lack of psychological and biological approaches to the exploration of the relationship between officer crewing and TASER use. As Study One could not definitively answer the first research question (i.e. *Do crewing levels affect the*

frequency and type of TASER use by police officers?), Study Two aimed to close the gaps in the knowledge base by examining both *internal* and *external* decision-making factors related to TASER use and crewing within UK policing. More specifically, this study focussed on answering research question one from Study One, and the following additional research questions:

- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Four:*** *If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?*
- ***Research Question Five:*** *Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?*
- ***Research Question Six:*** *How do officers think crewing impacts them, and how they do their job?*
- ***Research Question Seven****: How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

A mixed methods quasi-experimental field study was selected to explore both the internal and external factors driving officers in their decision to use TASER. In line with the pragmatic paradigm adopted by this thesis, a mixed methods approach was used so that the researcher could align the design of Study Two with the techniques and methods that would best serve the research questions it intended to explore; whilst a quasi-experimental field design was selected over a more robust experimental design (e.g. a randomised control trial) due to fewer practical, ethical and organisational barriers, and the enhanced ecological validity associated with this particular methodology.

Research questions one, four and five were explored primarily via quantitative methods as these deal with objective and observable variables (e.g. whether TASER was used or not, the number of officers present, an officer's gender etc.); whilst research questions six and seven were explored predominantly via qualitative methods as these deal with a subject matter that is much more subjective in nature and more difficult to directly observe. For example, although the outcome of an officer's decision can be observed (e.g. the type of force used by the officer), the decision-making process used by the officer to determine which type of force they should use cannot. Given the relational model of stress being used by this thesis (please see Chapter One for more information) and the dual ontological perspective being taken regarding this psycho-biological construct (please see the beginning of this chapter) research question three was explored via qualitative and quantitative methods.

A structured diary study with nested qualitative elements was chosen as the method by which to gather the data described above. This is where participants are asked to record their experiences, behaviour, and/or circumstances within their natural settings, in or close to real time, and on repeated occasions over a defined period. This particular method was chosen over cross-sectional surveys and use-of-force forms (as used in much of the extant literature) due to several distinct advantages. Not only do diary studies allow the rapid collection of both quantitative and qualitative data at both the individual and incident-level, but they also provide the opportunity to gather data from officers directly and from within their natural working context. These particular design characteristics help to reduce recall bias by enabling participants to record their experiences sooner after the event, and it enables the examination of inter- and intra-individual differences as variable factors (both internal and external) that can be tracked over time (Bolger et al., 2003; Parkinson et al., 1995).

The original sampling strategy for the diary study involved sending an email invitation to a random sample of three thousand police officers via the Police Federation of England and Wales' (PFEW) National Member Database (a database containing the contact details for approx. 130,000 thousand rank and file members of the PFEW), with the aim of achieving a 10-15% take-up rate and thus resulting in 300-450 participants.

However, shortly before the email invitations were due to be circulated in early 2019, the PFEW suffered a string of serious cyber-attacks at its Surrey Headquarters; [8] disabling access to their National Member Database and disrupting all internal streams of communication. Participant recruitment for the diary study was placed on hold in the hope that the damage sustained by the PFEW IT systems was minor and could be rectified summarily. Regrettably, it became apparent by April 2019 that a significant amount of work would be required to restore the PFEW IT systems to their original functionality and, as such, the PFEW National Member Database would no longer be a viable mechanism with which to recruit potential participants for the diary study.

This unfortunate series of events forced a last-minute redesign of the sampling strategy and limited the available participant recruitment pathways. Although a variety of recruitment methods were utilised and an exponential non-discriminative snowball approach was taken to ensure maximum reach to the potential participant pool (please see Chapter Four, Section 4.2.2), sign-up rates were not as high as hoped for and it was not possible to recruit the number of participants originally desired. The consequent reduction in sample size necessitated a move away from the planned multivariate approach to data analyses (such as structural equation modelling and hierarchical regression) that would have enabled and controlled for the use of nested variables, but also resulted in consistently underpowered analyses and extremely low rates in regard to

[8] Please see the PFEW website here for more information: https://www.polfed.org/wilts/news/2019/cyber-attacks-impact-federation-it-update/

some of the target phenomenon (e.g. TASER use; please see Chapter Four, Section 4.2.6 for more detail). Although the sample size is a significant limitation to the diary study, in the spirit of exploration, expediency and narrative ease, the remaining text will treat the results as though the sample was not prohibitive on the understanding that the reader is aware of these shortcomings and in the hope that future research will endeavour to address them.

CHAPTER THREE: THE SYSTEMATIC LITERATURE REVIEW

This chapter will start with a brief introduction to set the scene and illustrate the context within which this thesis, and Study One in particular, sits; followed by a rigorous description of the methods and techniques used for data collection and analysis. The results of the systematic literature review (Study One) will then be presented, before discussing the potential implications of these findings and outlining any conclusions that can be drawn from the evidence.

3.1 INTRODUCTION

In response to the unprecedented 18% real-term budget cuts between 2010 and 2015 (National Audit Office, 2015), the number of police officers in England and Wales fell by 15% between 2009 and 2018; equating to the loss of over 21,000 police officers (Home Office, 2020d). Though the number of officers in England and Wales has increased slightly between 2018 and 2020, the total number of officers is still far below those recorded before the austerity programme was initiated in 2010. As officer numbers reduced and demands increased, the Police Service of England and Wales (PSEW) was placed under significant stress (HMICFRS, 2018) and forces were required to find ways in which to stretch their ever-thinning resources, such as expanding the use of single-crewing.

Though the merits and demerits of single-crewing have been a topic of hot debate within the policing sector for many decades, there is currently little academic research to help evaluate the potential impacts of such practices within the UK (please see Chapter One for more information). Although some authors have argued in favour of single-crewing within specific contexts (Boydstun et al., 1977; Chelst, 1981; Green & Kolesar, 1984; Kaplan, 1979; Kessler, 1985; McKenzie & Whitehouse, 1995; Coupe & Blake, 2005), there is also evidence to suggest that single-crewing has the potential to inhibit both officer safety and performance – including officer decision-making

(Highways Agency, 2011a, 2011b; Houdmont et al., 2019; Quinton et al. 2020; see Chapter One).

As police officers routinely respond to emergency situations that frequently include unpredictable and highly emotive contexts; often involving members of the public that are '*vulnerable and/or volatile*' (Wood et al., 2018 p. 184), it is critical to examine any operational issues that might affect their ability to make quick and competent decisions. Especially those that affect the public directly, such as the use of TASER.

The English and Welsh policing model is governed by an overarching philosophy referred to as 'policing with consent,' which, amongst other things, considers police powers to be derived from the co-operation and approval of the general public (College of Policing, 2014a). These principles underpin and guide approved police practice within England and Wales, including their use of force; which is required to only be used when deemed necessary, proportionate, reasonable and legal (College of Policing, 2014a). Perhaps a complicated set of parameters to consider within a split second, especially when the decision to use force includes multiple options and officers have access to a multitude of tools, such as irritant sprays, batons, and TASER.

As discussed in Chapter One, the decision to use TASER, and to what extent, has not been the object of much scrutiny within the UK academic field thus far; despite the rising rates of frequency with which they are used (Independent Police Complaints Commission, 2014). Not only is TASER an '*agonising*' method of gaining control over a subject or situation (Dymond, 2021, p.1), it can also result in a number of serious adverse health impacts including puncture wounds, fall injuries, and cardiac effects for those with existing medical conditions (Childers et al., 2020; Kroll et al., 2016 - please see Chapter One for more details). Moreover, TASER use can cause cognitive

impairment for up to an hour after exposure (Kane & White, 2015); which could have serious implications in regard to whether a subject can successfully follow subsequent police commands, and understand their rights when cautioned. Given the seriousness of these consequences and the ongoing swell in usage, it is vital to expand our understanding of how, why, and in what circumstances, officers use TASER.

In light of the potential for single-crewing to impact on an officer's decision-making and the current dearth of knowledge surrounding the use of TASER within the PSEW, it is clear that additional research is needed to extend our current understanding and help inform public policy and police procedures.

As discussed in Chapters One and Two, the main aims of the systematic literature review were to gather the extant literature regarding the impact of officer crewing levels on the use of TASER to identify common themes and establish gaps or limitations in the current knowledgebase regarding the relationship between the two concepts. To date, there has not yet been a published review on the topic at hand, and given that one of the key advantages of systematic reviews is their ability to help refine and direct research questions (Petticrew & Roberts, 2008), it was prudent to conduct a systematic review on the topic before conducting any primary research. As such, this systematic review aimed to provide a synthesis of the currently available research on the effects of officer crewing levels on the decision to use TASER within the PSEW. More specifically, Study One was designed to answer the research question listed below and establish what, if any, impact crewing practices have on the decision to use TASER within English and Welsh policing:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*

Given that one of the main aims of conducting the systematic literature review was to help further refine and guide the development of the research questions herein, and thus

the development and design of any subsequent studies, a second research question was devised to identify other factors that might act as potential mediators, moderators, covariates, and/or confounders on the causal pathway being explored above:

- ***Research Question Two:*** *What other factors are known to be associated with, or effect the decision to use, TASER?*

3.2 METHODS

3.2.1 Search process

The protocol for this systematic literature review was registered on PROSPERO -International prospective register of systematic reviews (registration number: CRD42019151366). A copy of this protocol can be found in Appendix 3 and is based on PRISMA-P checklist (Shamseer et al., 2015).

A comprehensive literature search of several psychological and biomedical bibliographic databases was conducted to identify published and unpublished research, specifically: PROSPERO, The Cochrane Library, The Campbell Collaboration online library, PsycArticles, PsycINFO, PsycEXTRA, Scopus, ProQuest Dissertations & Theses Global, and the College of Policing's National Policing Library.

To avoid duplication, the first logical step in conducting a systematic review is to search for existing reviews in relation to the research questions. As such, PROSPERO, the Cochrane Library, and the Campbell Collaboration's online library of systematic reviews were the first databases to be searched. A total of 125 records were found using the systematic search process outlined in the systematic review protocol, however none remained after reviewing the titles. As no review had been conducted on this topic at the time the preliminary searches were conducted, a full literature search was performed in December 2019 via the remaining databases. A supplementary search was conducted in October 2021 for the years 2019-21 to ensure the review could

account for more recent publications. The records included in this review are all articles available up to (and including) October 2021, as well as a single organisational report that was identified by happenstance via a professional contact within the Police Federation of England and Wales (i.e. Quinton et al., 2020).

Search terms for the four key concepts are listed in Table 3.1, and a staged matrix design was used to combine search terms to ensure a robust search. Stage one of the matrix search searched for all four key concepts together; Stage two searched for all possible combinations of three concepts; Stage three searched for all possible combinations of two concepts, and finally; Stage four searched the reference list of all identified reports and articles for additional studies that fit the eligibility criteria.

Please see Appendix 4 for full matrix tables and Appendix 5 for a full list of search strings for each search in each database and the number of records returned for each search in each database.

The PRISMA diagram (Figure 3.1) details the results of the literature search, screening, and selection processes. In total the initial searches identified 14,447 published and unpublished sources. After removal of duplicates, 13,399 articles remained for screening.

Titles of the remaining 13,399 sources retrieved were screened against the exclusion criteria listed in Table 3.2. Records were retained if they were either identified as being relevant, or there was insufficient information within the title to determine whether the record met any of the exclusion criteria.

Table 3.1 *Systematic Literature Review: Key Concepts and Related Search Terms*

Key Concepts		Search Terms
1.	Crewing	Single-crew*, "Lone working", "Working alone", "Single crew", "Single-crewing", "Single patrol", "Single-patrol", "Crewing level", "Crewing", "Crewing-level", "Crew*"
2.	Decision	Decision, Choice, Choos*, Decid*, Elect, Opt, "Decision making"
3.	TASER	TASER, "Less-lethal-force", "Less-lethal force", "Less lethal force", "Non-lethal-force", "Non-lethal force", "Non lethal force", "Non-lethal-alternatives", "Non-lethal alternatives", "Non lethal alternatives", "Conducted electrical weapon", "Conducted energy device", "Conductive electrical weapon," "Conductive energy device"[9]
4.	Police	Polic*, Officer*, Constable*

Abstracts of the remaining 470 records were then screened against the same exclusion criteria. Records were retained if they were either identified as being relevant, or if there was insufficient information within the abstract to determine whether the record violated any of the exclusion criteria. This resulted in 82 records which were then subjected to a full text assessment for eligibility against the same exclusion criteria listed in Table 3.2, leaving 15 articles.

Table 3.2 *Systematic Literature Review: Exclusion Criteria*

1. Records that were not original research (e.g. opinion papers, book reviews).
2. Records that failed to address any of the key research questions in any detail.

[9] Please note, the last two search terms listed under key concept three (i.e., TASER) were identified and included after the search protocol was developed and submitted to PROSPERO.

Table 3.2 *Systematic Literature Review: Exclusion Criteria*

3.	Records focusing on populations other than the policing population of England and Wales, or populations with similar principles (e.g. Western policing populations).
4.	Records in any language other than English.

The reference lists from the resulting 15 articles were then reviewed to identify further published literature and/or government and institutional reports: yielding an additional 78 records. After removing the duplicates, 41 records were retained for screening. The abstracts of the 41 records were screened which resulted in 15 records which were then subjected to a full text assessment for eligibility against the same exclusion criteria listed in Table 3.2 - leaving five articles.

Combining these results with those of search stages one through three, ultimately resulted in a final sample of 20 records. These records form the basis of this review and are listed in Table 3.3 (records that were identified during the supplementary searches in 2021 are indicated by an asterisk at the beginning of the reference).

Table 3.3 *Systematic Literature Review: Final Review Sample*

1	Bishopp, S. A., Klinger, D. A., & Morris, R. G. (2015). An examination of the effect of a policy change on police use of TASERs. *Criminal Justice Policy Review, 26* (7), 727-746. https://doi.org/10.1177/0887403414543558
2	*Boehme, H. M., Martin, A., & Kaminski, R. J. (2021). Evaluating the 4th Circuit's decision to limit officer use of Tasers: a descriptive and time-series approach. *Police Practice and Research, 1-16*. https://doi.org/10.1080/15614263.2021.1982713

Table 3.3 *Systematic Literature Review: Final Review Sample*

3	Brandl, S. G., & Stroshine, M. S. (2017). Oleoresin Capsicum Spray and TASERs: A Comparison of Factors Predicting Use and Effectiveness. *Criminal Justice Policy Review*, *28*(3), 279–306. https://doi.org/10.1177/0887403415578732
4	Crow, M. S., & Adrion, B. (2011). Focal concerns and police use of force: Examining the factors associated with taser use. *Police Quarterly*, *14*(4), 366–387. https://doi.org/10.1177/1098611111423740
5	DeLone, G. J., & Thompson, L. M. (2009). The Application and Use of TASERs by a Midwestern Police Agency. *International Journal of Police Science & Management*, *11*(4), 414–428. https://doi.org/10.1350/ijps.2009.11.4.139
6	* den Heyer, G. (2020). An analysis of the effectiveness and use by the New Zealand Police of the TASER from 2009 to 2017. *International Journal of police science & management, 22*(4), 356-365. https://doi.org/10.1177/1461355720947779
7	Dymond, A. (2016). *Police use of taser in England and Wales, 2004-2014* [Doctoral thesis, University of Exeter]. In University of Exeter Repository. https://ore.exeter.ac.uk/repository/bitstream/handle/10871/28097/Dymond%2CA.pdf?sequence=1&isAllowed=y
8	Dymond, A. (2018). 'Taser, Taser'! Exploring factors associated with police use of Taser in England and Wales. *Policing and Society*, *30*(4), 396–411. https://doi.org/10.1080/10439463.2018.1551392

Table 3.3 *Systematic Literature Review: Final Review Sample*

9	* Escalante, G. A. (2020). A Phenomenological Study: Police Officers' Lived Experiences with the Use of CEDs [Doctoral thesis, Walden University, Minnesota]. In Walden Dissertations and Doctoral Studies Collection. https://scholarworks.waldenu.edu/dissertations/8883
10	Gau, J. M., Mosher, C., & Pratt, T. C. (2010). An inquiry into the impact of suspect race on police use of tasers. *Police Quarterly*, *13*(1), 27–48. https://doi.org/10.1177/1098611109357332
11	Hine, K. A., Porter, L. E., Westera, N. J., Alpert, G. P., & Allen, A. (2018). What were they thinking? Factors influencing police recruits' decisions about force. *Policing and Society*, *29*(6), 673–691. https://doi.org/10.1080/10439463.2018.1432612
12	* Kuzik, J. (2019). *Police Use of Force and Officer Injury: A Closer Examination of the Impact of Taser Deployment and Contextual Factors* [Master's thesis, The University of Nevada, Las Vegas]. ProQuest Dissertations and Theses Global. (Publication No. 13812854)
13	Lin, Y. S., & Jones, T. R. (2010). Electronic control devices and use of force outcomes: Incidence and severity of use of force, and frequency of injuries to arrestees and police officers. *Policing: An International Journal of Policing Strategies & Management*, *33*(1), 152–178. https://doi.org/10.1108/13639511011020647

Table 3.3 *Systematic Literature Review: Final Review Sample*

14	Mesloh, C., Henych, M., Hougland, S., & Thompson, F. (2005). TASER and Less Lethal Weapons: An Exploratory Analysis of Deployments and Effectiveness. *Law Enforcement Executive Forum, 5*(5), 67–80. https://iletsbeiforumjournal.com/images/Issues/FreeIssues/ILEEF 2005-5.5.pdf - page=74
15	* Quinton, P., Dymond, A., Boyd, K., & Teers, R. (2020). *Police use of force: Tactics, assaults and safety Exploratory analysis of police recorded data 2017 / 18*. College of Policing. https://assets.college.police.uk/s3fs-public/2020-09/200818-use-of-force-final-report-1.0.pdf
16	Ready, J. T., & White, M. D. (2011). Exploring patterns of taser use by the police: An officer-level analysis. *Journal of Crime and Justice*, *34*(3), 190–204. https://doi.org/10.1080/0735648X.2011.609741 [10]
17	Sierra-Arévalo, M. (2019). Technological Innovation and Police Officers' Understanding and Use of Force. *Law and Society Review*, *53*(2), 420–451. https://doi.org/10.1111/lasr.12383 [11]
18	Sousa, W., Ready, J., & Ault, M. (2010). The impact of TASERs on police use-of-force decisions: Findings from a randomized field-training experiment. *Journal of Experimental Criminology*, *6*(1), 35–55. https://doi.org/10.1007/s11292-010-9089-1

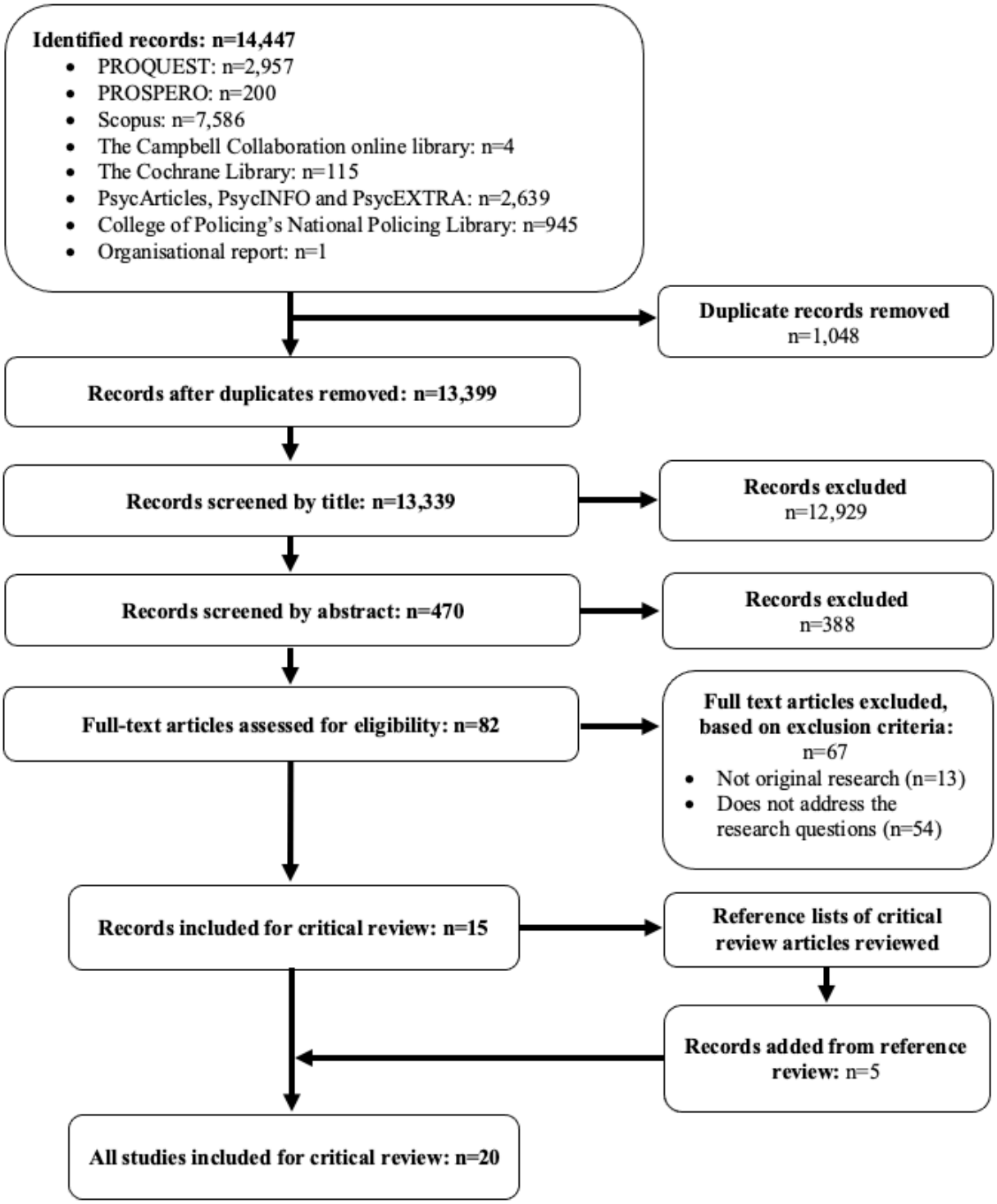
[10] The original article of interest (listed below) was a secondary article summarising the article by Ready & White (2011). As such the article by Ready & White (2011) was retained and the original article returned via searches was excluded: Donner, C. M. (2012). Exploring patterns of TASER use by the police: An officer-level analysis. *Policing: An International Journal of Police Strategies & Management, 35*, 2, 85-91.

[11] Please note – this article appears to be also listed as "Sierra-Arévalo, M. (2018). TASER technology and police officers' understanding and use of force. *Law and Society Review,* 53(2), 420-451."

Table 3.3 *Systematic Literature Review: Final Review Sample*

19	Thomas, K. J., Collins, P. A., & Lovrich, N. P. (2010). Conducted Energy Device Use in Municipal Policing: Results of a National Survey on Policy and Effectiveness Assessments. *Police Quarterly*, *13*(3), 290–315. https://doi.org/10.1177/1098611110373995
20	White, M. D., & Ready, J. (2007). The TASER as a less lethal force alternative: Findings on use and effectiveness in a large metropolitan police agency. *Police Quarterly*, *10*(2), 170–191. https://doi.org/10.1177/1098611106288915

Figure 3.1 *Systematic Literature Review: PRISMA Diagram**



*Adapted from (Moher et al., 2010).

3.2.2 Quality assessment

Although there are numerous available checklists, scales and summary judgements that aim to assess the quality of published evidence; there are currently no singularly recommended processes or tools to do so (Petticrew & Roberts, 2008). Many of the existing tools have emerged from organisations within the health sector, such as the Critical Appraisal Skills Programme (CASP; 2018) the National Institute of Health (NIH; 2016) and the National Institute of Clinical Excellence (NICE; 2012), and have been designed specifically to analyse evidence within the clinical healthcare framework. Although this may not seem inherently problematic, there are often differing trends across disciplines in terms of research design, methodological processes, units of analysis, and potential sources of bias; making the practical application of some of these tools difficult within other settings. As such, some attempts at generating and/or adapting quality assessment process and tools for other disciplinary frameworks have been made; such as the Maryland Scientific Methods Scale, as cited in (Petticrew & Roberts, 2008).

However, given the small pool of literature returns, the aim of utilising these quality assessment tools within the context of this literature review is not to *exclude* low quality studies, but to *evaluate* the quality of the available research to help inform interpretation of the findings. As such, the existing tools will provide adequate evaluative support and the development of a bespoke quality assessment tools is not, in this instance, deemed requisite. As such, several popular tools (or tool sets) were briefly reviewed for context and content before choosing the following three quality appraisal checklists used by NICE in their development of Public Health Guidance (For a copy of the checklists please see Appendix 6):

- **Checklist One:** Quality appraisal checklist for quantitative intervention studies: Designed to be used for randomised controlled trials, case–control studies, cohort studies, controlled before-and-after studies and interrupted time series.[12]
- **Checklist Two:** Quality appraisal checklist for quantitative studies reporting correlations and associations: Designed for correlation studies and other study designs that also report on correlations.[13]
- **Checklist Three:** Quality appraisal checklist for qualitative studies: Designed for focus groups, interviews and other study designs that uses qualitative data to examine the views and experiences of specific target populations.[14]

Firstly, contrary to many other quality assessment tools (such as the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instruments, or the Critical Appraisal Skills Program), the collection of NICE specifically includes a tool intended to evaluate correlational research; an important consideration given that over half of the twenty studies included in this review have a complex correlational design that uses multivariate techniques to explore relationships between the use of TASER and many different potentially associated variables.

Secondly, the collection of checklists from NICE are much more thorough than many of their counter parts as they examine more items and include clearer and more instructive guidance notes on the completion of the checklists.

[12] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-f-quality-appraisal-checklist-quantitative-intervention-studies
[13] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-g-quality-appraisal-checklist-quantitative-studies-reporting-correlations-and
[14] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-qualitative-studies

Finally, both checklists for the quantitative studies are based on the 'Graphical Appraisal Tool for Epidemiological Studies (GATE)' developed by Jackson et al. (2006), allowing a constant approach to quality appraisal across quantitative evidence.

However, this literature review returned a few studies that, due to their non-comparative and descriptive nature, do not naturally fall under the purview of any of these tools. To gain an understanding of the overall quality of the study, these studies have nonetheless been evaluated using the quality appraisal checklist for quantitative intervention studies and the response ‘not applicable’ has been applied to questions that were not relevant due to the nature of the evidence.

A quarter of the papers (n=4) identified via the searches conducted in December 2019 were independently rated by two reviewers, who then discussed and agreed the ratings together. After this, another 20% of papers (n=3), one from each type of quality assessment, were rated independently by the reviewers to ascertain inter-rater reliability. Given that the interrater agreement across papers were found to be moderate or higher (please see Table 3.4), the scores from the primary researcher were retained as the final scores for those three papers and the remaining papers were scored by the primary researcher alone (for interrater reliability calculation tables please see Appendix 7).

Table 3.4 *Systematic Literature Review: Interrater Reliability Scores*

Paper	Kappa	95% CI	Agreement level*
Dymond (2018)	0.59 (p<.000)	(0.331, 0.857)	Moderate
White & Ready (2007)	0.56 (p<.000)	(0.619, 1.000)	Moderate
Hine et al., (2018b)	0.62 (p<.000)	(0.190, 0.928)	Moderate

*(Landis & Koch, 1977).

3.2.3 Data management and synthesis

Data were mined from the review sample using a bespoke data extraction form developed for this thesis, based on the eight categories covered in the Cochrane data collection form for intervention reviews for randomised control trials (The Cochrane Collaboration, 2014). Table 3.5 lists all items included in the bespoke data extraction form against the stem category from the Cochrane Collaboration. For studies that presented several results, only those that are relevant to this review were extracted and included.

Due to the expected heterogeneity of the studies included in this review and feasibility in terms of time-efficiency, a quantitative synthesis/meta-analysis has not been included as part of the present review.

Once data had been extracted from the studies (please see Appendix 8 for the completed data extraction table for all twenty studies), the information contained within the data extraction table was then subject to thematic analysis loosely based on the six-phase method by Braun & Clarke (2006). Thematic analysis was performed so that the reviewer could a) explore any observed heterogeneity (in the sample characteristics, study designs, variables and/or outcomes etc.) to identify and identify gaps in the existing literature, and b) to explore common themes across the studies in line with the primary review question and its subsidiary questions.

Table 3.5 *Systematic Literature Review: Data Extraction Form Items*

Cochrane category	**Item included in bespoke data extraction form**
General Information	Reference
Study eligibility	Sample population (country)
	Review question being addressed

Table 3.5 *Systematic Literature Review: Data Extraction Form Items*

Cochrane category	**Item included in bespoke data extraction form**
Methods	Research Questions
	Type of Study
	Research design and method
Participants	Participant description including any information on socio-occupational demographics and setting
	Unit of analysis and source of data
Interventions	Independent or predictor variables (where appropriate)
Outcomes	Dependent variables
Risk of Bias	Quality Assessment Scores
Data and analysis	Key results

Thematic analysis was chosen as it allows a flexible and accessible approach to analysis that can span the inductive vs deductive divide. Although no assumptions about the literature that might emerge were made, the data had been extracted before analysis via a bespoke template that was made to specifically address the literature review questions and, as such, some decisions on what data to include in the analyses had already been made; thus, the approach can be considered only semi-deductive in nature.

The six-phase method as described by Braun and Clarke is outlined below with examples, where appropriate, linking the methodology to its practical application within this study.

Phase One – Familiarisation.

Braun & Clarke (2006) describe this as the researcher immersing themselves in the raw data and becoming familiar with its contents. In this example, it meant re-

reading each of the 20 studies whilst making notes of the data to highlight potential points of interest and begin the process of conceptualization.

Phase Two - Initial code generation.

As a semi-deductive approach was being taken the initial code generation was driven by a coding framework that was developed via a combination of the study research questions and the key issues that were identified during data familiarisation that would allow the material to be sifted, sorted and examined easily. The final coding framework for this review can be found below in Table 3.6; all data within the data extraction sheet was subject to coding against this framework.

Table 3.6 *Systematic Literature Review: Coding Framework*

1. ***Theoretical basis***
   - 1.1. Type of theoretical framework informing research question or study design
2. ***Outcomes examined***
   - 2.1. Types of dependent variables examined by the study
3. ***Independent variables and key results***
   - 3.1. Types of independent and control variables examined by the study
   - 3.2. Types of independent and control variables that were reported as being *associated* with TASER use

Phase Three - Searching for themes.

Braun & Clarke (2006) believe this to be the beginning of the analysis proper as the analysis now shifts away from generating individual codes and towards the creation of larger themes within the data.

> *"The basic process of generating themes and subthemes, which are the subcomponents of a theme, involves collapsing or clustering codes that seem to*

share some unifying feature together, so that they reflect and describe a coherent and meaningful pattern in the data" (Braun & Clarke, 2012, p.63)

However, given that all data were coded according to a coding framework developed as part of the semi-deductive approach used within this review's methodology, some top-level forced thematic grouping had already taken place. As such, the groupings in Table 3.6 are not considered as higher themes as such, but more as a deductive partition.

In practice, this just means that themes were searched for independently in each of the five sections described by the coding framework.

Phase Four - Reviewing Themes.

This phase encompasses the reviewing and validating of each of the themes not only as individual concepts, but also as part of the overall thematic model. This stage also provides an opportunity for the researcher to go back and re-code, add codes, and or amend or create new themes that have been missed, miscoded, or misplaced in the previous phases.

Due to their abundance, codes relating to part three of the coding framework (independent variable and key results) were grouped together into subthemes, which were then grouped into wider global themes to simplify the concept and overarching relationships between data.

Phase Five - Defining and naming themes.

Braun & Clarke (2006) describe this stage of the analysis as being characterised by the process of clearly identifying what is being captured by the themes, as well as what is interesting about the themes and the way they are organised.

Given the aims of this review, this stage also provided an opportunity to add an evaluative element to examine the subjective strength of each factor theme in explaining the decision to use TASER, resulting in an evaluative thematic diagram for part three of the coding framework (Appendix 9).

Phase Six – Reporting the findings.

In order for the final report to be both understandable to the reader and of empirical value, Braun & Clarke (2006) advocate for a clear, concise, and straightforward narrative account of the themes and their relationships that tell a coherent story about the data. More specifically, they identify a need to go beyond a mere descriptive account of the themes and to actively construct an argument that satisfies the original research question(s).

As such, in Section 3.3 this paper will systematically and consecutively present, for each of the three sections of the coding framework, a brief overview of the global themes before drilling down into each subtheme. Interpretations of each theme will be illustrated by descriptive details from each study and where appropriate, extracts from therein or evaluative discussion, thus providing evidence of grounding and enabling evaluation of persuasiveness.

3.3 RESULTS

The results section will provide a brief overview of the studies, including trends and insights from the quality assessment checklists, before systematically examining the themes that emerged from the three main sections of the coding framework.

3.3.1 Overview of results

An overview of all 20 studies included in this review can be found in the data extraction table in Appendix 8. Most studies were conducted in the United States of America (USA; n=15). Only three of the studies used a policing population from England and Wales (E&W), and the final two studies had been conducted in Australia and New Zealand. In the most part, studies were observational in nature (n=18), with only two studies falling into a category that could be classed as an experimental or quasi-experimental field design. Seventeen studies were quantitative and three were

qualitative, with official use-of-force forms and/or officer personnel files being the most frequently used source of data (n=13). Other forms of data collection included were survey based (n=3), direct observations (n=2), and interview data (n=3).[15] Sample sizes ranged from five (Boehme et al., 2021) to 45,661 cases (Quinton et al., 2020), and the majority (n=15) were explanatory or exploratory without the clear incorporation of an overarching theoretical framework to drive the research question(s).

3.3.2 Quality assessment

The full results of the quality assessments can be found in Appendix 10, but overall observations for each of the three assessment types can be found below.

Results from checklist 1: The quality appraisal checklist for quantitative intervention studies.

This checklist was designed to be used for randomised controlled trials, case–control studies, cohort studies, controlled before-and-after studies and interrupted time series. As such, it was applied to the following six studies included in this review: (Boehme et al., 2021; DeLone & Thompson, 2009; den Heyer, 2020; Mesloh et al., 2005; Sousa et al., 2010; White & Ready, 2007).

Overall, many of the items included in the checklist for quantitative intervention studies were not applicable. This is because four out of the six studies were descriptive in nature and thus did not compare scores across groups.

Nonetheless, where the questions were relevant, there did seem to be some patterns with the overall scores. For example, the results from this checklist showed that these studies were rated higher for internal validity than they were for external validity. However, this is mainly due to the sample populations. None of the populations examined within these four studies were from E&W and thus generalising the results to

[15] Please note, these numbers do not equate to the total number of records included in this review (i.e. n=20) as some studies used more than one type of data collection.

the UK would be problematic (the reasons for this will be discussed in more detail within the Discussion).

Results from checklist 2: The quality appraisal checklist for quantitative studies reporting correlations and associations checklist.

This checklist was designed for correlation studies and other study designs that also report on correlations. As such, the quality appraisal checklist for quantitative studies reporting correlations and associations checklist was applied to the following eleven studies included in this review: (Bishopp et al., 2015; Brandl & Stroshine, 2017; Crow & Adrion, 2011; Dymond, 2016, 2018; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020; Ready & White, 2011; Thomas et al., 2010).

Overall, many of the items included in the checklist for quantitative studies reporting correlations and associations were not applicable to these 11 studies. This is because one of the assumptions that this checklist is based on is that the predictor variables in the studies are controlled interventions.

Nonetheless, where the checklist questions were relevant, there did seem to be some patterns regarding the overall scores. For example, all the papers scored positively for internal and external consistency. In addition, three records (Dymond, 2018; Dymond, 2016; Quinton et al., 2020) consistently scored higher than their counterparts in relation to external consistency as a police population from E&W was used for these papers.

Results from checklist 3: The quality appraisal checklist for qualitative studies.

This checklist was designed for focus groups, interviews and other study designs that use qualitative data to examine the views and experiences of specific target populations. As such, the quality appraisal checklist for qualitative studies was applied to the following three studies included in this review: (Escalante, 2020; Hine et al., 2018b; Sierra-Arévalo, 2019). The scores varied for the three studies that this checklist

was applied to; Escalante (2020) and Hine et al. (2018b) received the most positive overall judgement, and Sierra-Arévalo (2019) received a negative overall score.

Although a qualitative approach was appropriate for all three papers and they were clear in their research aims, there was a marked difference in the rest of the evaluation. Specifically, the papers by Escalante (2020) and Hine et al. (2018b) clearly defined their methodology, data collection techniques, and analysis; whilst Sierra-Arévalo's 2019 paper lacked transparency.

3.3.3 Theoretical foundations of the extant literature

Only five of the 20 papers included in this review were clearly structured around an overarching theoretical framework or perspective that was used to direct and guide their research questions (Crow & Adrion, 2011; DeLone & Thompson, 2009; Dymond, 2016, 2018; Escalante, 2020). These theoretical perspectives and approaches included the following:

Focal Concerns Theory (as cited in Crow & Adrion, 2011)

Focal concerns theory was originally developed to account for the disparate treatment of convicted offenders (in regards to sentencing) based on gender caused by discretionary decision-making of the judiciary (Steffensmeier et al., 1993; Steffensmeier, 1980). However, since then it has also been used to explain the disparate treatment of convicted offenders based on ethnicity and has been suggested as a framework by which we can extend our understanding of police officer decision-making (Crow & Adrion, 2011; Ishoy & Dabney, 2018; Ulmer & Johnson, 2004). Focal Concerns Theory suggests that due to time or informational constraints, judges make sentencing decisions based on the following three issues: i) the perceived blameworthiness and culpability of the offender, ii) their need to protect the community, and iii) concerns about practical constraints and consequences involving the offender or their circumstances.

Consensus Theory (as cited in Dymond, 2018).

Consensus theory is a broad sociological approach rooted within the writings of the French sociologist, Emile Durkheim. According to a consensus theory approach, shared values and norms are the foundation of a functioning and harmonious society. In application to policing, consensus theory is concerned with the maintenance of social order and suggests that the police are acting in good faith on behalf of the communities that they serve (Kitossa, 2016; Terpstra, 2011); a perspective that would suggest that police use of force might typically be directed at those who are in breach of social order rather than any other reasons (such as membership of social minority groups or physical characteristics etc.).

Conflict Theory (as cited in DeLone & Thompson, 2009, and; Dymond, 2018).

Conflict theory is a sociological approach that is oft described as being rooted within Marxist theory (Olsson et al., 2015). Within the conflict theory perspective, power differentials within the community influence and shape the institutions that sit within them. As such, the police are viewed as agents of authority - acting to control social groups or situations that are considered to be a danger by the most powerful groups within the society in which they reside (Chamlin, 2009). This perspective may suggest that police use of force might typically be used more frequently against those who society (and thus the local law enforcement) perceive as falling outside of the community norms.

'Instrumental' Approaches (as cited in Dymond, 2016).

The instrumental approach is characterised by Dymond (2016) as the tendency within the current literature to reduce TASER (and other lethal weapons in general) to mere objects or tools; missing the wider relational context in which they sit. This approach is criticized in the field (e.g. Anaïs, 2015) for neglecting the possibility that they have a range of unintended consequences and exist within complex relationships.

An instrumental approach may not see value in or seek to explore TASER use (or other technological tools used by the police) further than a descriptive account.

Technological Determinism (as cited in Dymond, 2016).

Technological determinism refers to approaches that are concerned with how technology affects our thoughts, behaviours, and the very conditions of human existence. According to these schools of thought, which are often considered (albeit controversially) to be rooted within Marxist theory, technology shapes the development of cultural values, social structures and organization (Bimber, 1990). As such, it would imply that the development of TASER, in and of itself, could actually influence the use of police force.

Social Construction of Technology Approach (SCOT; as cited in Dymond, 2016).

Broadly speaking, the SCOT approach was developed in 1984 by a group of researchers interested in the sociological and scientific study of technology to help address some of the theoretical and sociologically inspired questions being raised by scholars at the time (Bijker, 2009). This constructivist approach used within science and technology disciplines argues that technology cannot be understood unless the social context in which is embedded is also understood; thus, suggesting that the wider social context in which TASER sits needs to be understood in order to understand its use at an individual level.

Actor Network Theory (ANT; as cited in Dymond, 2016).

ANT is a particular branch of constructivism closely associated with Callon (1986, as cited in Dymond, 2016), Latour (1991, as cited in Dymond, 2016), and Law (1992, 1999, as cited in Dymond, 2016). This methodological approach is based on the understanding that nothing exists in isolation and posits that inanimate objects may 'act' or 'participate' (or in some way influence) the relational networks that construct and

form the context of their existence. In this setting, the theory would suggest that the presence (or absence) of the TASER itself may influence the use of police force.

Prospect Theory and Cumulative Prospect Theory (as cited in Escalante, 2020)

Whilst prospect theory was originally developed by Tversky and Kahneman in the late 1970s as a way of explaining economic choices (Kahneman et al., 1979), other disciplines have since applied the theory to additional domains such as criminal justice, to help explain decision-making that includes losses and gains (Escalante, 2020). This theory purports that there are two stages within the decision-making process; an analysis stage (where individuals identify, organise and simplify the available options and their associated gains and losses) followed by an evaluative phase (whereby individuals then evaluate the simplified options and select the most beneficial; Kahneman et al., 1979). The analysis and evaluative phases are subject to several cognitive biases, such as the certainty and isolation effects (Kahneman et al., 1979). Tversky and Kahneman expanded their original approach in the early 1990s to account for decisions made during circumstances involving uncertain and risky decisions (Tversky & Kahneman, 1992), which indicates that decision-makers are more risk averse when outcomes only involve gains, and that they are more likely to embrace risk if a loss is a probable outcome (Escalante, 2020). Within the context of TASER use by police officers this may indicate that officers would be most likely to attempt to arrest non-compliant subjects *without the use of TASER* as this represents 'winning' (i.e. arresting the subject) with the more significant gain (due to reduced levels of stress and potential injury; Escalante, 2020).

3.3.4 Outcome measures

The review protocol stipulated, as part of the eligibility criteria, a) that studies must have examined one of the outcome measures listed below, and b) if a study

presented a number of results, only those results that are relevant to this review were to be extracted and included in this review:

- The frequency and type of TASER use
- Position of TASER use within sequential use-of-force situations
- Reasons for TASER use

Despite this, there are still various differences across the outcome measures used by the studies included in this review and exploration of these might provide additional relevant insights.

Although nineteen out of the twenty studies specifically examined the frequency of TASER use as an outcome measurement (all except Sierra-Arévalo, 2019), the way in which 'frequency' was defined differed greatly from study to study. For example, Ready & White (2011) defined frequency at a personal level by identifying and categorising individual officers in accordance with the frequency that they used TASER during the previous year; classifying them as either a non-user (those that had not fired their TASER), users (one to two uses) and high-frequency user (three or more uses). Whilst others, such as Crow & Adrion (2011), were much more simplistic and merely counted frequency at an incident-level (i.e. when TASER was used).

In addition, some papers examined frequency by comparing instances of TASER use over time (e.g. Bishopp et al., 2015), whilst others (such as Brandl & Stroshine, 2017) compared instances of TASER with other types of force such as firearms or oleoresin capsicum spray (OCS). Others just provided descriptive accounts of TASER use without a comparator (e.g. White & Ready, 2007). Moreover, in some of the papers, 'use' of TASER was not explicitly defined.

In practice, the use of TASER can be much more nuanced than merely being fired or not. The PSEW currently record the seven different types of TASER use; four of which are non-discharge uses as no electricity is discharged into the subject (drawn,

aimed, arced and red-dot), and the remaining three are categorized as discharge uses (drive-stun, fired and angle drive-stun; Home Office, 2020f). Given the above, one might expect some, if not all, of these categories to be reflected when examining the outcome measures. However, only six papers (Boehme et al., 2021; den Heyer, 2020; Dymond, 2016; Escalante, 2020; Quinton et al., 2020; Thomas et al., 2010) defined more than one type of TASER use and even then, the distinctions were only between *drawn and fired*, and *drawn and not fired* (with the exception of den Heyer, 2020). This is particularly relevant within the context of this review as the vast majority of TASER uses in England and Wale are non-discharge uses (86%; Home Office, 2020b).

Police use of force does not usually happen in isolation, but rather as part of a complex interpersonal interaction between an officer and a member of the public. This means that it is entirely possible that an officer might use more than one *type* of force during an exchange. As such, capturing all types of force used, and the order in which they are used, could be important variables when evaluating the use of TASER. Nonetheless, only four of the twenty papers examined the sequential position of TASER within incidents where more than one type of force was used (Brandl & Stroshine, 2017; Gau et al., 2010; Hine et al., 2018b; Lin & Jones, 2010).

Finally, only the three qualitative studies (Escalante, 2020; Hine et al., 2018b; Sierra-Arévalo, 2019), discussed officers' reasons for using TASER in particular (as opposed to their reasons for using force) and the scope of these explorations remained extremely small.

Of the three outcomes stipulated in the review protocol as part of the eligibility criteria, the most prevalent was the frequency of TASER use. Although almost all of the studies used the frequency of TASER use as one of their key outcomes, the way in which frequency was defined was largely disparate. Only around a fifth of the studies

used examined the position of TASER use within sequential use of force situations, and even fewer examined the reasons for TASER use.

3.3.5 Factors affecting TASER use

Analysis of the data extraction table resulted in the identification of 30 potential influencing factors (classified as both independent and/or control variables, or emergent themes from qualitative analysis; please see Table 3.7) that were examined by the 20 studies included in this review. All of which could be grouped into one of the three global themes listed below:

1. **Situational, contextual, and interactional elements** that impact on the frequency and type of TASER use by police officers.
2. **Subject characteristics** that impact on the frequency and type of TASER use by police officers.
3. **Officer factors** that impact on the frequency and type of TASER use by police officers.

Table 3.7 *Systematic Literature Review: Theme Table*

Global factor theme	Factor subthemes
1. Situational, contextual, and interactional elements	(i) Type of call/offence/incident
	(ii) Number of officers present
	(iii) Number of officers that apply force
	(iv) Number of subjects and/or bystanders
	(v) Local TASER and use of force policies
	(vi) Time of day and/or lighting
	(vii) Location
	(viii) Season

Table 3.7 *Systematic Literature Review: Theme Table*

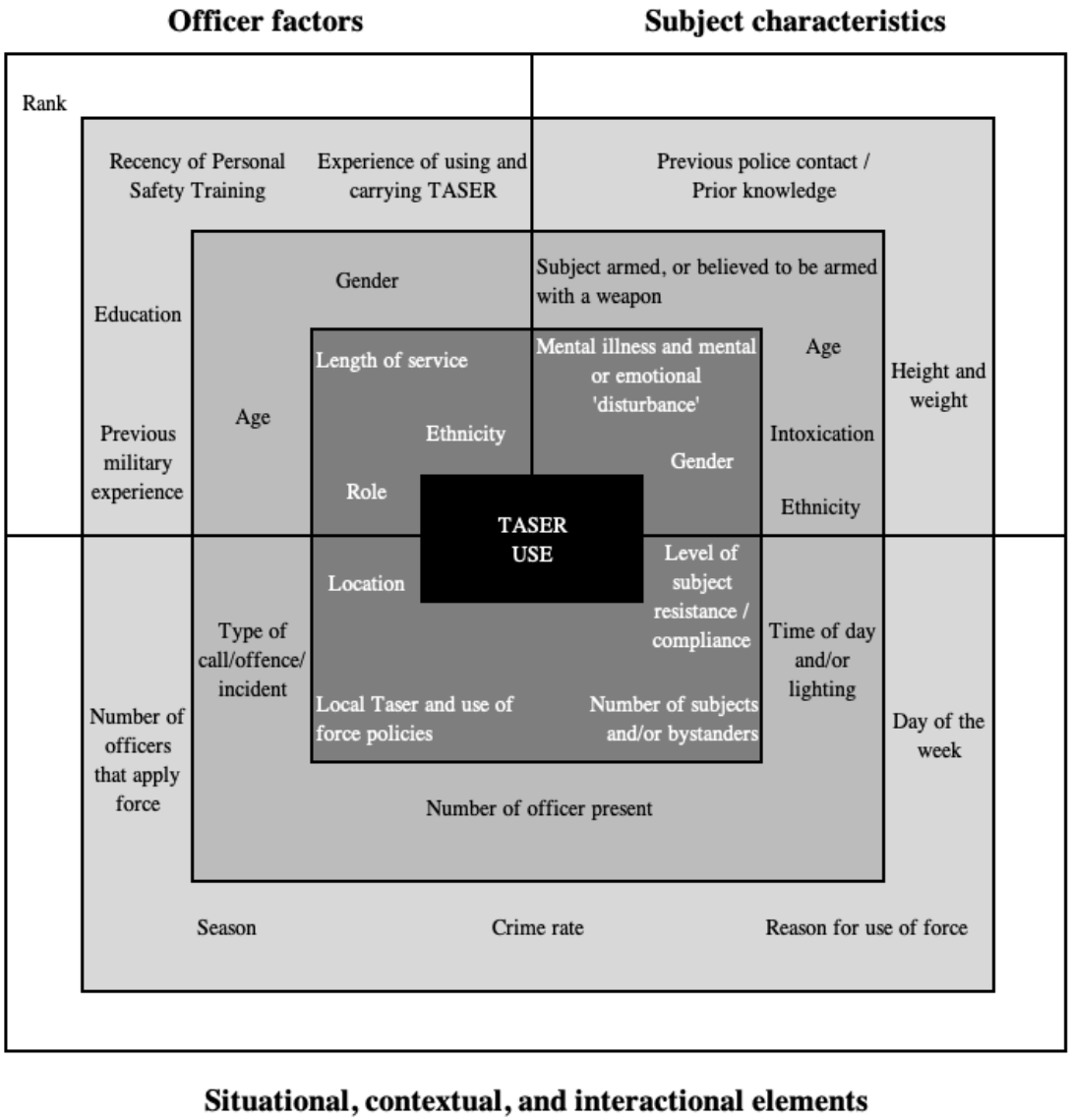
Global factor theme	Factor subthemes
	(ix) Crime rate of area
	(x) Day of the week
	(xi) Level of subject resistance/compliance
	(xii) Reason for use of force
2. Subject characteristics	(i) Ethnicity
	(ii) Gender
	(iii) Age
	(iv) Height and weight
	(v) Mental illness and mental or emotional 'disturbance'
	(vi) Intoxication
	(vii) Subject armed, or believed to be armed with a weapon
	(viii) Previous police contact/prior knowledge
3. Officer factors	(i) Ethnicity
	(ii) Gender
	(iii) Age
	(iv) Rank
	(v) Role
	(vi) Length of Service
	(vii) Education
	(viii) Previous military service
	(ix) Recency of Personal Safety Training
	(x) Experience of using and carrying TASER

Once each of these factor subthemes had been explored, the factor was evaluated and placed into one of following four categories:

- **1) A potentially influencing factor, or 2) a factor of unlikely influence:** Factor subthemes that were explored by *four or more* studies (and/or four separate data sets) and finding broadly similar effects were considered to be a potentially influencing factor or a factor of unlikely influence (depending on whether the findings were positive or null).
- **3) A factor of indeterminate influence due to *lack* of evidence:** Any factor subtheme that was explored by less than four research papers included in this review (and/or four separate data sets) was automatically considered to be a factor of indeterminate influence due to lack of evidence.
- **4) A factor of uncertain influence due to *conflicting* evidence:** Factor subthemes with *four or more studies* and disparate results were considered to be a factor of uncertain influence due to conflicting evidence

The full theme table and factor evaluation can be found in Appendix 9 and provides a concise and easy to understand summary of the results for each factor subtheme and their collective weight. Using the outcomes of the factor subtheme evaluation process, listed in Appendix 9, an evaluative thematic map was developed to further aid understanding and conceptualisation of the factor subthemes and their collective weights (please see Figure 3.2).

Figure 3.2 *Systematic Literature Review: Evaluative Theme Diagram*



	Factor of an unlikely influence
	Factor of an indeterminate influence due to lack of evidence
	Factor of an uncertain influence due to conflicting evidence
	Potentially influencing factor

Global factor theme 1: Situational, contextual and interactional elements.

This global factor theme consisted of the following twelve factor subthemes which will subsequently be examined in turn: (i) Type of call/offence/incident; (ii) Number of officers present; (iii) Number of officers that apply force; (iv) Number of subjects and/or bystanders; (v) Local TASER and use of force policies; (vi) Time of day and/or lighting; (vii) Location; (viii) Season; (ix) Crime rate; (x) Day of the week; (xi) Level of subject resistance/compliance, and; (xii) Reason for use of force.

(i) Type of call/offence/incident. Only five studies saw this as an emerging issue or included type of call, offence, or incident as part of their analysis (Crow & Adrion, 2011; DeLone & Thompson, 2009; Dymond, 2016; Hine et al., 2018b; Kuzik, 2019). However, the way in which this variable was captured was not consistent. For example, DeLone and Thompson's descriptive report from 2009 used the following six categories to describe the initial call:

1. Part one index crimes (the Uniform Crime Reporting Programmes definition of more serious violent and property crimes such as aggravated assault, forcible rape, murder, arson, burglary and robbery)[16]
2. Emotionally disturbed person
3. Traffic stop
4. Search/arrest warrants
5. Simple assault
6. Other

[16] Please note, this is a programme from the United States of America that was developed by the Federal Bureau of Investigation. Please see U.S Department of Justice. (2004). FBI Uniform Crime Reporting Handbook. Retrieved from: https://www2.fbi.gov/ucr/handbook/ucrhandbook04.pdf

Using the above categories, DeLone and Thompson found that the largest proportion of TASER uses were in relation to initial calls reporting an '*emotionally disturbed person'* (30%) followed by '*part 1 index crime'* (23%) and '*other'* (23%).

Two of the remaining three studies used multivariate analyses based on mandatory use-of-force forms and were slightly more comparable in their categorisation, however the results themselves differed. Crow and Adrion (2011) categorised incident type using the five-set categorisation listed below, and found no significant association with TASER use:

1. Suspicious activity or person, pursuit or other (warrant services, field interview)
2. Violent crime (assault/battery, fights, robbery)
3. Traffic (traffic stop, driving under the influence)
4. Order maintenance (disturbance, domestic dispute)
5. Property or drug crime (Theft, burglary, shoplifting)

Whilst Dymond's (2016) results indicated that incident type was significantly associated with TASER use when using the six-set categorisation listed below:

1. Suspicious person or activity/alarm
2. Violent crime
3. Traffic
4. Detain mental health
5. Custody
6. Other or unspecified

More specifically, Dymond (2016) found that TASER was: More likely to be fired in traffic incidents; more likely to be drawn (but not fired) in incident involving violent crime, and; less likely to be fired or drawn (but not fired) in Custody incidents.

Interestingly, the qualitative study by Hine et al. (2018b) also found that police recruits were considering the incident type when making use of force decisions within their training exercises. In particular, they considered the domestic violence scenario as higher risk, citing the violent nature of the offence as an indication of the subject's capability for violent behaviour. Kuzik's study in 2019 also found a link between violence and TASER use, but from the other perspective. Specifically, they found that non-violent call types were more likely to be at 'higher risk' of TASER use, and that violent call types were more likely to be at 'lower risk' of TASER use. Unfortunately, the authors do not discuss potential reasons for finding such a counterintuitive finding, however it is possible that this may be because the sample is North American and, as such, officers have access to additional equipment (e.g. firearms) that they may be more likely to draw than TASERs in violent call types.

It is perhaps surprising that so few studies examined this variable given that the type of call, offence or incident provides an indication of several key elements, such as; the type of response that the police service may send to the incident (e.g. number and type of police officers); the risk or threat that an officer may be face with upon arrival, and what an officer might *expect* to find upon arrival. However, this may well be an artefact of the type of data collection used, as use-of-force forms might not routinely require this information.

(ii) Number of officers present. Just over a third of the studies included the number of officers present in their exploration of the use of TASER, or it emerged from their findings. Two of the studies were descriptive, (DeLone & Thompson, 2009; White & Ready, 2007), four used more complex analyses to explore the impact of officer numbers on the use of TASER (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Quinton et al., 2020), and one was qualitative (Hine et al., 2018b). DeLone and Thompson's 2009 research indicated that only 8% of TASER incidents involved a *single*

officer, whilst 46% involved *two to three* officers and the same percent for *four or more* officers. This is similar to the findings of White and Ready (2007), which found that only 6% of TASER incidents involved an officer who had no 'back-up present.'

However, the reasons for this are unknown. It is possible that single-crewed officers in North America may favour drawing another type of equipment (e.g. their firearms) rather than their TASERs or, perhaps that violent call-outs elicit attendance from more officers than non-violent call outs – reducing the number of prospective occasions where the use of TASER might be appropriate. It could also be possible that officers in these samples were rarely single-crewed – reducing the number of opportunities for TASER to be used within this context overall.

Nonetheless, the multivariate analysis by Brandl and Stroshine (2017) goes some way to support the results of the descriptive studies above, as they found that TASER was more likely to be used than OCS when there were more officers present.

Conversely, the multivariate analyses conducted by Dymond (2016, 2018) found no significant association between the number of police officers present during an incident and TASER use (for either TASER being fired, or being drawn but not fired).

However, it is worth noting that Dymond (2016) did find that an increase in the number of officers present was associated with *decrease in the odds of subject injury*. Although this is not within the original scope of this review it may offer some additional insight, as the author of the paper suggested, that the presence of multiple officers might change the dynamic of the civilian-police encounter by dissuading the subject from resisting with high levels of violence. However the more recent British study by Quinton et al. in 2020 found that there were increased odds of an officer discharging their TASER if they were single-crewed at the time of the incident, than if they were with another officer that did not use force. Interestingly though, Quinton et al.

(2020) found that the odds of non-discharge uses of TASER (i.e. the TASER being drawn but not fired) were not increased when officers were alone.

Moreover, the qualitative study by Hine et al. (2018b) found that police recruits use of the officer to subject ratio (i.e. the number of officers present compared to the number of subjects) was an overt and pragmatic influence over their use of force decisions. More specifically, that when more officers than subjects present, the situation was considered to be lower risk and that, as a consequence, less force was needed.

(iii) Number of officers that apply force. Two of the 20 studies explored officer presence in more depth by including the number of officers that *apply force* as part of their analysis of TASER use (Brandl & Stroshine, 2017; Dymond, 2016).

Brandl and Stroshine's (2017) bivariate analysis suggested that TASER was more likely (than OCS) to be used when there are more officers applying force. However, this effect was no longer significant when entered into the multivariate model and other factors were controlled for. This is in keeping with the multivariate analyses conducted by Dymond (2016) which similarly found no significant association between the number of police officers using force during an incident and the use of TASER (either by firing the TASER, or drawing the TASER but not firing).

(iv) Number of subjects and/or bystanders. Five studies included the number of subjects in their exploration of the use of TASER or found it as an emergent issue; three of which were multivariate (Brandl & Stroshine, 2017; Dymond, 2016; Quinton et al., 2020), one of which was descriptive (DeLone & Thompson, 2009), and one was qualitative (Hine et al., 2018b).

In DeLone and Thompson's (2009) descriptive account of TASER use, the majority (58%) of subjects were alone when they were tased; whilst Brandl and Stroshine's (2017) multivariate analysis found that the more subjects were present, the more likely it was for officers to use OCS instead of TASER, and Dymond (2016)

found TASER was more likely to be drawn (but not fired) when there were two subjects rather than one. These results may well be reflective of an officers' inability to target multiple suspects at the same time with a TASER; a problem that OCS is not associated with. However, as subject to officer ratio was not controlled for, these results could indicate that a larger number of subjects draws more officers to an incident; making the incident easier to manage and, as such, a TASER may not be needed to be fired to gain control.

As previously mentioned however, the qualitative study by Hine et al. (2018b) found officer to subject ratio was an overt and pragmatic influence over force decision, and in addition, they found that officers considered the number of by-standers as an influence as they were concerned over *public perceptions* as well as the potential for bystanders to *become* involved in the incident and the subject to officer ratio change and increase risk. This may go some way to explain why Quinton et al. (2020) also found that officers were less likely to use TASER when they had indicated 'crowds' as being an impact factor.

(v) Local TASER and use of force policies. Police officers are not independent authorities but are instead agents of the service that they represent. As such, they are expected to act within the national and local organisational frameworks in which they sit – meaning that there will be many formal (and often informal) organisational factors that might influence the use of TASER.

Eight of the 20 studies explored one such organisational constraint within their analyses, in the form of local policy (Bishopp et al., 2015; Boehme et al., 2021; Crow & Adrion, 2011; Dymond, 2016, 2018; Ready & White, 2011; Thomas et al., 2010; White & Ready, 2007).

White and Ready's (2007) descriptive study focused on whether internal policy standards were met by the officers deploying TASER. They found that although the

majority of TASER uses in their sample were considered to be within the departmental policy (84%) and none were confirmed to be *in breach* of department policy, there was a fairly sizable proportion of incidents where that information was missing (16%).

The multivariate analyses conducted by Bishopp et al.'s study in 2015 and Boehme et al.'s 2021 study were both designed to specifically address the question of whether local policy change had affected officer's use of TASER. Both studies found that there was a reduction in TASER use after the local services moved towards more restrictive TASER policies.

Thomas et al.'s 2010 study was also specifically designed to explore the impact of policy on TASER use by asking municipal policing departments to fill in a survey, pitched at the organisational level, about their department's TASER policies and practices. They found that agencies that place TASER higher on the use of force continuum recorded significantly *fewer* deployments, and those that reported having more permissive policies reported higher frequencies of TASER use.

Similarly Crow & Adrion (2011) explored the impact of policy change on TASER use and found that a move toward a more restrictive policy was also significantly associated with a reduction in TASER use.

Although Dymond (2016, 2018) did not specifically measure policy change, they did record use of TASER from 2007 to 2015 and controlled for the year, noticing that there was a significant association between year and TASER use. Specifically, they found that TASER was more likely to be fired in 2009 and 2010, and TASER was also more likely to be drawn (but not fired) in 2009, 2010, 2012, 2013 and 2014. The author hypothesises that this result may be due to a change in British policing policy in 2008 which, for the first time, allowed for non-firearms officers to be trained in and carry TASER (TASER use by all specially trained officers was authorised by the Home

Secretary in November 2008; Houses of Parliament, 2008. For more information on TASER policy within UK policing, please see Chapter One).

However, Ready and White's 2011 survey into self-reported officer experiences of using TASER found, surprisingly, that more than half (53%) of whom they dubbed as 'high-frequency' TASER users (officers whose self-reported use of TASER for the previous 12 months was above the sample's average of twice) worked under restrictive use of force polices; indicating that policy is not the only factor that influences an officer's use of TASER.

(vi) Time of day and/or lighting. Four of the 20 studies explored the impact of lighting and/or the time of day that an incident took place on TASER use, with varying results. Crow and Adrion (2011) included the time of day in their exploration of TASER use as a control, splitting incidents into morning, afternoon, evening, and night, but found no significant association with TASER use. Dymond (2016) also explored whether lighting conditions were associated with TASER use (day light conditions vs. night or low light conditions), but also found no significant relationships. Similarly, Gau et al. (2010) compared TASER use across incidents that took place when it was light or dark outside, and found no significant associations. Kuzik (2019), however, found that incidents that occurred at night were more likely to be 'high risk' for TASER use and, conversely, that daytime incidents were more likely to be at 'lower risk' of TASER use.

(vii) Location. In total, five studies examined the impact of location on TASER; three descriptive accounts (DeLone & Thompson, 2009; den Heyer, 2020; White & Ready, 2007), one qualitative study (Hine et al., 2018b) and one study that used multivariate analyses (Quinton et al., 2020). The three descriptive studies that examined location type found that the largest proportion of incidents happened indoors (77%;

White & Ready, 2007), and in private residence or residential properties (73%, DeLone & Thompson, 2009; 65%, den Heyer, 2020).

Hine et al.'s (2018b) qualitative analysis also found that the location was an emergent issue discussed by police recruits; identifying that both open spaces and enclosed spaces posed contextual constraints on their choices. For example, when use of force in an open space was required, officers felt that OCS may not be the best option as there could be residual effects on bystanders. In addition, subjects' houses were considered to be high risk locations due to potentially limited information regarding who is in the property and if any additional risks are present (e.g. possession of weapons). Moreover, the multivariate analysis conducted by (Quinton et al., 2020) found that TASER was more likely to be used in dwellings and less likely to be used in police or medical settings.

(viii) Season. Only Bishopp et al. (2015) included the time of year (season) as a control when exploring factors associated with TASER use and found, contrary to expectations, that summer reduced the frequency of TASER use but did not go so far as to suggest a possible rationale for such a finding.

(ix) Crime rate. Ready and White (2011) included the local crime rate (per 100,000 population) in their analysis in an attempt to control for local geographical differences. They found that the higher the crime rate, the more likely officers were to be 'high-frequency' TASER users. However, there could be any number of reasons for such a finding, for example officers in high crime areas and/or with heavy workloads (i.e. high number of incidents per shift) may have more opportunities to use TASERs may use TASER to resolve incidents quicker, may be more confident and/or comfortable in using the device, or feel that the threat level is higher (due to their geographical location).

(x) Day of the week. Only one multivariate study examined whether TASER was affected by the day of the week on which the use of force event happened (Kuzik, 2019). Using Conjunctive Analysis of Case Configurations to examine the data, Kuzik (2019) found that incidents that happened during the week were more likely to be at 'higher risk' of TASER use and those that occurred at the weekends were more likely to be at 'lower risk' of TASER use. Unfortunately, the authors did not explore or discuss the potential rationale for such findings, however it may well be linked to variations in incident type that might occur across the week and weekends.

(xi) Level of subject resistance/compliance. Given that the use of force is predicated on the need to gain control of a subject or the situation, it is unsurprising that the level of subject resistance was one of the most frequently explored variables across all the research included in this review.

Although 15 out of the 20 studies included in this review examined the level of subject resistance when exploring the use of TASER, the way in which resistance was *defined* was far from consistent. For example, in DeLone and Thompson's (2009) descriptive account, resistance was included as a single binary question (yes/no) that asked whether the subject was physically resistant or not; whilst other authors, such as Brandl and Stroshine (2017) and Dymond (2018) took a more detailed view. In Brandl and Stroshine (2017) the level of subject resistance was indicated by four key categories:

1. No resistance
2. Passive and verbal resistance
3. Defensive resistance
4. Active resistance

Even though fleeing the police was considered to be included within *defensive resistance* and assaulting the police was considered to be a type of *active resistance*,

Brandl and Stroshine also coded and included these behaviours into the analysis separately from level of resistance. Conversely, Dymond (2018) categorised resistance into the following three categories:

1. Passive resistance or 'other'
2. General struggle or unarmed aggression
3. Possession or use of a weapon

Given the variation in measurement outlined above, perhaps it is unsurprising that the results from these 15 studies are inconsistent.

Six of these 15 studies indicated that TASER use and type of TASER use was associated with higher levels of resistance or 'active' resistance (Crow & Adrion, 2011; DeLone & Thompson, 2009; Dymond, 2016, 2018; Quinton et al., 2020; Sousa et al., 2010). However, four indicated that TASER use might actually be associated with *lower* levels of resistance (Gau et al., 2010; Kuzik, 2019; Mesloh et al., 2005; Ready & White, 2011). Perhaps these results could be somewhat contextualised by the findings from the 2019 paper by Sierra-Arévalo, which described TASER being used by officers in a 'pre-emptive capacity' to avoid resistance and subject injuries. The qualitative study by Escalante in 2020, however, discovered that a TASER had been drawn (but not discharged) by all five of their participants against a subject with the aim of gaining compliance.

The 2010 study by Lin and Jones demonstrated a more complex relationship between subject resistance and use of TASER. Their results indicated that whilst passive resistance increased the odds of a TASER related incident, it was less likely for passive resistance to be associated with a TASER being fired. This potentially indicates that there is a difference in the intended use of the TASER – with officers perhaps using the TASER as a *coercive tool* (or a deterrent) to gain compliance with passive resisters, and as a *disabling tool* with higher levels of aggression.

Ready and White (2011) also found that officers who used TASER on subjects that were passively resisting and those that were used on potentially lethal resistance were more likely to be frequent TASER users.

And finally, Brandl and Stroshine (2017) found that subject resistance was not significantly associated with the decision to use TASER over OCS; supported also by the findings from a set of field-training trials by Hine et al. (2018b) which found that '*despite being presented with similar suspect resistance initially, recruits decided to use various force options and types,*' (p.7). However, these findings may have more to do with the similarities between the level of force associated with TASER and OCS and the population (new recruits) rather than the level of subject resistance.

As previously mentioned, some specific types of resistance behaviour were isolated and examined more closely by several studies. Fleeing from the police was looked at an individual factor at by two of the fifteen studies (Brandl & Stroshine, 2017; Mesloh et al., 2005). The descriptive study by Mesloh et al. found that TASER was used to stop fleeing suspects (across all offense types) the majority of the time, whilst the multivariate analysis by Brandl and Stroshine (2017) found that fleeing the police increased the odds of TASER being chosen as the type of force used over OCS. These results are most likely reflective of TASER's greater deployment range compared with its counterparts (it is effective up to approximately six to eight meters; The CoP, 2013a).

Physical assault was another type of resistant behaviour that was looked at specifically by Brandl and Stroshine (2017). However, they did not find a statistically significant relationship between whether the subject assaulted police or not, and whether the TASER or OCS was used in the incident. Again, this could be an artefact of TASER and OCS being considered as similar levels of force.

Lastly, the descriptive study by DeLone and Thompson (2009) indicated that a slightly larger proportion of subjects that were involved in a TASER incident had been verbally abusive (54%).

(xii) Reason for use of force. Surprisingly only three papers examined the role of the officer's reason to use force in relation to TASER use (Dymond, 2016, 2018; Quinton et al., 2020). This may be of particular interest given that the policing population used in these studies were from England and Wales and the categories used by the authors were similar to those included in the mandatory use-of-force forms that these officers are required to use. Moreover, all three studies found that officers who reported to be using force to protect themselves or others were more likely to both fire their TASER and draw (but not fire) their TASER; indicating that in the UK, TASERs are perhaps only used in the most extreme situations.

Global factor theme 1: A summary. Overall, only four of the 12 factor subthemes within the global theme of *Situational, contextual and interactional elements* were found to be potentially influencing factors (i.e. location, local TASER and use of force policies, the number of bystanders, and the level of subject resistance/compliance), whilst three were found to be factors of uncertain influence due to conflicting evidence (type of call/offence/incident, time of day and/or lighting, and the number of officers present), and the remaining five were found to be a factor of indeterminate influence due to lack of evidence.

Global factor theme 2: Subject characteristics

This global theme consisted of the following eight factor subthemes which are examined in turn: (i) Ethnicity; (ii) Gender; (iii) Age; (iv) Height and weight; (v) Mental illness and mental or emotional 'disturbance'; (vi) Intoxication; (vii) Subject armed, or believed to be armed, with a weapon, and; (viii) Previous police contact/prior knowledge.

(i) Ethnicity. Subject ethnicity was explored by ten studies; eight of which included multivariate analyses, and the remaining two studies were descriptive in nature (DeLone & Thompson, 2009; den Heyer, 2020).

DeLone and Thompson's descriptive account found that a larger proportion of White subjects had been tased within their sample of 26 cases. However, given the small sample size and the descriptive nature of the study does not mean that Black, Asian and minority ethnic (BAME) subjects were less likely to be tased, it may simply be that the local study population was mostly White. The study by den Heyer in 2020 indicated that, within in their antipodean sample, the majority of TASER subjects were from the Maori community and that the Maori community were disproportionately represented in TASER uses. The eight multivariate analyses were more robust but also conflicting; with four reporting no differences based on subject ethnicity (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019) and the other four reporting the following results:

- When the subjects were non-White, TASER was more likely to be used than other types of force (Crow & Adrion, 2011).
- When subjects were Hispanic, TASER was more likely to be the first type of force to be applied (Gau et al., 2010).
- When subjects were Black, TASER was less likely to be used as the first type of force to be applied (Gau et al., 2010).
- Incidents involving minority male citizens had higher rates of TASER use (Lin & Jones, 2010).
- Black or Black British subjects, were more likely than White or White British subjects to have TASER drawn (but not discharged) against them (Quinton et al., 2020).

- Asian or Asian British subjects, were less likely than White or White British subjects to have used against them (Quinton et al., 2020).

Given the disparate cultural context of racial disparity and inequality across countries, it is important to note that studies using samples from North America, or the Antipodes may not be generalisable to the British population. Only three studies conducted their analyses on a policing population from England and Wales (albeit two used the same data set), and found conflicting results (Dymond, 2016, 2018; Quinton et al., 2020). However, to dismiss the potentially influential nature of a subject's ethnicity based on heterogeneous results from only three studies would be inappropriate, and given the potential impact of such disparity, extremely unethical.

(ii) Gender. Half of studies included in this review examined subject gender as part of their research or found it as an emergent issue; with two being descriptive accounts (DeLone & Thompson, 2009; den Heyer, 2020), one being qualitative in nature (Hine et al., 2018b), and the remaining seven using multivariate analyses (Brandl & Stroshine, 2017; Crow & Adrion, 2011; Dymond, 2016, 2018; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020).

DeLone and Thompson's (2009) descriptive account of TASER incidents reported that the majority of TASER subjects in their sample were male (89%); a result that was echoed by den Heyer's (2020) account which states that TASER was deployed '*mostly against males aged 30 years or younger,'* (p. 360), but does not offer any further information on gender nor age.

These findings were also echoed by six out of the seven multivariate analyses which found that TASER was more likely to be used than other force when the subject was male (Crow & Adrion, 2011); that TASER was less likely to be fired, and less likely to be drawn (but not fired) at female subjects (Dymond, 2016, 2018; Quinton et al., 2020); that male subjects more likely to be at 'high risk', and females were more

likely to be at ‘low risk’ of TASER being used against them (Kuzik, 2019); and that female citizens were less likely to be involved in a TASER incident (Lin & Jones, 2010).

The final multivariate analysis that explored gender as a predictor of TASER use found no association between the two (Brandl & Stroshine, 2017). However, this may be because this particular study compared the likelihood of TASER being used in comparison to OCS, rather than other (lower) levels of force. As TASER and OCS are often considered to be relatively similar in regard to their level of force, it is possible that there was no observable effect as both types of force were equally unlikely to be used by officers on a female subject.

Hine et al.'s (2018b) qualitative analysis also found that the recruits overtly considered female subjects to be less threatening, and consequently did not feel as much force was necessary. However, it is possible that this result may be due to the large proportion of the participants being male, and it would have been interesting to examine these results for any disparity if gender was regarded as a dynamic pairing (i.e. a male officer and female subject; a female officer and a female subject; a male officer and a male subject, and finally; a female officer and a male subject).

(iii) Age. Subject age was explored by six studies; three of which reported no differences based on subject age (Brandl & Stroshine, 2017; Crow & Adrion, 2011; Kuzik, 2019). However, the remaining multivariate study that examined age (Quinton et al., 2020) found that subjects under 18 years of age were less likely to have TASER used against them than subjects that were 18 years old or more. The two remaining studies provided descriptive accounts (den Heyer, 2020; White & Ready, 2007); with White and Ready (2007) reporting that, on average, those being tased from within their sample were in their mid-thirties and, as previously mentioned, den Heyer (2020)

reported that TASER was deployed '*mostly against males aged 30 years or younger,'* (p. 360), but did not offer any further information on gender nor age.

(iv) Height and weight. In regards to subject height and weight, three studies included this as an independent variable in bivariate and/or multivariate analyses or found it as an emergent issue (Brandl & Stroshine, 2017; Gau et al., 2010; Hine et al., 2018b). However, no studies reported any differences. More specifically, Brandl and Stroshine (2017) found no significant relationships between subject height nor weight, and TASER being used as opposed to OCS in their bivariate analysis, and removed both height and weight from their multivariate analysis due to large amounts of this data being missing from their data set.

Gau et al., (2010) took a different approach and used a continuous scale measuring the ratio of officer-to-subject height and weight. Perhaps in an attempt to better capture differences in potential or perceived threat levels due to disparity in officer and subject sizes. However, these were also found to be non-significant in their overall multivariate analysis.

Interestingly however, Hine et al. (2018b) found that participants in the police training exercises not only reported being aware of a subject's build, but expressly identified this as a consideration when thinking about options in relation to use of force. However, as these participants were new recruits, perhaps this particular influence diminishes as officers gain experience.

(v) Mental illness and mental or emotional 'disturbance.' Seven of the studies within this review explored the subject's mental health status and/or presentation during the incident on the use of TASER; two being descriptive (den Heyer, 2020; White & Ready, 2007), whilst the remaining five used multivariate analyses (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020).

The descriptive study by White and Ready in 2007 found that almost all of the TASER incidents in their sample involved a subject that was 'emotionally disturbed,' whilst that of den Heyer (2020) identified that TASER had not been used against any subjects with 'mental health issues,' or 'displaying suicidal behaviours,' within the year 2010. However, by 2011, den Heyer (2020) found that 19% of TASER uses in New Zealand involved those with 'mental health issues' and 12% involved subjects 'displaying suicidal behaviours.'

The remaining five studies all found a significant relationship between the subject's mental health status and/or presentation during the incident and the use of TASER. More specifically, Brandl and Stroshine (2017) found that TASER was more likely to be used than OCS when the subject was considered to be 'mentally disturbed;' Dymond, (2016, 2018) found that TASER was more likely to be fired when a subject had either a mental 'disability' or was considered to have a mental health issue; and Quinton et al. (2020) reported that TASER was more likely to be both fired and drawn (but not discharged) in incidents where mental health was cited as an 'impact factor.' Quinton et al. (2020) also reported that subjects were more likely to have a TASER drawn (but not fired) against them when they were perceived as 'mentally disabled.'

Kuzik (2019) also examined the impact of perceived mental 'instability,' on TASER use, however the author grouped this particular factor under an umbrella term called 'Subject impairment' together with the subject being under the influence of drugs and/or alcohol. Nonetheless, they reported that subjects that were considered to be 'impaired' were more likely to be at 'high risk' of TASER being used against them, whilst non-impaired subjects were more likely to be at 'low risk.'

Perhaps these results indicate that officers feel more threatened by subjects that appear to have mental health issues, or perceived them as more erratic, and/or less likely to respond to other verbal commands. The findings from Brandl and Stroshine (2017)

are particularly of interest, as it is not clear what advantage TASER might have over OCS due to a subject's mental state other than its incapacitation effects not being reliant on pain compliance.

Although these variables have been listed under 'Subject characteristics,' it is also important to note that there is a distinct difference between subjects that have a mental illness diagnosis, and those that just *appeared* to be mentally or emotionally 'disturbed' according to the attending officer. More specifically, one is more objective than the other. As such, it may be prudent to also consider the officer's perception of the subjects affect under 'Officer factors.'

(vi) Intoxication. Over a third of the studies included in this review explored intoxication due to drugs within the context of TASER use or found it as an emergent issue; three studies were descriptive, with two finding that the majority of subjects in their sample had not been under the influence of drugs when they had been tased by the police (69% in DeLone & Thompson, 2009; 91% in White & Ready, 2007), and the remaining study reporting that the majority of 'early events' in New Zealand involved subjects that were impaired by alcohol (54%) or drugs (14%; den Heyer, 2020).

However, a British multivariate analyses by Dymond (2016, 2018) found a significant relationship between drug intoxication and TASER use, whereby TASER was more likely to be fired but no more likely to be drawn (but not discharged) when a subject was under the influence of drugs. Interestingly, the more recent British multivariate study by Quinton et al. (2020) found an altogether different pattern; whereby TASER was *less likely* to be drawn (but not fired) when a subject being under the influence of drugs was listed by officers as an 'impact factor' and no significant relationship was found between this and a discharge use of TASER.

The remaining study that reviewed the influence of drug use on TASER as a distinct factor was by Brandl and Stroshine (2017), which compared the TASER to

OCS, and found no significant association between drug use and the type of force used. However, as previously mentioned, this may be related to the fact that OCS and TASER are considered to be a similar level of force and, consequently, it could be that both types of force were equally likely to be used in the circumstances.

These same five studies also explored intoxication due to alcohol, with slightly more conflicting results. The first of the descriptive studies reported that a slightly larger proportion of subjects that had been tased were under the influence of alcohol (58%; DeLone & Thompson, 2009), whilst the other indicated that the vast majority of subjects were *not* under the influence of alcohol (94%; White & Ready, 2007). However, it must be noted that DeLone and Thompson's sample was much smaller than White and Ready's (26 and 243 cases respectively).

The results from Dymond's 2016 and 2018 multivariate analyses found that when subjects were reportedly under the influence of alcohol, TASER was more likely to be drawn (but not discharged), but no more likely to be fired. This is particularly interesting, as this pattern of use is the exact reverse of their findings for subjects that were under the influence of drugs. Moreover, the multivariate study by Quinton et al. (2020) also found a different pattern; whereby TASER was less likely to be drawn (but not fired) and less likely to be fired when being under the influence of alcohol was listed as an impact factor.

This could possibly indicate that those who are perceived as being under the influence of drugs may elicit different behaviour from police officers than those who are perceived as being under the influence of alcohol. One explanation for this might be that officers perceive different levels of threat and risk between the two types of intoxication due to associated behaviours, or it is also possible (if blood testing was not used to conclusively determine the cause of intoxication) that officers' use of force may

retrospectively influence their official recording of the suspected cause of intoxication when filling in official use-of-force forms.

Participants from the qualitative study by Hine et al. (2018b) discussed intoxication in a more general manner; subjects that appeared intoxicated were considered to be a higher-risk due to being unpredictable, less rational, and by potentially having an increased pain tolerance (due to the effects of intoxication diminishing physical sensation). The remaining study that examined alcohol as a distinct factor was by Brandl and Stroshine (2017) who found no significant association was found between alcohol intoxication and use of TASER (compared to OCS).

The final study to examine the impacts of drugs and alcohol was Kuzik (2019). However, as discussed previously, Kuzik (2019) aggregated these potential impact factors under a broader category termed 'Subject impairment' and found that 'impaired subjects' were more likely to be at 'higher risk' of TASER being used against them, and those that were 'not impaired' were more likely to be at 'lower risk.'

(vii) Subject armed, or believed to be armed, with a weapon. Seven of the studies included in this review examined whether TASER use was related to the presence or believed presence of weapons, two of which were descriptive (den Heyer, 2020; White & Ready, 2007), four were multivariate studies (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Lin & Jones, 2010), and the presence of weapons also emerged within one of the key themes from the qualitative study published by Escalante in 2020.

White and Ready (2007) found that in the majority of their sample cases (60%) the subjects involved in a TASER incident were not armed, whilst den Heyer (2020) found that roughly two thirds of subjects involved in a TASER discharge event in 2010 were armed with a weapon.

The multivariate analysis conducted by Brandl and Stroshine in 2017 had similarly conflicting results, finding that if a weapon was thought to be present then

TASER was more likely to be used than OCS. However, if a weapon was *confirmed* as being present, TASER was no more or less likely to be used then OCS. The remaining multivariate analyses only examined the presence of weapons and whilst Dymond (2016, 2018) found that TASER was more likely to be used than other types of force if weapons were present, Lin and Jones (2010) found that subjects armed with a weapon and/or displaying life threatening behaviour were less likely to have TASER used against them.

Cultural and organisational differences between North American and British policing may go some way to account for these results. Specifically, the findings from both Brandl and Stroshine (2017) and Lin and Jones (2010) are from a North American population, and may relate to the additional equipment available to these officers (i.e. firearms). For example, the absence of a significant difference between TASER and OCS use found by Brandl and Stroshine (2017) might be due to officers in North America being less likely to use *either* of these types of force compared to other equipment (such as firearms). Equally, it could be that Lin and Jones (2010) found that TASER was less likely to be used than other types of equipment for the same reason (i.e. the North American policing population has access to additional equipment in the form of personal issue firearms). Given that the majority of police officers within the UK, unlike their counterparts in North America, do not have access to personal issue firearms, it may stand to reason that UK police are more likely to use TASER than other types of force when faced with an armed subject (Dymond, 2016, 2018), as they are unlikely to have any other long-range options that are able to incapacitate the subjects in a swift and efficient manner.

(viii) Previous police contact/prior knowledge. Only two studies examined previous police contact/prior knowledge of the subject, one of which was a multivariate

analysis (Quinton et al., 2020) and the other was descriptive (DeLone & Thompson, 2009).

DeLone and Thompson's descriptive account of TASER incidents in 2009 indicated that 92% of TASER subjects had previous police contact. However, it must be noted that this was a small sample (26 incidents) and thus may not be representative of the wider population. The much larger multivariate analysis by Quinton et al. (2020) indicated that when prior knowledge of the subject was listed by the officer as an 'impact factor' the subject was more likely to have TASER drawn against them (but not discharged).

Global factor theme 2: A summary. Overall only two of the eight factor subthemes within the global theme of Subject Characteristics were examined and found to be potentially influencing factors (mental illness and mental or emotional 'disturbance,' and gender); whilst four were found to be a factors of uncertain influence due to conflicting evidence (ethnicity, age, intoxication, and subject armed/believed to be armed with a weapon), whilst the remaining two were found to be factors of indeterminate influence due to lack of evidence.

Global factor theme 3: Officer factors.

This global theme consisted of the following ten factor subthemes which are examined in turn: (i) Ethnicity; (ii) Gender; (iii) Age; (iv) Rank; (v) Role; (vi) Length of Service; (vii) Education; (viii) Previous military service; (ix) Recency of Personal Safety Training, and; (x) Experience of using and carrying TASER.

(i) Ethnicity. Officer ethnicity was explored by just under a third of the studies, with five out of the six using multivariate analysis (Bishopp et al., 2015; Crow & Adrion, 2011; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010), the remaining study was based on officer survey data and used bivariate analysis (Ready & White, 2011).

Although the majority of the studies used similar data collection methods, the results were far less consistent. Bishopp et al. (2015) reported that Black officers were less likely to use TASER than White officers, but not Latin; whilst Gau et al. (2010) found, conversely, that White officers were less likely to use TASER than other types of force and were also less likely to use TASER as their first type of force to be applied. Lin and Jones (2010) found similar to Gau et al. (2010), that non-White officers were more likely to be involved in a TASER incident than White officers, whilst Crow and Adrion (2011) found no association between officer ethnicity and TASER use. Kuzik's study in 2019 however, found that White officers were more likely to be at 'higher risk' of using TASER; whilst Ready and White's officer survey in 2011 also found that non-White officers were more likely to be 'high-frequency' TASER users.

There could be many reasons for such disparate findings, but given the potential complex nature of cultural, social and psychological factors that can influence interracial interpersonal interactions (Jordan et al., 2012), it is likely that officer ethnicity by itself may not be a defining influence over the decision to use TASER, but may be part of a more complex interaction model.

(ii) Gender. Seven studies explored the impact of officer gender on TASER use; six of which utilised multivariate analysis (Bishopp et al., 2015; Crow & Adrion, 2011; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020) whilst the remaining study used bivariate analysis (Ready & White, 2011).

The results were fairly inconsistent, with five of the studies finding no significant associations between office gender and TASER use (Bishopp et al., 2015; Crow & Adrion, 2011; Gau et al., 2010; Lin & Jones, 2010; Ready & White, 2011) and the remaining two studies reporting that male officers were more likely to use TASER (Kuzik, 2019; Quinton et al., 2020).

(iii) Age. Four studies explored officer age as part of their analysis, one of which used bivariate analyses (Ready & White, 2011), whilst the remaining three used multivariate analyses (Crow & Adrion, 2011; Gau et al., 2010; Kuzik, 2019)

Ready and White's officer survey found that 'high-frequency users' of TASER were more likely to be younger (based on mean age), whilst Crow and Adrion (2011) found that it was in fact older officers that were more likely to use TASER than their younger counterparts. More specifically, they found that for every year of age increase there was a 5% increase in odds that the TASER would be used. However, it is important to note that officer age effects were found to be stronger when the subject was attempting to flee the police, perhaps highlighting the older officers' ability or willingness to enter into a foot-chase compared to their younger colleagues. Kuzik (2019) also reported that younger officers were more likely to be at 'low risk' of using TASER and Gau et al. (2010), conversely, found no significant associations.

(iv) Rank. Four of the studies explored officer rank as part of their analyses, one of which was an officer survey (Ready & White, 2011), whilst the remaining three were multivariate analyses of use-of-force forms (Crow & Adrion, 2011; Dymond, 2016; Gau et al., 2010). None, however, found any significant associations between rank and TASER use.

(v) Role. Although role was included in six studies, the categorisation of role was fairly inconsistent (Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020; Ready & White, 2011; White & Ready, 2007). For example, Dymond, (2016, 2018) did not specifically examine the role of the officer that used TASER, but whether there was a firearms, traffic or response officer present during the incident; whilst Ready and White (2011), however, wanted to know if the officer was part of a special unit (i.e. that they were part of a unit that was not patrol or traffic).

Ready and White (2011) found no association between type of TASER user (non-users, users, or high-frequency users) with role, whilst White and Ready's 2007 descriptive account found that officers involved in TASER incidents were mostly from the Emergency Service Unit.

Dymond (2016, 2018), however, found that TASER was more likely to be both fired, and drawn (but not discharged) if a Traffic officer or Firearms officer was present, and less likely to be both fired *and* drawn (but not discharged) if there was a Response officer present. Dymond (2016) postulates that these results are most likely to be because Firearms and Traffic officers are more likely to be equipped with TASER than their colleagues in Response; they may also merely be an artefact of the police service's organisational structure, as officers within these roles are potentially more likely to be sent to high-risk scenarios. Conversely, Kuzik (2019) found that patrol officers were more likely to be in the 'high risk' group for TASER use, and non-patrol officers were more likely to be in the 'low risk' group.

Finally, Quinton et al. (2020) reported that armed response officers were more likely than regular response officers to fire TASER during a use-of-force incident and officers that were labelled as working in 'other' roles were less likely than regular response officers to draw (but not discharge) TASER.

(vi) Length of Service. Length of service is often used as a proxy measure of experience and has been included in, or emerged from, the analysis of over a third of the studies included in this review; five of which used multivariate analyses (Dymond, 2016, 2018; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020), one used bivariate analyses (Ready & White, 2011), and the remaining study was qualitative (Sierra-Arévalo, 2019).

Dymond (2016, 2018) categorised length of service into the following three groups based on whether the most experienced officer involved in the incident had five

or fewer years of service, between six and ten years of service, or over ten years of service. The findings indicated that TASER was more likely to be fired, and more likely to be drawn (but not fired), when the most experienced officer involved in the incident had a length of service of six to ten years. Dymond proposed that this could be because this group of officers may be more likely to have received TASER training. Given that it was not until 2019 that the Home Office approved the request for student police officers (those who have not yet passed their two-year probationary period) to be able to carry TASER, this could very well be the case (UK Government, 2019).

Although Quinton et al., (2020) used the same age categories as Dymond (2016, 2018), they reported that the only significant association to emerge from their analyses was that officers with more than 15 years' service were less likely to draw (but not discharge) a TASER during a use-of-force incident, than an officer with less than six years' service. Kuzik (2019) reported that, in their sample, officers with 10 or more years' service were more likely to be at 'high risk' of using TASER, whilst those with fewer than 10 years' service were more likely to be at 'low risk.'

Conversely to the studies above, Lin and Jones (2010) failed to find any significant associations in their multivariate analysis between officer tenure and TASER use. Ready and White (2011), however, reportedly found that officers with shorter tenure were more likely to be 'high-frequency' TASER users, which dovetails with the qualitative findings in Sierra-Arévalo's 2019 study whereby 'rookie cops' use TASER more (and possibly less appropriately). They postulated that this could be because, when compared with their colleagues with longer service lengths, they a) have less experience and less developed communication skills, b) have been given training on TASER more recently, and c) view threat levels more conservatively (and do not want to engage physically with subjects).

(vii) Education, and (viii) Previous military service. Both officer education and previous military service was only examined in Ready and White's (2011) officer survey. No significant associations were found with frequency of TASER use.

(ix) Recency of Personal Safety Training. Officers within the PSEW are required to regularly undertake and pass Personal Safety Training (PST)[17] which, amongst other things, includes; information on what is reasonable force and when it can be used, practising approved use-of-force techniques (physical and verbal), and how to report uses of force. It does not, however, cover TASER - a separate training course is required for this.

Dymond (2016, 2018) separated PST recency into the following three groups: six months or fewer, between six months and a year, and over a year. They found that officers were more likely to fire TASERs when it had been a year or more since they attended PST. As PST often includes role playing the use of different types of force and bodily contact, perhaps officers who have more recently received the training are more confident in using unarmed techniques and taking control of the situation without TASER. However, the author cautioned that the relationship between the two variables was unclear and that the underlying mechanism could be more complex.

(x) Experience of using and carrying TASER. Bishopp et al. (2015) examined whether previous use of TASER was associated with future use. Interestingly, they found that those who had used TASER in the previous months were less likely to use TASER again in the future. They postulated that the reduction in TASER use was to do with novelty regression, where the baseline TASER use was measured shortly after TASER became available and the reduction in use is a natural effect of the novelty wearing off.

[17] Sometimes referred to as Officer Safety Training.

However, it is feasible that this could also indicate that their initial experience of using TASER in the real world (as opposed to in a training scenario) might have been aversive in some way. Perhaps the TASER was not effective enough (or possibly too effective), or perhaps officers felt the subsequent scrutiny and paperwork were prohibitive. Another possibility is that after experiencing the TASER utility its mere presence made officers feel confident enough to try and handle situations differently.

Finally, Ready and White's (2011) analysis also included the number of years that an officer had been carrying TASER for, finding no significant association between an officer's type of TASER user and the number of years that they had carried TASER.

Global factor three: A summary. Overall, three of the 10 factor subthemes within the global theme of Officer Factors were found to be potentially influencing factors (officer ethnicity, role and length of service). Two factor subthemes were of uncertain influence due to conflicting evidence (age and gender), four were found to be factors of indeterminate influence due to lack of evidence (education, recency of PST training, experience of using and carrying TASER, and previous military experience), whilst the remaining factor appeared to be of unlikely influence (rank).

3.4 DISCUSSION

This systematic review sought to identify and synthesise findings that would enable the exploration and evaluation of the impact of crewing levels on the decision to use TASER within the PSEW. Specifically, the review aimed to address the following two research questions:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*
- ***Research Question Two:*** *What other factors are known to be associated with, or effect the decision to use, TASER?*

As such, the discussion will review the evidence for each research question separately, discuss the overarching objective of this thesis (i.e., the examination of the potential impacts of crewing on the decision to use TASER by the PSEW), review the implications for current practice and future research, before concluding with a brief evaluation the strengths and weaknesses of Study One, i.e. the systematic literature review.

3.4.1 Do crewing levels affect the frequency and type of TASER use by police officers?

Although it could be argued that the overall results indicated that crewing levels could potentially impact on an officer's decision to use TASER, the evidence was both mixed and sparse. Even though seven out of the 20 studies explored crewing levels as part of their analyses, two of these (DeLone & Thompson, 2009; White & Ready, 2007) were purely descriptive in nature and could not be used to explore any potential *relationship* between crewing and TASER use by police officers, and one was qualitative (Hine et al., 2018b). The remaining four studies used multivariate inferential analyses to explore the impact of crewing on the use of TASER and yielded conflicting results; with two finding a significant relationship between crewing and TASER use (Brandl & Stroshine, 2017; Quinton et al., 2020), and two finding no significant relationships Dymond (2016, 2018).

However, it is also important to note that although Dymond (2016) did not find a significant association between TASER use and crewing levels, they did find that an *increase in the number of officers present* was associated with a *decrease in the odds of subject injury*. Even though (as mentioned previously) this is not within the original scope of this review, it may offer some additional insight. Dymond suggests that the mere presence of multiple officers might change the fundamental dynamic of the civilian-police encounter by dissuading the subject from resisting with high levels of

violence; perhaps echoing the findings from the single qualitative study that explored crewing levels (Hine et al., 2018b). Hine et al. (2018b) reported that their participants listed officer-to-subject ratio as an overt and pragmatic influence over their use of force decisions; more specifically. When there were *more officers than subjects* the situation was considered to be lower-risk, and, consequentially, less force would be needed to gain control over the situation.

It is also possible that the studies by Dymond (2016, 2018) found no statistically significant relationships between the number of officers and the use of TASER due to their sample. Although their policing population was taken from England and Wales, both papers used the same sample which came from a single, predominantly rural, police force. This level of specificity of the sample could have introduced a systematic bias into the analyses as policing environments across England and Wales can be very different. These differences can be especially pronounced between rural and urban environments, for example adults in urban areas are more likely to be victims of violent crime than those in rural areas (Office for National Statistics, 2019). As such, officers in more metropolitan areas may consider being single-crewed as higher-risk than their rural counterparts, have better access to TASER, and subsequently may be both more able, and willing, to use TASER. Another potential limitation of these two studies is that they appear to have used the same data set, and thus perhaps should be considered as two parts of a single study as opposed to two papers with separate but convergent findings.

These limitations, however, were somewhat addressed in the more recent British study by Quinton et al. (2020). A similar approach to that of Dymond (2016, 2018) was used, but Quinton et al. (2020) expanded their sample to include use of force data from 16 different Police Forces across England and Wales, including some with more metropolitan environments (e.g. Greater Manchester Police). Interestingly, Quinton et

al.'s (2020) results in relation to officer crewing differed from that of Dymond (2016, 2018); with officers that were alone during a use-of-force incident being significantly more likely to discharge a TASER than their colleagues that were accompanied by another officer (whom did not use force). Whilst these conflicting results may be, at least in part, due to the differing samples, they could also be due to the different way that crewing data was treated during analysis. For example, in Dymond (2016, 2018) the analyses compared TASER use between incidents where there was a single officer present (i.e. single-crewed), where there were two officers present, and when there were more than two officers present. Quinton et al. (2020) however, compared the TASER use between incidents where an officer was single-crewed at the time force was used with those where officers were crewed with another officer *who did not use force*.

Although both of the papers by Dymond used the same data set they, along with the study by Quinton et al. (2020), do have a significant and singular advantage over all the other records included in this review; they are the only studies using data from the PSEW. The remaining seventeen studies used North American or Antipodean populations, an important distinction given that different countries have different policing models (Sampson, 2012) and police different societies.

The model of policing in England and Wales is based on the nine so-called 'Peelian Principles' which establish the philosophy of 'policing with consent.' This philosophy considers police powers to be derived from the co-operation and approval of the general public rather than authoritarian conduct. These principles establish the fact that any use of force against the general population should be 'necessary,' 'proportionate,' and 'reasonable,' in all circumstances and must have a legal basis for doing so. According to the College of Policing (2014a, 2014b) Sir Robert Peel, the founder of the current British policing model, is even quoted as stating that public approval "*diminishes with our use of physical force and increases with our impartial*

service to the law" (College of Policing, 2014b, p.14), implying that force against the public should be used sparingly by the police.

In contrast, the policing model in the USA is both more permissive in regard to the use of force and more complex in its design. For example, policing in the USA comprises of varying local regional and state laws, enforcement practices and agencies, and their definition of an appropriate amount of force is described broadly as the "*amount of effort required by police to compel compliance from an unwilling subject*" (International Association of Chiefs of Police, 2001, p.1).

Compared to the UK, law enforcement within the USA is often considered to be much more authoritarian as officers have more access to firearms, are policing a population with looser gun control laws, higher rates of gun ownership (Karp, 2018), and higher rates of homicide (United Nations Office on Drugs and Crimes, n.d.). As such, it is likely that the same situation across these diverse social contexts may have completely different potential outcomes and associated risks, and that officers from these divergent cultures would consequently use force, and more specifically, TASER, differently. Due to the differences outlined above, it is clear that generalising studies from the USA to British policing might not best inform practice in England and Wales.

Given the conflicting results of the studies that did examine the impact of crewing on TASER use, the evidence regarding a possible association between crewing levels and TASER must be considered, overall, to be uncertain; with the extent and expression of any potential relationship, as well as any underlying drivers, remaining unclear.

3.4.2 What other factors are known to be associated with, or effect the decision to use, TASER?

Analysis of the data extracted from the 20 studies included in this review examined 30 different variables (or factor subthemes), all of which fell into the one of

the following three global factor themes: Situational, contextual and interpersonal elements, Subject characteristics, and Officer factors. Of these 30, only nine were consistently found to be significantly associated with TASER use across a number of studies; four of which were related to the situation, context or interactional elements of the incident (i.e. location, local TASER and use of force policies, the number of bystanders, and the level of subject resistance/compliance), two of which were related to the characteristics of the TASER subject (mental illness and mental or emotional 'disturbance,' and gender) and the remaining three were related to officer factors (officer ethnicity, role, and length of service).

However, even within these factor subthemes the *direction* of the association was not always clear. Although the evidence seems to suggest that TASER use reflects local policy, and that a subject is more likely to be involved in a TASER incident if they are male, experiencing mental illness and/or displaying mental or emotional 'disturbances' the relationships between TASER use and both the number of bystanders and a subject's level of resistance/compliance appear to be more complex.

It is possible that the common underlying factor between several of these subject characteristics is a perceived difficulty in predicting the subject's behaviour. The qualitative results from Hine et al. (2018b) indicated that officers perceived intoxicated subjects to be higher risk due to being more unpredictable, less rational, and to potentially have a higher threshold for pain. This may not be an unwarranted conception given that approximately a third of assaults without injury on a constable (32%) and a similar proportion of assaults with injury on a constable in England and Wales between 2017/18 were recorded as '*alcohol related*' (28%: Office for National Statistics, 2019). Given that over a third of the public think, incorrectly, that people with a mental health problem are likely to be violent (TNS-BMRB, 2015b), perhaps it is not unreasonable to propose that officers might also be more likely to use TASER as they also perceive

these subjects as being higher-risk due to assumptions about violent and unpredictable behaviour. However, given that one of the most cited reasons for an officer's use of force is to 'protect subject' (41%), officers may not just be worried about being the victim of violence themselves; they may also be concerned about subjects with mental health difficulties self-harming or posing a risk to themselves.

Although the vast majority of variables examined across the studies included in this review appear to provide inconsistent, conflicting, or inadequate evidence to support their impact as a predictor of TASER use, discovering (or at least exploring) the reasons behind these discrepancies is a difficult, but necessary, task if we hope to better understand the nature and extent of TASER within the PSEW.

The first potential cause of such inconsistency is the differing policing contexts (international and local) in which these TASER incidents are taking place. As previously mentioned, there are considerable differences between the policing contexts of the USA, the Antipodes, and the UK, as well as within-country differences between rural and urban policing. There are also key differences across police roles (e.g. Response, Roads, or Neighbourhood policing roles), which may impact on the likelihood of officers' use of TASER. For example, in the PSEW, one of the key duties of a Response officer is to attend emergency calls, whilst those within a Neighbourhood policing role are expected to work collaboratively with their local communities to problem solve and maintain good public relations. Given the diverse defining features of roles such as these, officers in different roles will have varying levels of contact with the public, access to TASER equipment and the required training and, consequently, experience differing opportunities to use TASER (whereby TASER is accessible *and* an appropriate use of force for the situation at hand).

Although Dymond (2016) tried to control for access to TASER by controlling for year (due to differing levels of access to TASER across time), only Quinton et al.

(2020) explicitly controlled for access to TASER at the incident-level (i.e. whether an officer had access to a TASER *during* the incident where force is required). Access to TASER would, naturally, have a significant impact on an officer's opportunity (rather than decision) to use TASER and given that there could be any number of extraneous variables associated with TASER availability, failure to control for this could provide a source of systematic bias in the data. For example, although Brandl and Stroshine (2017) found a significant relationship between crewing and the use of TASER, with the presence of more officers resulting in an increased likelihood of TASER being used, this could be due to opportunity to use TASER rather than crewing as the more police officers are present, the more likely there is to be a TASER carrying officer *present*.

Another potential reason for conflicting results across the review sample is the inconsistent way in which the same variables were measured. A good example of this is a subject's level of resistance. Although this was included in the results of three quarters of the studies included in this review, the way in which this was measured ranged from a single binary question (yes/no) that asked whether the subject was physically resistant or not (DeLone & Thompson, 2009) to specific types of resistance, such as fleeing from the police (Mesloh et al., 2005), and response scales which listed three or four differing levels of resistance (Brandl & Stroshine, 2017; Dymond, 2018).

A final possible source of inconsistency across the review sample is the method by which the data has been treated in preparation for the multivariate analyses used by the studies within this review. This is because the majority of multivariate analyses utilised by these studies required the authors to artificially dichotomise their variables. For example, TASER was often only examined as 'used' or 'not used,' with the reference category as being 'other use of force' or another specific type of force (e.g. OCS). However, conflating use of force options into binary categories, may well obscure more subtle differences between similar use of force options, and provide a

limited scope within which the wider context of TASER use cannot be examined. For example, Brandl and Stroshine (2017) found that crewing impacted on an officer's selection between using TASER and using OCS; a relationship that would have been masked if all non-TASER force had been aggregated into a single binary outcome. Conversely, however, if an analysis only compares TASER use to one other type of force (e.g. OCS), then the authors cannot ascertain any overall changes in TASER use and any other relationships between TASER use and other specific types of force may be missed entirely. For example, if single-crewed officers are more likely than double-crewed officers to use a baton than their TASER, it may not be possible to evidence this if the analysis only compares the rate of TASER use to the rate of OCS use – as proportionally, the use of these two types of force could remain the same.

In addition, the tendency to neglect the distinction between discharge and non-discharge uses of TASER, such as 'red-dotting' (an application of TASER whereby the weapon is drawn and aimed directly at a target with the laser sight on, but without discharging the TASER), also means that the majority of analyses within this review could not detect any subtle impacts that these variables might have on TASER use. A particularly important area to consider, given that 86% of all TASER uses in UK are not actually discharges (Home Office, 2020c).

Although the level of inconsistency across study findings is not ideal, it may not be that unusual. The outcome of this review appears to be similar to that of a review in 2010 by Klahm and Tillyer, which focussed on the wider issue of use of force as a whole (instead of TASER use in particular). However, they also found that the majority of variables examined across multiple studies within their review sample had divergent findings and/or a weak relationship with use of force overall. Nonetheless, they also concluded that male suspects, those that were intoxicated, offering resistance, or were

arrested during their encounter with police were much more likely to experience police force.

Regardless of the potentially confounding issues listed above, another limitation that needs to be addressed is the lack of any psychological or biological approaches to the exploration of TASER use. Given that decision-making is a complex process that relies on a myriad of factors, it is important to consider what Dror (2007) refers to as internal factors, and include the beliefs, values, affect, cognitive ability, availability of cognitive resources (e.g. working memory), prior learning, expectations, personality traits, and experience of the decision-maker. These factors can account for why individuals facing the same decision factors can ultimately end up differing in their decision outcome. Indeed, Dymond (2016) went so far as to say *"The use of Taser cannot be understood without an emphasis on the decision making of the officers charged with using the weapon."* (p. 187).

Moreover, although many of the studies examined the behaviour and presentation of TASER *subjects* as part of their analysis, none of the studies included in this review do the same for officer characteristics. For the most part, the only officer factors included in the analyses were social or occupational demographics (e.g. ethnicity, age, gender, rank, role, and length of service); none of the studies examined the behaviour of the officers, nor the tone or the quality of their interaction with the TASER subject. Though this deficit is likely to be due to the availability and accessibility of data (use-of-force forms do not routinely ask for details regarding the officer's affective state, nor for their behaviour over and above their selection of force), neglecting these variables ultimately also neglects the officer as an active agent, reducing them almost to a passive instrument of the law. Any decision model that removes officers' autonomy in such a manner is problematic for several reasons. First, they will be unable to account for how and why individuals facing the same decision

factors can ultimately end up differing in their decision outcome. Secondly, they would also be unable to account for how and why the same individual might make a different decision across time – even when all the external decision factors (such as situation, context and subject characteristics) remained the same. Finally, a deficit of this sort would leave a model unable to account for, nor examine, problematic TASER use – including errors and disproportionate use or discriminatory practices on or against vulnerable groups and minorities.

The interpersonal nature of use-of-force incidents highlights another limitation of many of the studies included in this review. Some subject characteristics are measured and recorded as isolated absolutes when they would, perhaps, be better viewed as a dynamic set of interpersonal characteristics. For example, subject height and weight cannot be used as a proxy for perceived levels of threat, when this does not take the officers height and weight into account also. For example, a subject who is 6' tall would potentially be considered as a greater threat by an officer who is 5' tall than by an officer of similar height to the subject. Perhaps then, as in Gau et al.'s 2010 study, some characteristics might be better suited to being examined as a bilateral measurement (such as officer to subject height ratio).

In addition, whilst many of the independent variables listed were objective in nature, there were a few - mainly in regard to subject characteristics - that relied heavily on a subjective assessment by the officer, such as mental or emotional 'disturbance.' Given that the majority of data across the studies came from official self-report sources (such as use-of-force forms), this may have introduced a level of reporting bias as officers may seek to, consciously or unconsciously, sanitise the report. It also means that the data focuses on the outward expressions of an officer's decision-making (i.e. use of force outcomes) rather than the underlying mechanisms of decision-making, preventing the true nature of the phenomenon from being unveiled and understood.

Perhaps then, the field would benefit from primary data collection methods and more qualitative methods to explore some of these driving factors as only three of the 20 studies utilised this methodology to explore how and when TASER is used.

The final but perhaps the most important limitation of the studies included in this review is that none of them actually sought to evaluate the *quality* of the decision to use TASER. That is to say, whilst all of the studies reviewed the *use* of TASER as an outcome none examined the *legality* or *appropriateness* of this use by reviewing whether its use was justified by the legal and organisational parameters under which it took place.

Implications for practice, policy and research

Research. Understanding the factors associated with TASER use and the underlying mechanisms driving them is important for numerous reasons. Not only is TASER use costly for the subject in terms of pain, possible injury, trauma and cognitive processing immediately after exposure, but poor practice can also be costly to the police service in terms of the potential for complaints, internal investigations, and their relationship with the general public.

In addition to the reasons related above, policing policy should be based on evidence, and as such it is important to fully understand the nature and extent of TASER use within the PSEW. Only then can training protocols be tailored to its appropriate use and deliver policy that is formulated to instruct officers when they can and should use TASER.

The results of this review indicate that the existing understanding surrounding the factors associated with TASER use and the underlying mechanisms driving them could be improved, especially in relation to *appropriate* use. At present, the research appears to be limited, non-UK centric, and with many conflicting results. The existing studies, as mentioned above, also appear to neglect the role of discretionary decision-

making of individual officers; a fundamental and necessary policing skill (Wood et al., 2018).

As such, it would be beneficial for additional future research within the UK policing population to concentrate on individual officer thoughts, feelings and behaviours (rather than just socio-occupational demographic characteristics).

Future research should also consider exploring an outcome that has thus far been omitted from all TASER studies, i.e. whether or not the TASER use was appropriate. In essence, whether the decision to subject a member of the public to TASER was the right decision, or whether another approach could have (and should have) been used. This area has most likely been neglected so far due to methodological issues with evaluating and classifying this outcome, but also due to political and practical issues. By admitting inappropriate TASER use an officer could potentially open themselves up to disciplinary and possibly legal actions, and as such, the only way to collect data on the overall quality of an officers' decision may be via anonymous self-report or through confidential internal processes, such as training environments or internal review groups. For example, in 2016, HIMCFRS reported that South Wales Police had previously established a TASER review group to identify trends, lessons learned, and consider of the use of TASER; whilst Thames Valley Police and Hampshire Constabulary were operating a peer review group which assessed data on the use of TASER and reviewed individual incidents where appropriate (HMIC, 2016b, 2016a).

In addition, future research may also benefit from taking a qualitative approach to examine the why and how officers use TASER, as this may provide a richer understanding of the causal mechanisms for the officers' choices – supplementing the qualitative approaches utilised by the majority of research thus far.

Due to the conflicting results in relation to intoxication, one final research recommendation would be to gather more information around the use of TASER on

intoxicated subjects; especially given that some medical professionals have highlighted concerns that TASER use on a subject under the influence of alcohol or drugs can carry a higher risk of adverse health outcomes (Defence Scientific Advisory Council Sub-Committee on the Medical Implications of Less-Lethal Weapons, 2012).

Practice and policy. For police legitimacy to be protected, all use of force needs to be used as sparingly and appropriately as possible. Cases of unnecessary, disproportionate, or unreasonable force can put a strain on the relationship between the police and a public; a concerning result for a policing model that is based on the public's consent like in the PSEW.

As such, any potentially disproportionate use of TASER on vulnerable groups (such as those with mental health conditions) should be of considerable concern to policy makers and the police service alike. Unsurprising then, that the role of the police and, more specifically their use of TASER within mental health emergencies, is a hotly debated topic; with many health professionals raising concerns around the appropriateness of their use and the potential for creating additional trauma to those who are already in distress (Little et al., 2013; O'Brien & McKenna, 2007; O'Brien & Thom, 2014). These concerns are most likely exacerbated by high profile TASER incidents involving vulnerable subjects such as Dalian Atkinson ("Dalian Atkinson," 2021) and Michael Gilchrist (Menendez, 2019), that have tragically ended in severe harm and death.

Although responding to mental health emergencies is not a new role for the PSEW, it is one that has become more frequent as officers are increasingly expected to absorb the work of other partner agencies (Betts & Farmer, 2019; Elliott-Davies et al., 2016; Elliott-Davies, 2019). However, it is not just TASER that appears to be used disproportionately against vulnerable groups such as those with mental ill health, but the overall use of force has been considered to be similarly concerning. According to

the Independent Commission on Mental Health and Policing (Adebowale, 2013), there have been recurrent failings in regard to effective communication between police officers in the Metropolitan Police Service (MPS) and people with mental ill health and vulnerabilities – and infers that this may be a factor in the disproportionate use of force against this population. Moreover, the report suggests that Personal Safety Training should be amended to specifically deal with the issue of TASER in the context of mental health. However, evidence on whether or not this has been borne out in practice is not publicly forthcoming and recent reports suggest that although additional mental health and communication training for officers is required (HMICFRS, 2017), investment in such training is currently inconsistent (Betts & Farmer, 2019; HMICFRS, 2018). Moreover, a recent national review by HMICFRS (2018) indicates that funding cuts across the public services have left the police to manage mental health crises in the community more often than they should, and that although some Forces are investing in mental health training, the quality and accessibility is, overall, quite variable.

Perhaps then, one policy recommendation would be to conduct an investigative review into whether the recommendations from the Independent Commission on Mental Health and Policing in 2013 (Adebowale, 2013) have been implemented within the MPS; and whether they perhaps also need to be implemented in other forces.

The College of Policing (CoP) also appears to recognise the disproportionality of TASER use on subjects with mental ill health as it encourages forces to consider referring TASER incidents to the Independent Officer of Police Conduct (IOPC; previously the Independent Police Complaints Commission, or IPCC) if TASER has been used on someone with mental health difficulties or who are otherwise vulnerable (CoP, 2013a).

Although the IOPC released a review of TASER use in 2021 (IOPC, 2021), the previous review was released over six years prior in 2014 (IPCC, 2014b). Given the

documented propensity for TASER to be used, and used disproportionately, against vulnerable groups (Brandl & Stroshine, 2017; Dymond, 2016, 2018; IOPC, 2021; Kuzik, 2019; Quinton et al., 2020) perhaps more regular reports on the matter going forward would be prudent. This is particularly pertinent a recent announcement by the Home Office included a promise of £10 million uplift in funding to significantly increase the number of officers carrying the devices in England and Wales (Home Office, 2019a).

The potential policy responses mentioned thus far are mostly reactive, and although monitoring and recording of incidents and the implementation of recommendations are important; there may be some scope for more proactive measures. For example, in 2017, a memorandum of understanding was developed and agreed between the PSEW and British mental health services in regard to the use of restraint in mental health & learning disability settings (CoP et al., 2016). Perhaps there is similar scope for a working group to create another memorandum of understanding, but this time for the use of TASER in mental health emergencies.

Given the propensity for proportionately greater TASER use in vulnerable groups, it should be considered a matter of some urgency that TASER use in these instances are monitored and receive the appropriate follow-up; not only to ensure that the subject receives the appropriate aftercare, but so that any acute or chronic adverse health impacts are recorded accurately.

Finally, due to the disproportionate use of TASER against the Black community (Home Office, 2020c; IOPC, 2020), the recent commencement of the independent review into said disproportionate use of TASER (National Police Chiefs' Council, 2020a), and recent speculation that UK police chiefs are currently considering the public admission of institutional racism (over two decades since the Metropolitan Police were labelled as 'institutionally racist' by the Stephen Lawrence Inquiry, also known as

the MacPherson report; MacPherson, 1999), it would be remiss if subject ethnicity were not mentioned here. Although the results of the eight multivariate studies that examined subject ethnicity during their analyses were divergent, given social and contextual differences between countries, it is important to focus on the results of those that used British samples (Dymond, 2016, 2018; Quinton et al., 2020). Whilst Dymond (2016, 2018) found no associations between subject ethnicity and TASER use, this may have been due to the predominantly rural force area being examined. Data on regional ethnic diversity published by the UK government not only indicates that Black ethnic groups are more likely to live in urban areas than their White counterparts, but that only 2% of individuals from Black ethnic groups live in rural locations (UK Government, 2018). Indeed, when Quinton et al. (2020) conducted similar data analyses on comparable data from a wider range of UK police forces, they found that TASER was more likely to be drawn against Black and Black British subjects than White and White British subjects during use-of-force incidents. However, they also found that TASER was *less* likely to be used against members of the Asian and Asian British communities; indicating that the relationship between TASER use and ethnicity is perhaps more complex than the majority of the research has accounted for thus far, and that there continues to be an urgent need for additional, more detailed data to be recorded and published publicly.

Strengths and limitations

The main strength of this review was the wide scope provided by using the four staged search design that ensured any combination of two or more key concepts would be returned for review. This ensured that the review net was cast extremely wide, and as such, the likelihood of relevant research being omitted was reduced.

In terms of limitations, there are two of substantial import. Firstly, the scope of the review was specific to the use of TASER. However, TASER is just one of many types of force available to a police officer as part of their tool kit when they are making

the decision to use force. As such, perhaps the scope of the study should have been expanded to enable TASER use to be examined more holistically as part of the wider use of force spectrum and its associated literature. Though related to the first limitation, the second is specific to the search terms. Although limiting the search terms for the third key concept to those that directly referred to TASER (and not other types of force, nor 'use of force' in general) enabled a more focussed and efficient search, this may have led to the exclusion of some potentially relevant material. For example, the report by Quinton et al. (2020) was not identified through the database searches and instead was identified by happenstance via a professional contact within the PFEW. This was because the report included information on multiple types of force, and thus the authors chose to use the more inclusive term 'use of force' within the document title (and given that the report was grey literature there was no abstract to search).

The final limitation was the omission of two search terms from within the key concept of TASER that whilst are not commonly used, especially within the UK, may have impacted on the search returns: i.e., 'stun gun' and 'electronic control devices.'

3.5 CONCLUSIONS

This review has drawn together and evaluated the existing evidence base on TASER use to ascertain what may already be known about the factors that could impact the use of TASER by the PSEW, and where any gaps in our collective knowledge may reside.

Only three papers, two of which were drawn from the same rural data set, examined TASER use within the PSEW; the remaining papers all used North American or Antipodean policing populations. Whilst there are huge differences in policing context between these populations the results have, nonetheless, provided some insight. However, the results were, overall, fairly inconsistent across studies and few factors were consistently found to be predictive of TASER use.

The results of this review indicate that the existing understanding surrounding the factors associated with TASER use, and the underlying mechanisms driving them, is currently lacking. At present, the research appears to be limited, non-UK centric, and with many conflicting results. Nonetheless, some variables were consistently found to be significantly associated with TASER use across several studies within the review; including a concerning tendency for TASER use to be more likely when a subject's mental state was judged to be disturbed or impaired. As such, it would be beneficial for additional future research to examine TASER use within the policing context of England and Wales in more depth, including any potential differences between rural and urban environments and exploring how and why perceptions of mental disturbance or impairment result in an increased likelihood for TASER use.

Although behaviour can be considered, in most cases, to be the successor to decision-making, examining behaviour alone cannot necessarily tell us about the underlying mechanisms driving the cognitive processes. Decision-making is influenced by a delicate and complex mix of internal and external stimuli (Dror, 2007) and although some of these papers attempt to recognise this in some way, many of the internal stimuli that might be associated with an officer's decision to use TASER (e.g. how an officer might think or feel) have not yet been explored. Given that officers are autonomous participants in their encounters with the general public, the psychological perspective should be addressed as it could, potentially, account for some of the variance seen across the results of the existing work.

CHAPTER FOUR: THE DIARY STUDY OVERVIEW

This chapter will start by providing a brief introduction to give a contextual backdrop against which Study Two is set, before providing a rigorous description of the methods and techniques used for data collection and analyses. Due to the complicated and multi-staged approach utilised by Study Two, particular attention will be paid to: study design and ethical approval, sampling strategy, study procedure, participant management, study materials, and analytical approach. Data cleaning, response rates and socio-occupational demographics for each of the participation stages through Study Two (i.e. registration, the baseline survey, shift diaries, and the post-participation questionnaire) are detailed at the end of this chapter. Due to the depth and breadth of data that were collected and analysed as part of this particular study, the results have been divided into quantitative and qualitative findings; with quantitative results reported within Chapter Five, and qualitative results reported in Chapter Six.

4.1 INTRODUCTION

The use of TASER by the Police Service of England and Wales (PSEW) has steadily increased over the last two decades since they were introduced in 2003 (please see Chapter One for more details). Although TASER is classed as both a 'less-lethal' weapon and an 'incapacitation' device, the electrical current that causes the neuromuscular incapacitation that characterises this particular type of armament is not only extremely painful but can also result in serious injury (please see Chapter One).

TASER use, though potentially very damaging for the targets, may also be damaging to the police service. Cases of poor practice and disproportionate use against citizens can be costly to the police service in terms of the potential for complaints, internal investigations, and the relationship between the police and the public. For example, in May 2020, the Independent Office for Police Conduct (IOPC) called for greater scrutiny of the use of TASER by the police in England and Wales after concerns

were raised over the *"disproportionate use of TASER against Black people and those with mental ill health"* (Independent Office for Police Conduct, 2020) - leading to the proceeding review of disproportionality in TASER use discussed in Chapter One.

Given the serious nature of potential TASER impacts (please see Chapter One), the imperative to gain a greater understanding as to the factors that are associated with its deployment and use, is undeniable; and, perhaps, the lack of research into TASER use by the PSEW, quite surprising. The results from Study One, i.e. the systematic literature review, highlighted that there are only a few studies that have chosen to examine TASER use in detail, and that the existing understanding surrounding the factors associated with TASER use, and any underlying mechanisms driving them, are currently lacking. In particular, there is little UK-centric research, and the research to-date only focusses on situational, organisational or, in a few cases, social factors, that might impact on an officers' decision to use TASER (please see Chapter Three for more detail).

Though decision-making is a complex and dynamic process between the external and internal world, the two innermost aspects of decision-making have yet to be considered by the literature – i.e., the biological and psychological drivers of officer decision-making. In order to gather, interpret, and evaluate information about ourselves and our surroundings, we are reliant on what our senses tell us; senses which are fallible and open to error, especially when the circumstances are less than ideal. Much previous research, for example, has evidenced that our biological response to acute stress can impact a range of cognitive and affective processes linked to decision-making, including; working memory, threat-selective attention, anxiety, and fear (Het & Wolf, 2007; Putman et al., 2007; Putman, Hermans, et al., 2010; Soravia et al., 2006; Wolf, 2003). Similarly, poor sleep, acute physical fatigue and tiredness have been found to decrease aspects of cognitive functioning such as vigilance and monitoring, reaction

times and memory (Dembe et al., 2005; Guo et al., 2018; Harrison & Horne, 2000; Health and Safety Executive, 2006; Kronholm et al., 2009; Moore et al., 2012), whilst mental fatigue (a psychobiological state caused by sustained cognitive demands; Marcora et al., 2009) can also inhibit cognitive functioning and, potentially, physical endurance (Boksem et al., 2005, 2006; Boksem & Tops, 2008; Marcora et al., 2009; van der Linden & Eling, 2006; van der Linden et al., 2003; Van Der Linden et al., 2003).

These particular internal decision factors could potentially impact officer decision-making by limiting the mental resources available to the decision-maker, meaning that they have to rely more heavily on what Stanovich & West (2000) called System One processing (characterised as being fast, automatic, associative, intuitive, implicit and unconscious decision-making) which could include cognitive short-cuts and heuristics, potentially leaving the decision-maker more open to error and bias (such as unconscious stereotyping).

The evidence above is of particular importance within the current context as officers often face critical incidents that can result in acute stress (Anderson et al., 2002; Arble et al., 2019; Mark et al., 1997), many officers report high levels of job-related stress and fatigue that interferes with work (Elliott-Davies, 2021), and there is some evidence that might suggest a potential link between frequent single-crewing and higher levels of job-related stress (Elliott-Davies, 2020).

As mentioned previously, the systematic literature review not only failed to find a definitive answer to the first and foremost research question posed as part of this thesis (i.e. *Do crewing levels affect the frequency and type of TASER use by police officers?*), but it also identified a number of gaps in the existing evidence base regarding the relationship between TASER use and crewing. This included a paucity of UK-centric research, a tendency to treat officers as instruments of the law instead of individual actors in an interpersonal exchange, and finally, an absence of psychological

and biological approaches to the exploration of the relationship between officer crewing and TASER use.

As such, the main aims of Study Two are to explore and evidence how crewing practices might affect how police officers think and feel, and how these might relate to both the internal and external factors that drive the decision to use TASER. This study was also designed to try and mitigate some of the other limitations from previous studies highlighted through the systematic literature review, including being able to control for TASER access and availability at the time that force was used.

In order to meet the aims outlined above, research question one from Study One (i.e. *Do crewing levels affect the frequency and type of TASER use by police officers?)* was retained for Study Two, along with the addition of five supplementary research questions. The first three of these supplementary questions (listed below) were developed to close the gaps in the current knowledgebase by examining decision-making factors that are internal to the officers themselves:

- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Four:*** *If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?*
- ***Research Question Five:*** *Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?*

Given that Study One also discovered that the majority of the extant literature was primarily quantitative in nature, a quasi-experimental mixed methods field study was chosen so that a qualitative approach could be used to examine how crewing impacts officers, and how they go about making use of force decisions; providing the opportunity to gain a much more in-depth understanding of officer experiences than

previously captured. As such, the following two research questions were also added with the intention of exploring officers' experiences to augment the findings from the previous research questions, which focus on behavioural outcomes only:

- ***Research Question Six:*** *How do officers think crewing impacts them, and how they do their job?*
- ***Research Question Seven:*** *How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

As discussed in Chapter Two, research question one, four and five are explored primarily via quantitative methods; the results of which are presented in Chapter Five. Research questions six and seven are predominantly explored via qualitative methods; the results of which are presented in Chapter Six. Research question three, however, is explored equally via qualitative and quantitative methods; as such, results pertaining to this particular research question are presented in both Chapters Five and Six. Nonetheless, Chapter Seven draws the results together from both Chapter Five and Six to directly address the research questions listed above and discuss the overall findings.

4.2 METHOD

4.2.1 Design and ethical approval

As mentioned within the previous section, this study was designed as a structured diary study with nested qualitative elements (self-reported field observations). The study used the online web-based survey software Survey Monkey to collect data between April and September in 2019 via a bespoke phone app called 'RH Cops and Crewing,' which could be downloaded from both the Apple App Store and the Google Play Store. The phone app acted both as a central repository for participant information (please see Appendix 11 for participant information) and as the single point of access for all electronic forms other than the post-participation questionnaire.

Examples of the app interface are provided in Figures 4.2 - 4.7, and a video demonstration of the app functionality can be viewed via the following link: https://youtu.be/xlhp_HJMV3o.

Ethical approval was granted by the Royal Holloway University London ethics committee (REF:1449), and a Letter of agreement between the Police Federation of England and Wales (PFEW) and Royal Holloway, University of London was developed and signed by both parties (Appendix 12).

4.2.2 Sampling strategy

A non-probability sampling technique was used to generate participants. More specifically, an exponential non-discriminative snowball sampling strategy was employed whereby potential participants were first invited to take part in the study via a variety of methods including the following (for examples of each please see Appendix 13):

- Invitation by the following key policing figures via social media such as Twitter, LinkedIn, and Facebook:
    - Chair, Vice Chair and Treasurer of the PFEW
    - The official PFEW Twitter account
    - National Representatives of the PFEW
    - The Police Foundation
    - The Director of the Canterbury Centre for Policing Research, and
    - a Senior Lecturer at the Canterbury Centre for Policing Research.
- A short article advertising participation in Police Magazine; the monthly magazine printed by the PFEW.
- Invitation circulation in local force areas by engaged Branch Board Members of the PFEW via email, posters, flyers, local intranet systems, and local publications.

From these initial contacts, further participation was encouraged by referral from existing participants or interested others. This included local Sergeants and support from leaders circulating the invitation round their teams/memberships and word of mouth between individuals.

4.2.3 Procedure

When receiving the participation invite via the methods outlined above, participants were directed to download the RH Cops and Crewing Application (or app) onto their mobile phones via a link, a QR code, or by instructing them to search for 'RH Cops and Crewing,' in their application store (the Google Play Store for those with Android phones, and the Apple App Store for those with iPhones). Once downloaded, participants could register to take part via an online form within the app. For a process timeline please see Figure 4.1, and for example screen shots of the app, please see the Figures 4.2 - 4.7. The study took a four-stage approach where participants completed the following:

i. **Registration via the RH Cops and Crewing App:** This included personal details and occupational demographic questions such as name, rank, role etc, logged and evidenced participant consent, and, required a PNN email address as proof of officer status (please see Appendix 14 for a copy of the registration questions).

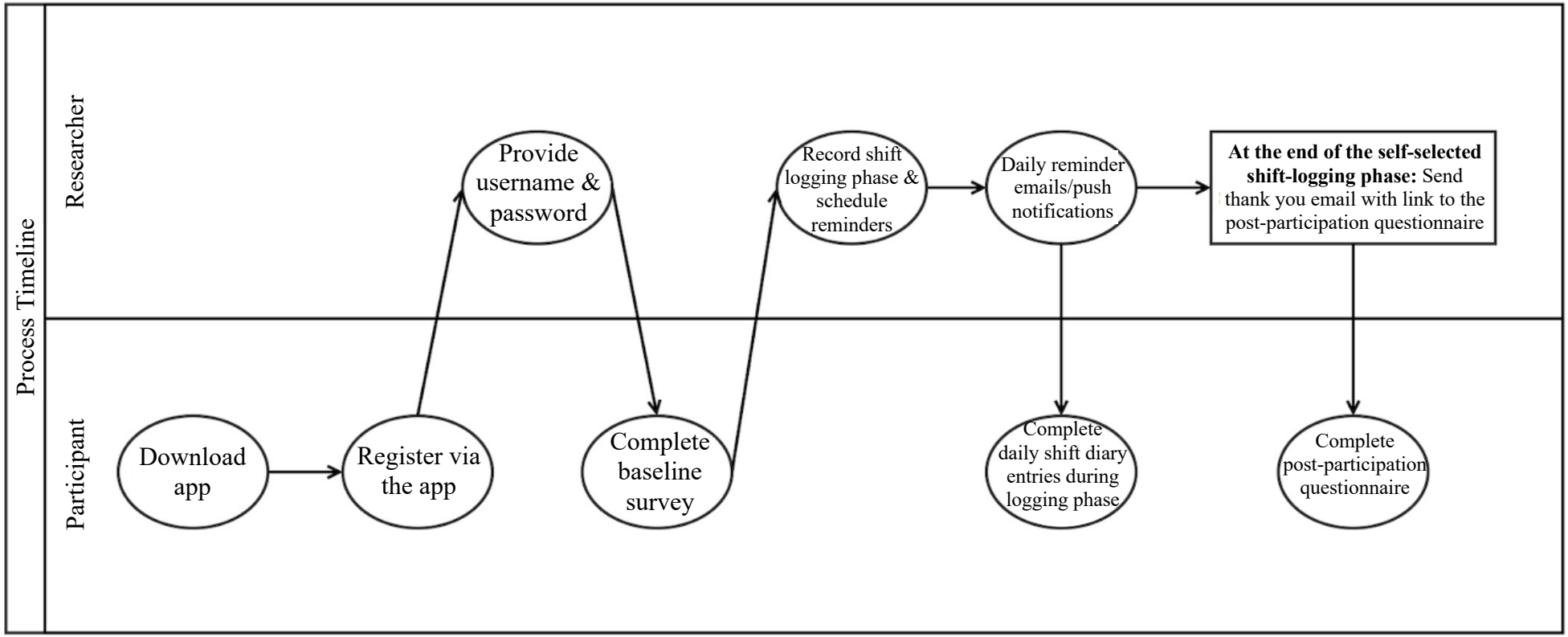
ii. **Completion of a baseline survey via the RH Cops and Crewing App:** This asked participants questions about themselves, how they feel about work, and how they make decisions (please see Appendix 15 for a full copy of the baseline survey questions).

iii. **Shift diary consisting of a quick five-minute survey at the end of each shift for two weeks via the RH Cops and Crewing App:** This asked

participants questions about their daily shift experiences (please see Appendix 16 for a copy of the shift diary survey questions).

iv. **A post-participation questionnaire via email:** This asked participants questions about their thoughts, experiences, and views on police crewing practices more generally (please see Appendix 17 for a copy of the post-participation questionnaire questions).

Figure 4.1 *Diary Study: Process Timeline*



Figures 4.2 – 4.7 *Diary Study: A Selection of Cops and Crewing App Screenshots*

Figure 4.2

App download screen

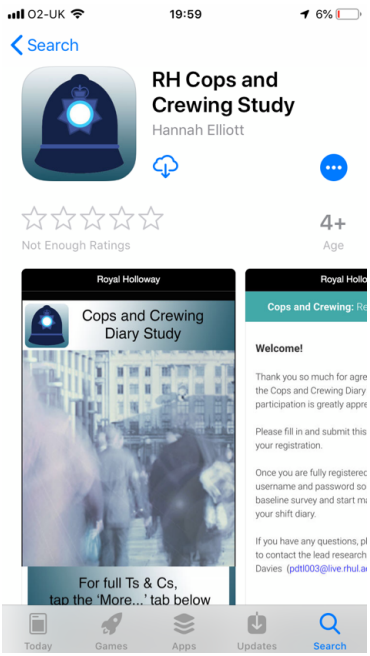


Figure 4.3

App home screen

Figure 4.4

App registration screen

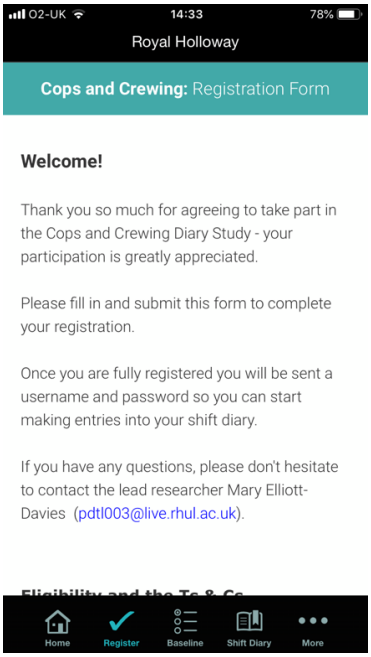


Figure 4.5

App baseline survey screen

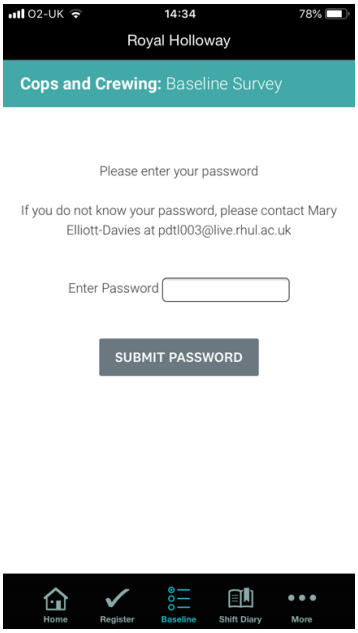


Figure 4.6

App shift diary screen

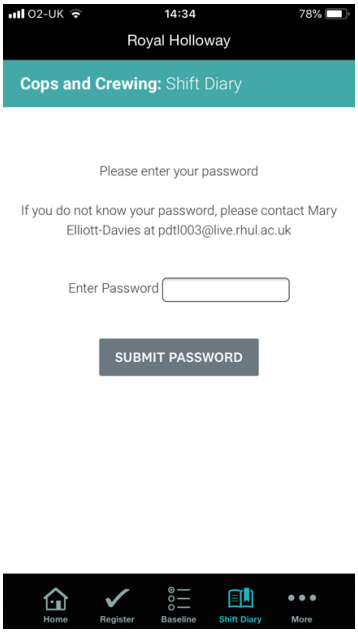
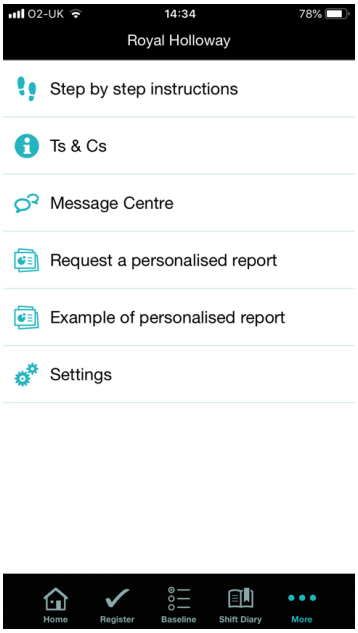


Figure 4.7

App menu screen



4.2.4 Participant management

In order to optimise engagement and data integrity, a number of participant management strategies were embedded in the study procedure, including usernames, password protection, and various participation reminders. Please see below for more information.

Confidentially and anonymity

Upon registration, potential participants were sent a unique username and password in an email to their Police Service registered PNN email address (for example email please see Appendix 18). To ensure impartiality and true anonymity, usernames were generated using an online username generator[18] and consisted of three random letters and then two or three numbers.

Participant usernames were not only used for triangulating results across the baseline survey, shift diary entries and post-participation questionnaire; but they were also used to anonymise data so that all personal information could be being held separately to the research results. In addition to their username, each participant was assigned a participant ID for use by the researcher only (a sequential number starting from one, in order of their registration) so that the total number of participants was easy to keep track of. All data was stored securely on the researcher's computer in password-protected files.

Shift diary reminders

Participants were asked (as part of the registration process) whether they would like to have daily email reminders encouraging them to fill in their shift diary during their self-selected logging phase. Those that requested this and provided dates (via their

[18] https://www.lastpass.com/username-generator

baseline survey) indicating when they would be taking part in the shift diary logging phase, were sent daily email reminders (for example email please see Appendix 18).

Other reminders

Participants that had registered to take part in the study but then failed to complete their baseline survey and/or any shift diary entries were sent a single email reminder to encourage re-engagement in the process.

In addition, participants that failed to fill in the post-participation questionnaire within three weeks of being invited, were sent a single follow-up reminder email to encourage re-engagement in the process (please see Appendix 18 for example email reminders). Participants were sent emails inviting them to complete the post-participation questionnaire once their self-selected shift-logging phase had ended, or, if they had not provided this information in their baseline survey, approximately three weeks after registration.

Personal report requests

As part of the engagement process, participants were offered the option of receiving a personalised report based on their responses to the questions within the baseline survey and the shift diary entries. To request a personalised report, participants were required to complete a request form via the RH Cops and Crewing app (please see Appendix 19 for a copy of the request form and Appendix 20 for an example report). As part of this report, participants were offered a brief evaluation of their general decision-making style based on their scores from the General Decision-Making Style inventory, sleep and fatigue trends, total number of hours worked, total number of incidents attended and overviews of their self-reported crewing levels, workload ratings and stress ratings. In total, 16 participants requested a personalised report, and each received these via email within three weeks of requesting the report and/or finishing their shift diary entries. For an example of a personalised report, please see Appendix 20.

Prize Draw

To provide additional motivation to register, participants were also eligible to take part in a free prize draw upon registration to win one of three £20 Amazon vouchers. Participants that wanted to take part were asked to leave a preferred email address to be contacted by should they be one of the lucky winners.

Of the 154 officers that registered, 146 indicated that they wanted to take part in the prize draw. These participants were allocated a number between one and 146 in order of registration, and then three numbers between one and 146 were randomly selected using an online random number generator.[19]

All three winning participants were sent an email thanking them for participation and informing them of their success. Amazon vouchers were sent on the 23 September 2019 to the preferred email addresses listed on their registration forms. The email also offered them the opportunity to receive a brief study summary outlining a few key descriptive statistics if they were interested in the findings of the study.

Participants that did not win were sent an email thanking them for their participation and letting them know that they were unfortunately not prize draw winners. However, the email also offered them the opportunity to receive a brief study summary outlining a few key descriptive statistics if they were interested in the study findings. Participants that had not entered the prize draw were also sent a thank you email offering the opportunity to receive a brief study summary outlining a few key descriptive statistics.

For examples of these emails, please see Appendix 21, and for an example of the brief study summary email and brief study summary please see Appendix 22. In total, 17 participants requested a copy of the brief study summary, and these were circulated on the 1 April 2020.

[19] https://www.random.org

4.2.5 Materials

Due to the exploratory nature of the research the number of quantitative measures that were collected was high. However, all quantitative variables were selected based on existing literature and normal recording practices (please see Appendix 23 for a table outlining the quantitative variables examined, the rationale, and supporting evidence for their inclusion).

4.2.5.1 Step 1 – The Registration Form

The registration form for the study acted, in part, as the participant consent form; with potential participants being asked to confirm the following:

- That they were a serving police officer;
- That they were in a role that required everyday contact with the public and the provision of direct intervention to keep people safe and enforce the law;
- That they read and understood the Ts & Cs section of the app and consented to participation in the study;
- That they consented to the information that they provided whilst participating in the study to be used and processed by the researcher in the manner set out in the Ts & Cs section of the app, and;
- That they consented to any special category data on their wellbeing being used and processed by the researcher in the manner set out in the Ts & Cs section of the app.

Only those participants who positively confirmed all the above were able to progress through the form. The form also asked participants for their: Name, gender, age, length of service, length of service in their current role, current rank, force, role type, their Police National Network email address (referred to as a PNN address), their

preferred email address, whether they were an authorised TASER or firearms officer, whether they wanted email reminders, and, finally, whether they wanted to take part in the prize draw.

Upon the submission of a valid registration form, participants were sent a username and password to their PNN address. Only those with a valid username and password were able to access the baseline survey and shift diary areas of the app, ensuring that only those that were eligible and had consented fully were able to take part in the study.

4.2.5.2 Step 2 – The Baseline Survey

To access the baseline survey participants needed to select the Baseline Survey icon in the RH Cops and Crewing app and then enter their username and password. Upon gaining entry to the survey, participants were asked a range of questions to ascertain their self-selected dates for their shift diary logging phase (see below), their overall views and experiences of being a police officer, and of their decision-making style. Question domains are described below.

Workload

Overall workload was assessed using the single item indicator used by the Armed Forces Continuous Attitude Survey (AFCAS: Ministry of Defence, 2018) and the PFEW in their biennial Demand, Capacity and Welfare Survey (DCWS: Elliott-Davies, 2021a). Survey respondents were presented with the question '*How would you rate your workload over the previous 12 months?*' and were provided with the following 5-point response scale: (i) Much too low, (ii) Too low, (iii) About right, (iv) Too high, and (v) Much too high.

This item was selected as it allows for benchmarking against and triangulation with appropriate comparator populations.

Job-related stress

As mentioned in previous chapters, stress (within the context of this thesis) is considered to be a relational process between the following three key components:

- *Stressors*: Changes to the environment or the presentation of stimulus that can cause 'stress.'
- *Psychological stress reaction*: The perception of and psychological response to stressors.
- *Physiological stress reactions*: The physiological responses to stressors.

Although it is common for research to focus on the first component on the relational process (stressors), this may not be an appropriate shorthand in measuring an individual's experience of job-related stress as it does not take an individual's appraisal or emotional response to the stressor into account.

As such, a more experiential measurement of job-related stress was applied. Job stressfulness was assessed using the question '*In general, how do you find your job?*' Participants were provided with the following five-point response scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately stressful, (iv) Very stressful, and (v) Extremely stressful.

This common single-item indicator has been used in numerous existing surveys and allows for a broad evaluative measurement of respondents' experiences of numerous stressors, as well as allowing for comparison with other UK policing studies that have used this particular tool (Elliott-Davies, 2019; Houdmont & Elliott-Davies, 2017).

The single-item approach to job-related stress has gained popularity within the UK over the past two decades (Calnan et al., 2004; Collins & Gibbs, 2003; Houdmont et al., 2012; Phillips et al., 2008; Wadsworth et al., 2007) and has been described by the

UK Health and Safety Executive as offering "*a crude single item surrogate indicator of job stressfulness*" (The Health and Safety Executive, 2012, p.14).

Stress outside of work

Criticism is sometimes directed at the single-item measure of job-related stress outlined above, as it cannot identify individuals whose job-related stress may merely be a consequence of acute stress in their personal lives. As such, an item was included in the baseline survey to gauge (and where appropriate, control for) stress that is not related to work.

To do this, the job-related stress measure was adapted and stressfulness of participants' every-day life outside of work was assessed using the following question: '*In general, how do you find your life outside of work?*' Participants were provided with the following five-point response scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately stressful, (iv) Very stressful, and (v) Extremely stressful.

Violent victimisation

To assess experience of verbal and physical violence, respondents were asked the following five items adopted from a nationwide study of Finnish police officers (Leino, 2013). The survey respondents were provided with the following 6-point response scale: (i) Never, (ii) Once or twice, (iii) More than twice, (iv) Once a month, (v) Once a week, and (vi) Daily.

The wording of the first three items was identical to that used in the Finnish study (Leino, 2013), the wording of the fourth item, however, was adapted slightly. Whilst the original item examined frequency of violence involving a *threat t*o use a deadly weapon, this item aims to examine the frequency of violence involving use of a deadly weapon. This change in wording was selected to enable comparison with large, comparable data sets held by the PFEW that had opted to alter the wording to measure

the most extreme cases of violence. A fifth item was also added to ascertain the frequency of violence in relation to spitting.

- Item one: '*How often have citizens directed verbal insults (e.g. swearing, shouting, abuse) towards you in the last 12 months?'*
- Item two: '*How often have citizens directed verbal threats (e.g. threat of hitting, threat of kicking) towards you in the last 12 months?'*
- Item three: '*How often have citizens directed unarmed physical attacks (e.g. struggling to get free, wrestling, hitting, kicking) towards you in the last 12 months?'*
- Item four: '*How often have citizens directed the use of a deadly weapon (e.g. stick, bottle, axe, firearm) towards you in the last 12 months?'*
- Item five: '*How often have citizens directed spitting assaults (i.e. being deliberately spat upon) towards you in the last 12 months?'*

These items were selected for several reasons. Firstly, the instrument assesses multiple forms of violent victimisation; secondly, the instrument is policing-specific, and, finally, there are available and contemporary data against which to compare findings from this current study.

Fear of future violence

Respondents were asked '*How strongly does fear of future violence from members of the public concern you?*' and were provided with the following five-point response scale: (i) Not a lot, (ii) A little, (iii) Somewhat, (iv) A lot, and (v) Very much. This item was also adopted from Leino's (2013) nationwide study of Finnish police officers and has been utilised by the PFEW as part of their biennial Demand and Capacity survey (Elliott-Davies, 2019; Houdmont & Elliott-Davies, 2016); allowing for comparison across appropriate policing populations.

Sleep requirements

To understand whether or not officers had got enough sleep before each shift, it was necessary to understand how much sleep that they personally required. This was assessed using the following question: '*Approximately how many hours sleep do you personally need, per night, to wake feeling refreshed and alert?*'

A drop-down list was provided with '*Less than one hour*' and '*One hour*' as the first two available options, and then hourly intervals until '*20 hours,*' with the final option available being '*More than 20 hours.*'

General Decision-Making Style

An adapted version of Scott and Bruce's 1995 General Decision-Making Style inventory was used to assess how individuals approach decision-making (Sadovykh et al., 2015). This scale comprised 25 items and was designed to assess how individuals approach decision situations, distinguishing between the following five styles:

- A *rational style* emphasises a thorough search for and logical evaluation of alternatives.
- An *avoidant style* emphasises postponing and avoiding decisions.
- A *dependent style* emphasises a search for advice and direction from others.
- An *intuitive style* emphasises a reliance on hunches and feelings.
- A *spontaneous style* emphasises a sense of immediacy and a desire to get through the decision-making process as soon as possible.

Participants were asked to indicate the extent to which they agreed or disagreed with each of the 25 items which were displayed as statements. Participants were provided with a five-point response scale to answer each of the items: (i) Strongly agree, (ii) Agree, (iii) Neither agree nor disagree, (iv) Disagree, (v) Strongly disagree. Examples can be seen below, and the full list of items are detailed in Appendix 24):

- Example one (rational): *'I double-check my information sources to be sure I have the right facts before making decisions'*
- Example two (avoidant): *'I put off making decisions because thinking about them makes me uneasy'*
- Example three (dependent): '*I rarely make important decisions without consulting other people'*
- Example four (intuitive): '*When I make decisions, I tend to rely on my intuition'*
- Example five (spontaneous): *'I generally make snap decisions'*

This particular decision-making measurement tool was chosen as the GDMS has not only been widely utilised and validated (Loo, 2000; Scott & Bruce, 1995), but is also able to predict several related outcomes, including negative stress and action state orientation. Moreover, similar versions of the GDMS have been utilised successfully within both police and military research (Brown & Daus, 2015; Mitchell, 2007; Thunholm, 2004, 2008).

Shift Diary Logging Phase Selection

The second part of the study was the shift diary logging phase, whereby participants were asked to complete a brief survey (called a shift diary entry) at the end of every shift that they worked for a self-selected two-week period.

To enable the accurate sending of email reminders (if a participant had opted-in), and to enable a timely invite to the post-participation questionnaire after their completion of the shift diary logging phase, participants were asked to indicate the start and end point of their logging phase with the following question:

> *'To take part in the diary study, you must make entries into a shift diary after every shift for two whole weeks. Please look at your diary and choose an appropriate two-week period before the end of August (where you are due to*

work for at least seven shifts) and enter the start and end date in the boxes below:'

Two response boxes formatted to date entries were provided: one for the start date and one for the end date.

4.2.5.3 Step 3 – The Shift Diary Logging Phase

The third part of the study was the logging phase, whereby participants completed a brief survey (called a shift diary entry) at the end of every shift that they worked for a self-selected two-week period.

To access their shift diary participants needed to select the shift diary icon in the RH Cops and Crewing app, and then enter their username and password. Upon gaining entry to the survey, participants were asked a range of questions to ascertain their experiences during their most recent shift, including levels of crewing, how stressful they found the shift to be, how tiring they found the shift to be, and whether use of force was needed.

Shift details

Participants were asked the date of their shift, the time that they went on duty (to the nearest hours) and time that they went off duty (to the nearest hours). This allowed shifts to be classified and grouped by length and type (i.e. morning, afternoon, night).

Shift crewing

Participants were asked to indicate the type of crewing that they had experienced over the shift by selecting one of the following five options: (i) Single-crewed only, (ii) Mostly single-crewed, (iii) Mostly double-crewed, (iv) Double-crewed only, and (v) Other.

Available equipment

Participants were asked to indicate whether they (or their colleague) were wearing body worn video equipment, and whether they (or their colleague) were

carrying a TASER. Participants were supplied with a binary response option of Yes or No to each of these questions.

Stressfulness of shift

In keeping with the other measures of stress utilised within this study, the overall stressfulness of the shift was measured using a bespoke single-item measure by asking participants: '*How stressful did you find your shift overall?*'

Participants were provided with the following five-point response scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately stressful, (iv) Very stressful, and (v) Extremely stressful.

Overall workload on shift

In keeping with the baseline measurement of workload, an estimate of the overall workload during the participants shift was measured using a bespoke single-item measure by asking participants: '*How did you find your workload during your shift?*'

Participants were provided with the following five-point response scale: (i) Much too low, (ii) Too low, (iii) About right, (iv) Too high, and (v) Much too high.

A secondary measurement of overall workload was taken by asking participants report how many incidents they attended during their shift. Participants were provided with an open text response box which only accepted numerical answers between 0 and 100.

Shift safety

Participants were asked to indicate how safe they felt during their shift on a scale of 0 to 10 (where 0 = not at all, and 10 = extremely). A slider scale was provided for respondents with a numerical indicator box to the right that digitally represented their selection on the slider tool.

Sleep and fatigue

Participants were asked to indicate how many hours sleep (approximately) they had in the 24 hours before their shift so this could be compared to the amount of sleep, they personally require to feel refreshed and alert (provided as part of the baseline survey) and sleep deficits could be identified. A drop-down list was provided with '*None*' as the first available answer followed by hourly intervals until '*20 hours,*' with the final option available being '*More than 20 hours.*'

Participants were also asked to indicate how physically tired they felt at the end of their shift on a scale of 0 to 10 (where 0 = not at all, and 10 = extremely). A slider scale was provided for respondents with a numerical indicator box to the right that digitally represented their selection on the slider tool.

Mental exhaustion was also measured using a slider scale, with participants being asked to indicate on a scale of 0 to 10 (where 0 = not at all, and 10 = extremely) how mentally drained they felt at the end of their shift.

Use of force

If participants indicated using force against a member of the public during their shift, they were asked a series of follow-up questions to explore the tactical options used, reason for use of force, level of threat posed, level of stress experienced, and the number of officers present when the use of force began. For full details please see Appendix 25.

4.2.5.4 Step 4 – The Post-participation Questionnaire

The last part of the study was the post-participation questionnaire. Participants were sent an invitation email (with an electronic link to the questionnaire) once their self-selected two-week shift diary logging phase had ended, or if they had not provided this information, three or more weeks since they registered to take part in the study.

Participants were asked to answer questions about their thoughts, experiences, and views on police crewing practices.

Crewing preferences

Participants were asked to indicate their crewing preference and reasons for their preference using the following question: '*When you're on shift, do you prefer to be... (please select one of the following options).*' Participants were then provided with a three-point response list of (i) Single-crewed, (ii) Double-crewed, and (iii) Other. Once they had selected their preference, they were asked to explain why via an open text box.

The impacts of crewing

Participants were provided open text boxes to respond to the following questions about the impacts of crewing levels**:**

- Item one: *'How does crewing level affect you, and your fellow officers?'*
- Item two: *'How do crewing levels affect officer performance and your ability to do your job?'*

Incidents impacts

Participants were provided with open text boxes to respond to the following questions about incidents:

- Item one: *'What factors influence your stress levels the most when responding to an incident?'*
- Item two: *'What factors influence your confidence the most when responding to an incident?'*
- Item three: *'How do you go about assessing the threat level during an incident, and what factors are the most important?'*

Using force

Participants were asked to think back to the last time that they had to use force in the line of duty, and were provided open text boxes to respond to the following questions:

- Item 1: *'Please describe how you made the decision to use force, and what type of force to use....'*
- Item 2: *'What factors are the most influential when you were making the decision on how and when to use force?'*

Decision-making

Participants were asked two separate but related questions about the National Decision-Making model (the NDM) used by the PSEW. The first of which asked, '*How often do you use the National Decision-Making Model when making time pressured decisions in the line of duty?*' and participants were presented with the following 5-point response scale: (i) Never, (ii) Rarely, (iii) Sometimes, (iv) Usually, and (v) Always. The second item relating to the NDM asked '*How useful do you find the National Decision-Making Model when making time pressured decisions in the line of duty?*' and participants were presented with the following 5-point response scale: (i) Not at all useful, (ii) A little useful, (iii) Somewhat useful, (iv) Very useful, and (v) Extremely useful. Participants were then given the change to provide additional comments about crewing levels, responding to incidents or how they make difficult decisions via an open text box.

4.2.6 Analytical approach

4.2.6.1 Quantitative data

Quantitative data were examined using both descriptive and inferential analyses; for descriptive statistics please see Chapter Five, Section 5.1, and Section 5.2 for

inferential analyses and results. However, due to the sample size being much smaller than originally envisioned, the initial analysis plan had to be adapted by moving away from multivariate analyses (please see Chapter Two, Section 2.2.2). Nevertheless, the exploratory nature of the diary study was retained by running an abundance of bivariate analyses on the large corpus of quantitative data collected as part of this study. Due to the sheer number of statistical tests conducted on the diary study data, the analyses were grouped and reported as six separate analysis sections to aid comprehension and facilitate a smooth narrative flow:

- Analysis Cluster One: TASER use
- Analysis Cluster Two: The impact of incident crewing and incident interactions
- Analysis Cluster Three: The impacts of shift crewing and shift level interactions
- Analysis Cluster Four: The impacts of officer characteristics
- Analysis Cluster Five: Decision-making
- Analysis Cluster Six: The impacts of TASER availability

Given the depth and breadth of the type of data collected throughout this study, a combination of contingency tables, correlation analyses, and means comparisons were used to explore the data to their fullest potential. A 0.5% probability threshold for the identification of statistical significance was applied ($p \leq 0.05$) to all analyses, meaning that results are only considered significant when there is less than a 5% probability the null hypothesis is correct (i.e., that there is no association between the variables). In addition, unless otherwise stated, two-sided significance values were used as the relational direction of potential associations had not been hypothesised. In addition to statistical significance, the effect size (i.e. the magnitude of the effect) was calculated for all statistically significant results, and only those that were found to have reached the threshold for a small effect size, or higher, were considered to be a statistically meaningful result.

Cramer's V was used to calculate the effect sizes for statistically significant results in contingency tables and was chosen over Phi as, unlike the latter, the former can be used where one of the variables contains three or more categories. Thus, for example, Phi could be used to compare those that are single-crewed and those that are double-crewed in terms of the proportion that reported using TASER, but could not be used to compare officers reasons for using force in terms of the proportion that report this outcome. The maximum possible value for Cramer's V is 1.0 and it is generally accepted that a coefficient of >.50 represents a large effect size, >.30 a medium effect size, and >.10 a small effect size (Morgan et al., 2013). As such, only contingency table analyses that revealed a statistically significant difference that reached a value of .10 or higher were considered to be a statistically meaningful result.

The effect size for correlation analyses and for Mann Whitney U tests were determined using the correlation coefficient. Cohen (1988) proposed guidelines for the interpretation of the strength of correlation coefficients that have become the accepted norm in the behavioural sciences (Morgan et al., 2013). These state that a coefficient of $r = .10$ indicates a weak correlation, $r = .30$ indicates a moderate correlation, and $r \geq .50$ indicates a strong correlation. As such, only correlation analyses and Mann Whitney U tests that revealed a statistically significant difference and reached a value of .10 or higher were considered to be a statistically meaningful result.

The effect size for each of the independent t-tests were calculated using Hedges' g and was chosen over Cohen's d due to the unequal sample sizes between the groups being tested, as the effect size is weighted according to the relative size of each sample. Cohen (1988) suggested that a large effect size for Hedges' g could be interpreted as >.8, whilst a medium effect size is indicated by a g value of >.5, and a small effect size as >.20.

Power analyses for non-significant results were performed retrospectively wherever possible,[20] and it is important to note that the analyses yielding non-significant results were consistently under-powered (i.e. $1- \beta \leq .8$; Field, 2009); meaning that the null hypothesis in these cases should not be accepted without caution, and the pattern of results should be considered carefully.

Whilst the analytical approach described above (i.e., running multiple bivariate tests on the same dependent variables) increases the chance of committing a type I error, using further statistical procedures to adjust for such inflation (e.g., applying Bonferroni corrections) would further lower the statistical power of the analyses and, conversely, increase the likelihood of a type II error (Nakagawa, 2004).

Given the exploratory nature of the analyses, the small sample sizes collected via the diary study, and the subsequent lack of power (discussed above), the application of further statistical procedures was considered to be counterproductive.

Where appropriate, data were checked against the assumptions of parametric testing (e.g., normally distributed data) and where these were violated, non-parametric tests were used to interpret the results. For completeness and comparability, both parametric analyses and their non-parametric counterparts were conducted for many of the analyses contained herein. In these cases, both results are presented alongside an indication of whether the parametric assumptions were met (please see Table 5.15 for an example).

Given that the data collected by the diary study were nested in nature and multivariate testing was not appropriate due to the sample size (please see Section 2.2.2 for more information), analyses containing data about uses of force could be

[20] G*Power was used to for power analyses and does not provide the option to calculate power for some types of analyses, such as Fisher's exact tests with contingency tables larger than 2 x 2.

considered at either an incident-level,[21] a shift-level,[22] or at an individual-level;[23] and analysis containing data about officers' shifts could be considered at a shift-level, or at an individual-level. However, in order to consider data about use-of-force incidents at a shift- or individual-level; or to consider the data about officers' shifts at an individual-level; the data would require substantial processing and would subsequently result in a substantial reduction in sample size. Nevertheless, considering the data at an incident-level would not be without its own challenges; treating the data in this manner would mean that officers may have provided more than a single 'unit' of data to the analyses each (depending on how many shift diary entries they submitted, and how many time they used force during the shift), and as such, the effect of individual differences between officers might be artificially inflated and in some cases the analytical assumptions would be violated.[24]

In keeping with the pragmatic research paradigm applied herein, the type of analyses used when exploring the data were selected case-by-case and based on what fit the data. Let us consider, for example, the first two tranches of bivariate testing in Chapter Five. These two analyses constellations were specifically concerned with which characteristics were related to whether TASER was used at all during an incident (TASER Outcome 1), and whether TASER was used as the first tactical option (TASER Outcome 2). Due to the categorical nature of outcome variables (whether TASER was used, and whether TASER was used as the first tactical option during the incident) contingency tables were considered to be the best fit to explore the potential relationships within the data. However, in order to meet the assumption

[21] If data is being considered at the incident-level, this means that the *incidents where force is used* are considered to be the unit of analysis.
[22] If data is being considered at the incident-level, this means that the individual *shifts that officer work are* considered to be the unit of analysis.
[23] If data is being considered at the incident-level, this means that the *incidents where force is used* are considered to be the unit of analysis.
[24] Such as the assumption of mutually independent observations in contingency tables.

of mutually independent observations required for any contingency table analysis, the data could either be considered at the incident-level or would need substantial processing in order for the analyses to consider the data at an individual-level. More specifically, a new variable would need to be created for each outcome variable so that each officer had a single score for each predictor condition. Creating a new, singular variable per participant based on their use of TASER would require converting categorical data (e.g. the use of TASER) into continuous data; a process which could potentially create additional analytical challenges that would need to be overcome. For example, one way of converting repeated measures of TASER use into a single continuous variable, would be to merely sum the number of TASER uses when an officer was single-crewed and when they were double-crewed; however, this would not take the number of opportunities presented to each participant to use TASER into account. For example, a participant that has been single-crewed twice and used TASER once, would have the same score as a participant that has been single-crewed 10 times but had also used TASER only once. Another way to convert the use of TASER into a continuous variable for each participant would be to calculate TASER use as a proportion in relation to the overall number of incidents where force was used. Using the example above, this would result in the first participant having a result of 50%, whilst the second participants would have a result of 10%. However, this type of transformation would artificially inflate differences between participants due to the varying value (i.e. the percentage point each TASER use would represent); potentially resulting in a positively skewed and leptokurtic data set due to the binary nature of the original data and the extremely low overall frequency of TASER use (n=10).

Considering the data at an incident-level however, would mean that officers may have provided more than a single 'unit' of data to the analyses each (depending on how many shift diary entries they submitted, and how many time they used force

during the shift), and as such, the effect of individual differences between officers might be artificially inflated and the assumption of mutually independent observations (required for contingency tables) would be violated. However, this methodology provides the largest sample size and (n=181) and follows the precedent set by previous research, which primarily also consider TASER data at an incident-level rather than the individual-level (e.g. Dymond, 2016, 2018; Quinton et al., 2020).

After considering the potential challenges set out above, it was felt that the simplest and most appropriate approach would be to conduct these particular analyses at an incident-level as this minimises the amount of data manipulation needed, provides additional statistical power to detect any relationships that might exist between the variables, and follows existing protocols established within the extant literature.

Conducting analyses on the data the incident-level, however, was not appropriate in all cases. Due to the potential benefits outlined above and the relative ease with which some of the continuous data collected by the diary study could be amended to enable such treatment, considering the data at the individual-level was deemed to be the most appropriate way forward for a number of the analyses reported herein (e.g. Analysis Clusters Two through Five in particular). Nonetheless, considering the data at the individual-level within these analyses posed an additional quandary due to the lack of experimental control afforded by the study design. Given that the data were self-reported field observations, there were no opportunities to control or manipulate operational conditions (such as crewing levels). As such, some officers only produced a single data point across a single condition (e.g. a single incident stress rating for a single incident where they were alone when the use of force began); whilst others produced multiple data points across both conditions (e.g. three separate incident stress ratings, for three separate incidents, where they were alone

when the use of force began; and, five separate incident stress ratings, for five separate incidents, where they were with other officers when the use of force began).

The lack of experimental control described above meant that some individuals had a data point for both predictor conditions, whilst others only had a data point for one (e.g. average incident stress rating for incidents where they were alone when the use of force began, but no average incident stress rating for incidents where they were with other officers when the when the use of force began). This presents an additional challenge when selecting the appropriate statistical analyses at the individual-level, i.e. whether to treat the data as independent measures (where different participants are used in each condition of the predictor variable, e.g. an officer provided data whilst single-crewed *or* whilst double-crewed), or repeated measures (where the same participants are used in both conditions of the predictor variable, e.g. an officer provided data whilst single-crewed *and* whilst double-crewed).

In truth, the data collected through this study does not neatly fit into either category, as some participants provided repeat measures, whilst others did not. There were three approaches that could be taken to resolve this particular challenge: the first being to use an analyses designed for repeated measures and filter the dataset to only include individuals that had a score for both predictor conditions; the second was to use an analyses designed for independent measures and filter the dataset to only include individuals that had a score for one of the predictor conditions; and the third was to use an analyses designed for independent measures but to violate the assumption of independence and leave the dataset unfiltered.

Both the first and second option would require the dataset to be filtered, resulting in a reduction in sample size, and, consequently, a loss in statistical power - increasing the likelihood of a type II error. Although the third option would retain a larger sample size, violating the assumption of independence would increase the

likelihood of a type I error as the differences seen within the data set could be over-influenced by the characteristics of those participants that provide more than one data-point. After considering the challenges outlined above, a staged approach was developed for any analyses that considered the data at the individual-level; with primary analyses treating the data as independent and being conducted on the unfiltered dataset to utilise the additional statistical power provided by a larger sample size, and any significant findings being subject to secondary analysis using a filtered dataset to confirm these differences with a more conservative lens.

Finally, in order to conduct the range of analyses identified above certain data collected via the diary study needed to be converted and/or aggregated into new variables. All data conversions and aggregations utilised in the analyses reported hereafter are described in the Appendix 26, for additional details on how data was collected please see Section 4.2.3 – 4.2.5.

4.2.6.2 Qualitative data

Thematic content analysis loosely based on a combination of the six-phase method of thematic analysis described by (Braun & Clarke, 2006), and the seven-phase process of qualitative text analysis described by Kuckartz (2014), was used to analyse the qualitative data collected throughout Study Two (for details on ontological and epistemological positioning please see Chapter Two). A thematic content analysis was chosen over traditional thematic analysis as it combines the flexibility and exploratory nature of thematic analysis with the more structured and systematic approach promoted by content analysis. Due to the wide topical expanse of the qualitative question posed within the diary study, the answers to each individual question were coded and grouped into themes separately as part of the analytical process in phase three (detailed below), there was considerable overlap between the context and content of the responses across questions, and as such, the emergent themes. Consequently, a broader review of the data

was conducted in phase five, resulting in the recoding, regrouping, and reorganising of the emergent themes in a more holistic manner across participant responses, both within and between questions. This reorganisation resulted in the five following focal areas of enquiry, termed within this thesis as 'Empirical Domains:'

- Empirical Domain One: Stress, threat and confidence at an incident-level
- Empirical Domain Two: The impacts of crewing on use-of-force incidents
- Empirical Domain Three: The impacts of crewing on officers
- Empirical Domain Four: Threat assessment and use of force decision-making process
- Empirical Domain Five: Influential factors in threat assessment and the decision to use force

Although no assumptions about the themes that might emerge were made, the data were coded and organised in line with the two research questions and five topic areas listed above; thus, whilst the process cannot be considered as fully inductive, it equally could not be considered as deductive alone. As such, the method of analyses is a 'hybrid' approach that incorporated both top-down and bottom-up elements of reasoning. The top-down element of this hybrid approach was driven by the research questions, existing theory, and individual questions asked via the shift diaries and the post-participation questionnaire; whilst bottom-up element was driven by the content of the data themselves.

Data were considered primarily at the semantic (or manifest) level; however, some latent analysis was included as some codes were more subjective and inferred from the data (e.g. respondent's disposition towards crewing practices, or psychosocial impacts of single-crewing- such as loneliness and isolation).

The unique combination method of analysis is described outlined below with examples, where appropriate, linking the methodology to its practical application within this study.

Phase One –Familiarisation and initial work with text

The first phase of the analysis involved immersion in the data through multiple read-throughs of all the qualitative data left by participants (across all the questions) and the highlighting of important passages.

Phase Two - Initial code generation

As discussed above, a hybrid approach was taken for this phase and the data were coded in a manner by which the material could be sifted, sorted and examined within and between questions easily.

Phase Three - Searching for subthemes and determining global themes

In this stage of the analysis the focus changes from generating individual codes and towards the identification of broader themes that span across the data by grouping similar codes together according to context and meaning. In this instance, themes were initially identified, within each question individually, before being organised into larger 'global themes' to simplify the concept and overarching relationships between data. For theme tables depicting the initial theme generation for each individual qualitative question and accompanying grounding quotations please see Appendix 27.

Phase Four – Compiling and reviewing data according to themes.

The fourth phase involved compiling all the text assigned to each of the themes to review and validate the concepts individually and of the overall thematic model (where appropriate). Whilst the answers to each of the individual questions were coded and grouped into themes separately during phase three of the analysis (please see Appendix 27), there was considerable overlap between the context and content of the responses, and as such, the emergent themes. Consequently, a broader review of the

data was conducted as part of this phase of the analysis, resulting in the recoding, regrouping, and reorganising of the emergent themes in a more holistic manner across participant responses, both within and between questions. This reorganisation was in line with, and informed, the five Empirical Domains listed above.

Phase Five - Defining and naming themes

This stage of the analyses involved another round of thematic review and clear identification of what was being captured by the themes, as well as what was interesting about the themes, and the way they are organised.

Phase Six – Category based analysis and reporting the findings

The last phase in the process is the descriptive analysis of the themes and to report the findings; as such, the remainder of this chapter will systematically and consecutively present the findings from the five Empirical Domains listed in phase four above.

4.3 DATA CLEANING AND RESPONSE RATES

4.3.1 Data cleaning

Survey responses were removed when the survey form had been started but no data entered, when the form was a duplicate or if the username could not be attributed to an individual (i.e. did not match any registered usernames, nor were similar enough to any of the existing usernames to be easily attributable).

In total, this resulted in three records from the registration data set being removed (one duplicate and two due to username recording errors); nine records from the baseline survey (due to empty entries); 101 shift diary records (89 empty records and 12 unknown usernames), and finally; six records from the post-participation questionnaire (one duplicate and five empty entries). In order to ensure that any incident attended by more than one officer was not accidentally double-counted (i.e. by being recorded once by each officer in attendance via their individual shift diary), records

relating to the same use-of-force incident were searched for using a combination of shift and incident variables, including; shift date and time, force, incident crewing level, type of force used and reason for use of force. No matching cases were found.

4.3.2 Response and completion rates

In total, 151 officers successfully registered to take part in the study via the app, with 20.6% of these participants (n=32) then completing all three remaining parts of the study. For full details of completion rates broken down by study stages please see Table 4.1 below.

Table 4.1 *Diary Study: Completion Rates by Study Stage*

Respondent completion type	**Number of respondents (%)**
Completed the baseline survey, at least one diary entry, and the post-participation questionnaire	**33** (21.9%)
Completed the baseline survey and at least one diary entry only	**32** (21.2%)
Completed the baseline survey and the post-participation questionnaire only	**1** (0.7%)
Completed at least one diary entry and the post-participation questionnaire	**5** (3.3%)
Completed the baseline survey only	**11** (7.3%)
Completed diary entries only	**16** (10.6%)
Completed the post-participation questionnaire only	**0** (0.0%)
Did not complete any part of the study after registering	**53** (35.1%)
Total	**151**

4.4 DEMOGRAPHIC DESCRIPTION OF SAMPLES

4.4.1 Registration sample

Full social demographics of the 151 participants that registered, and the 98 participants that completed at least one part of the study can be found in Table 4.2 whilst their occupational demographics can be found in Table 4.3. Chi-squared statistic was used to determine whether there were any statistically significant differences between the socio-occupational demographic profiles of officers that registered to take part in the study only, and those that had registered and went on to complete one or more parts of the study. When comparing these two groups, no statistically significant differences were found between their gender (χ^2 (1)=.80, p>.05, V=.12),[25] age (χ^2 (2)= 3.87, p>.05, V=.16), rank (χ^2 (1)= 2.10, p>.05, V=.12), or length of service (χ^2 (2)= 4.09, p>.05, V=.16).

As individual raw data was not available for the whole federated officer population of England and Wales, a 'weighted cases' approach was used to examine the extent to which the sample of 98 participants that completed one or more parts of the study represented the policing population from which it was drawn (i.e. the PSEW).[26]

The results indicated that the sample was not statistically different to the wider police population of England and Wales for rank (χ^2 (1)= 3.46, p<.05, V=.012), but was statistically different to the police population of England and Wales for gender (χ^2 (1)= 9.77, p<.05, V=.01),[27] age (χ^2 (2)= 25.15, p<.00, V=.01), and length of service (χ^2 (2)= 42.30, p<.00, V=.02). However, none of the statistically significant differences met the

[25] This analysis did not include responses of '*prefer not to say*' (n=2) as the Police Workforce statistics include binary options only (*male* and *female*).
[26] Federated officer population figures are taken from Home Office Figures and represent officer headcount between the ranks of Constable and Chief Inspector and includes British Transport Police. For more details, please see Table 4.2 and 4.3.
[27] This analysis did not include responses of '*prefer not to say*' (n=2) as the Police Workforce statistics being include binary options only (*male* and *female*).

threshold value for a small effect size (.1 using Cramer's V); meaning that whilst the sample was statistically different to the policing population for three out of the four demographics tested, these differences were not large enough to be meaningful and thus the sample can be considered broadly representative of the wider police population in England and Wales across the socio-occupational characteristics tested.

Table 4.2 *Diary Study: Social Demographics of Study Samples and the Police Population of England & Wales*

Social demographics		All registered Participants			Participants that completed one or more parts of the study			Federated officer population ‡	
		N	**%**	**Valid %**	**N**	**%**	**Valid %**	**N**	**%**
Gender	Female	28	18.5%	18.8%	16	16.3%	16.7%	40,054	31.5%
	Male	121	80.1%	81.2%	80	81.6%	83.3%	87,161	68.5%
	Other	0	0.0%	0.0%	0	0.0%	0.0%	NA[28]	-
	Prefer not to say or not specified	2	1.3%	-	2	2.0%	-	0	-
	Total	**151**	**100.0%**	**100.0%**	**98**	**100.0%**	**100.0%**	**127,215**	**100.0%**

[28] The Police Workforce statistics include binary options only (*male* and *female*).

Table 4.2 *Diary Study: Social Demographics of Study Samples and the Police Population of England & Wales*

Social demographics		All registered Participants			Participants that completed one or more parts of the study			Federated officer population ‡	
		N	**%**	**Valid %**	**N**	**%**	**Valid %**	**N**	**%**
Age	25 and under	26	17.2%	17.2%	17	17.3%	17.3%	8,623	6.8%
	26-40	77	51.0%	51.0%	55	56.1%	56.1%	60,917	47.9%
	41+	48	31.8%	31.8%	26	26.5%	26.5%	57,675	45.3%
	Not specified	0	0.0%	-	0	0.0%	-	0	0.0%
	Total	**151**	**100.0%**	**100.0%**	**98**	**100.0%**	**100.0%**	**127,215**	**100.0%**

‡Federated officer population figures taken from Home Office Figures and represent officer headcount between the ranks of Constable and Chief Inspector and includes British Transport Police (Home Office, 2019f, 2019d).
Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Table 4.3 *Diary Study: Occupational Demographics of Study Samples and the Police Population of England & Wales*

Occupational demographic		All registered Participants			Participants that completed one or more parts of the study			Police population ‡	
		N	**%**	**Valid %**	**N**	**%**	**Valid %**	**N**	**%**
Ranks	Constable	135	89.4%	89.4%	85	86.7%	86.7%	100,618	79.1%
	Sergeant and above	16	10.6%	10.6%	13	12.2%	12.2%	26,597	20.9%
	Not specified	0	0.0%	-	0	0.0%	-	0	0.0%
	Total	**151**	**100.0%**	**100.0%**	**98**	**100.0%**	**100.0%**	**127,215**	**100.0%**
Length of Service*	0-9 years	90	58.4%	58.4%	64	65.3%	65.3%	44,007	34.4%
	10-19 years	45	29.2%	29.2%	26	26.5%	26.5%	55,831	43.6%
	20 years or over	16	10.4%	10.4%	8	8.2%	8.2%	28,156	22.0%
	Not specified	0	0.0%	-	0	0.0%	-	0	0.0%
	Total	**151**	**100.0%**	**100.0%**	**98**	**100.0%**	**100.0%**	**127,994**	**100.0%**

‡ Police population figures for ranks are taken from Home Office Figures and represent officer headcount between the ranks of Constable and Chief Inspector and includes British Transport Police. Figures for length of service are in relation to all ranks but does include British Transport Police (Home Office, 2019e). Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Most participants that successfully took part in at least one part of the study indicated that they were either from Surrey Police (20.4%), or Avon and Somerset Constabulary (13.3%), for full details please see Table 4.4 below.

Table 4.4 *Diary Study: Participants by Force*

Force	**Participants that completed one or more parts of the study only**		**Police population ‡**	
	N	**% of overall study participants**	**N**	**% of police population**
Surrey Police	20	20.4%	1905	1.5%
Avon and Somerset Constabulary	13	13.3%	2737	2.2%
Metropolitan Police Service	10	10.2%	30781	24.2%
Devon & Cornwall Police	6	6.1%	3044	2.4%
Hampshire Constabulary	5	5.1%	2752	2.2%
Humberside Police	4	4.1%	1905	1.5%
Nottinghamshire Police	4	4.1%	1959	1.5%
British Transport Police	2	2.0%	2849	2.2%
Cambridgeshire Constabulary	2	2.0%	1458	1.1%
Cheshire Constabulary	2	2.0%	2013	1.6%
Gloucestershire Constabulary	2	2.0%	1095	0.9%
Kent Police	2	2.0%	3575	2.8%
Merseyside Police	2	2.0%	3390	2.7%

Table 4.4 *Diary Study: Participants by Force*

Force	Participants that completed one or more parts of the study only		Police population ‡	
	N	% of overall study participants	N	% of police population
South Yorkshire Police	2	2.0%	2381	1.9%
Suffolk Constabulary	2	2.0%	1188	0.9%
Thames Valley Police	2	2.0%	4199	3.3%
Bedfordshire Police	1	1.0%	1162	0.9%
Cumbria Constabulary	1	1.0%	1170	0.9%
Derbyshire Constabulary	1	1.0%	1784	1.4%
Dorset Police	1	1.0%	1249	1.0%
Dyfed-Powys Police	1	1.0%	1146	0.9%
Essex Police	1	1.0%	3125	2.5%
Greater Manchester Police	1	1.0%	6438	5.1%
Gwent Police	1	1.0%	1306	1.0%
Lancashire Constabulary	1	1.0%	2916	2.3%
Lincolnshire Police	1	1.0%	1867	1.5%
Norfolk Constabulary	1	1.0%	1641	1.3%
North Wales Police	1	1.0%	1457	1.1%
Northumbria Police	1	1.0%	3098	2.4%
Staffordshire Police	1	1.0%	1573	1.2%
Sussex Police	1	1.0%	2708	2.1%
West Yorkshire Police	1	1.0%	5199	4.1%

Table 4.4 *Diary Study: Participants by Force*

Force	Participants that completed one or more parts of the study only		Police population ‡	
	N	**% of overall study participants**	**N**	**% of police population**
Wiltshire Police	1	1.0%	1001	0.8%
Other	1	1.0%	0	0.0%
Cleveland	0	0.0%	1205	0.9%
Durham	0	0.0%	1117	0.9%
Hertfordshire	0	0.0%	2023	1.6%
Lincolnshire	0	0.0%	1096	0.9%
London, City of	0	0.0%	724	0.6%
North Yorkshire	0	0.0%	1385	1.1%
Northamptonshire	0	0.0%	1235	1.0%
South Wales	0	0.0%	2989	2.3%
Warwickshire	0	0.0%	814	0.6%
West Mercia	0	0.0%	1985	1.6%
West Midlands	0	0.0%	6571	5.2%
Total	**98**	**100.0%**	**127,215**	**100.0%**

‡Police population figures taken from Home Office Figures (Home Office, 2019e) and represent officer headcount between the ranks of Constable and Chief Inspector.
Please note: All proportions represent valid percentages as there was no missing data. There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

The majority of participants were from a response type role (81.6%) following by Roads policing or traffic (12.2%). For full details please see Table 4.5.

Table 4.5 *Diary Study: Participants by Role Type*

Role type	**Participants that completed one or more parts of the study only**	
	N	**%**
Response	80	81.6%
Roads Policing or Traffic	12	12.2%
Neighbourhood Policing	3	3.1%
Community safety or Community relations	0	0.0%
Another function	3	3.1%
Total	**98**	**100.0%**

Please note: All proportions represent valid percentages as there was no missing data. There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Participants had also been provided with a text box to record their job title. In total, 54 of the 98 participants chose to leave feedback via this box, with:

- **19** participants (35.2%) reporting a response type job title (e.g. Immediate response officer, Response officer, Constable response team);
- **18** participants (33.3%) recording their rank as their job title;
- **Seven** participants (13.0%) reporting a job title related to neighbourhood policing (e.g. Neighbourhood patrol team, Neighbourhood patrol officer, Community beat manager);
- **Three** participants (5.6%) reporting a job title related to armed or tactical response roles (e.g. ARV, Tactical Support Team);
- **Three** participants (5.6%) reporting a job title related to roads policing (e.g. Roads Policing Unit, Road Casualty Reduction team);

- **Two** participants (3.7%) reporting a mixed job title of armed response and roads policing (Traffic/Firearms, Roads and Armed Policing Officer);
- **One** participant (1.9%) reporting that they were a Custody officer, and finally;
- **One** participant (1.9%) reporting that their job title was Critical Incident Manager.

Overall, 40 out of the 98 participants (40.8%) that took part in one or more parts of the study indicated that they were authorised TASER officers (ATO); whilst the other 58 indicated that they were not (59.2%). Only three participants (3.1%) indicated that they were an authorised firearms officer (AFO), with the remaining 95 (96.9%) indicating that they were not.

4.4.2 Baseline survey sample

In total, 77 participants completed the baseline survey. Basic socio-occupational demographics of this sample can be found in Table 4.6.

Table 4.6 *Diary Study: Baseline Survey Demographics*

Socio-occupational demographic		Baseline Survey Sample		
		N	%	Valid %
Gender	Female	15	19.5%	20.0%
	Male	60	77.9%	80.0%
	Other	0	0.0%	0.0%
	Preferred not to say or not specified	2	2.6%	-
	Total	**77**	**100.0%**	**100.0%**
Age	<25	16	20.8%	20.8%
	26-40	42	54.5%	54.5%
	41 plus	19	24.7%	24.7%
	Not specified	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Table 4.6 *Diary Study: Baseline Survey Demographics*

Socio-occupational demographic		Baseline Survey Sample		
		N	%	Valid %
Rank	Constable	69	89.6%	89.6%
	Sergeant and above	8	10.4%	10.4%
	Not specified	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**
Length of service	0-9 years	53	68.8%	68.8%
	10-19 years	18	23.4%	23.4%
	20 years or over	6	7.8%	7.8%
	Not specified	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

4.4.3 Shift diary sample

In total, 591valid shift diary entries were submitted by 86 participants. Basic socio-occupational demographics of this sample can be found in Table 4.7.

Table 4.7 *Diary Study: Shift Diary Demographics*

Socio-occupational demographic		All registered Participants		
		N	%	Valid %
Gender	Female	13	15.1%	15.5%
	Male	71	82.6%	84.5%
	Other	0	0.0%	0.0%
	Preferred not to say or not specified	2	2.3%	-
	Total	**86**	**100.0%**	**100.0%**

Table 4.7 *Diary Study: Shift Diary Demographics*

Socio-occupational demographic		All registered Participants		
		N	%	Valid %
Age	<25	15	17.4%	17.4%
	26-40	48	55.8%	55.8%
	41 plus	23	26.7%	26.7%
	Not specified	0	0.0%	-
	Total	**86**	**100.0%**	**100.0%**
Rank	Constable	73	84.9%	84.9%
	Sergeant and above	13	15.1%	15.1%
	Not specified	0	0.0%	-
	Total	**86**	**100.0%**	**100.0%**
Length of service	0-9 years	56	65.1%	65.1%
	10-19 years	24	27.9%	27.9%
	20 years or over	6	7.0%	7.0%
	Not specified	0	0.0%	-
	Total	**86**	**100.0%**	**100.0%**

4.4.4 Post-participation questionnaire sample

In total, 39 participants completed the post-participation questionnaire. Basic socio-occupational demographics of this sample can be found in Table 4.8.

Table 4.8 *Diary Study: Post-Participation Questionnaire Demographics*

Socio-occupational demographics		**N**	**%**	**Valid %**
Gender	Female	34	87.2%	87.2%
	Male	5	12.8%	12.8%
	Other	0	0.0%	0.0%
	Preferred not to say or not specified	0	0.0%	-
	Total	**39**	**100.0%**	**100.0%**
Age	<25	8	20.5%	20.5%
	26-40	19	48.7%	48.7%
	41 plus	12	30.8%	30.8%
	Not specified	0	0.0%	-
	Total	**39**	**100.0%**	**100.0%**
Rank	Constable	36	92.3%	92.3%
	Sergeant and above	3	7.7%	7.7%
	Not specified	0	0.0%	-
	Total	**39**	**100.0%**	**100.0%**
Length of service	0-9 years	27	69.2%	69.2%
	10-19 years	10	25.6%	25.6%
	20 years or over	2	5.1%	5.1%
	Not specified	0	0.0%	-
	Total	**39**	**100.0%**	**100.0%**

CHAPTER FIVE: THE DIARY STUDY – QUANTITATIVE COMPONENT

Due to the depth and breadth of data that was collected and analysed as part of Study Two, i.e. the diary study, the results have been divided into quantitative and qualitative findings; with quantitative results reported herein Chapter Five, and qualitative results reported in Chapter Six.

Chapter Five will start by providing an account of the descriptive statistics from the three main data collection stages of the diary study (i.e., the baseline survey, the shift diary entries, and the post-participation questionnaire) before moving on to the inferential analysis and results. Due to the sheer number of variables and statistical testing that was undertaken as part of the inferential analyses, this section has been grouped into six sub sections based on the content theme of the analysis. More specifically, analyses are grouped by area of exploration. The analyses start by exploring data from a specific and relatively short moment in time (i.e. data about a single use-of-force incident) before expanding the focus outwards to examine data from a broader period of time (i.e. data about an officers shift) and then data about the officers themselves (i.e. data about an officer, such as their socio-occupational demographics and decision making styles).

Due to the sizable number of exploratory bivariate tests reported herein, a brief summary of the resulting evidence will be presented at the end of this chapter. Results will be discussed alongside the qualitative results in Chapter Seven.

5.1 DESCRIPTIVE STATISTICS

5.1.1. Descriptive statistics: The baseline survey

Overall, most participants that completed the baseline survey felt that their workload over the last 12 months was '*Too high'* or '*Much too high'* (70.1%), just under a third of participants 32.5% felt that their job was '*Very'* or '*Extremely,'* stressful

and only 1.3% reported not being concerned over future fear of violence from members of the public. These result are similar to those found by a recent national survey of police officers in 2020, where 60% reported that their workloads were '*Too high'* or '*Much too high,'* and 33% reported that their job was '*Very'* or '*Extremely,'* stressful (Elliott-Davies, 2021).

Violence towards officers in this sample was reported as being commonplace, with 98.7% respondents reporting to have been the recipient of an unarmed physical attack at least once in the last 12 months (e.g. struggling to get free, wrestling, hitting, kicking), and 48.0% respondents reporting experiencing this on a monthly basis. Although these figures are much larger than those found by a similar national survey to the one mentioned above in 2018 (67% and 31% respectively, Elliott-Davies, 2019), this is most likely to be due to the role of the police officers. Whilst the national survey was open to all officers, the current study was only open to those in a front-line role, and thus probably at higher risk from violent victimisation from the public also.

Table 5.1 *Diary Study: Descriptive Statistics for Baseline Survey*

Outcome		**Respondents**		
		N	%	Valid %
Workload in the last 12 months	Much too low	0	0.0%	0.0%
	Too low	0	0.0%	0.0%
	About right	23	29.9%	29.9%
	Too high	45	58.4%	58.4%
	Much too high	9	11.7%	11.7%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Table 5.1 *Diary Study: Descriptive Statistics for Baseline Survey*

Outcome		**Respondents**		
		N	%	Valid %
Job-related stress in the last 12 months	Not at all stressful	1	1.3%	1.3%
	Mildly stressful	12	15.6%	15.6%
	Moderately stressful	39	50.6%	50.6%
	Very stressful	24	31.2%	31.2%
	Extremely stressful	1	1.3%	1.3%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**
Stress outside of work in the last 12 months	Not at all stressful	16	20.8%	20.8%
	Mildly stressful	35	45.5%	45.5%
	Moderately stressful	20	26.0%	26.0%
	Very stressful	4	5.2%	5.2%
	Extremely stressful	2	2.6%	2.6%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**
Strength of concern over the fear of future violence in the last 12 months	Not at all	1	1.3%	1.3%
	A little	21	27.3%	27.3%
	Somewhat	24	31.2%	31.2%
	A lot	23	29.9%	29.9%
	Very much	8	10.4%	10.4%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Table 5.1 *Diary Study: Descriptive Statistics for Baseline Survey*

Outcome		**Respondents**		
		N	%	Valid %
Frequency of verbal insults in the last 12 months	Never	0	0.0%	0.0%
	Once or twice	3	3.9%	3.9%
	More than twice	4	5.2%	5.2%
	Once a month	22	28.6%	28.6%
	Once a week	30	39.0%	39.0%
	Daily	18	23.4%	23.4%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**
Frequency of verbal threats in the last 12 months	Never	1	1.3%	1.3%
	Once or twice	8	10.4%	10.4%
	More than twice	15	19.5%	19.5%
	Once a month	29	37.7%	37.7%
	Once a week	20	26.0%	26.0%
	Daily	4	5.2%	5.2%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Table 5.1 *Diary Study: Descriptive Statistics for Baseline Survey*

Outcome		**Respondents**		
		N	%	Valid %
Frequency of unarmed physical attacks in the last 12 months	Never	1	1.3%	1.3%
	Once or twice	13	16.9%	17.3%
	More than twice	25	32.5%	33.3%
	Once a month	25	32.5%	33.3%
	Once a week	9	11.7%	12.0%
	Daily	2	2.6%	2.7%
	Not stated	2	2.6%	-
	Total	**77**	**100.0%**	**100.0%**
Frequency of attacks with a deadly weapon in the last 12 months	Never	44	57.1%	57.1%
	Once or twice	18	23.4%	23.4%
	More than twice	12	15.6%	15.6%
	Once a month	0	0.0%	0.0%
	Once a week	3	3.9%	3.9%
	Daily	0	0.0%	0.0%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Table 5.1 *Diary Study: Descriptive Statistics for Baseline Survey*

Outcome		**Respondents**		
		N	%	Valid %
Frequency of spitting assaults in the last 12 months	Never	22	28.6%	28.6%
	Once or twice	28	36.4%	36.4%
	More than twice	15	19.5%	19.5%
	Once a month	11	14.3%	14.3%
	Once a week,	1	1.3%	1.3%
	Daily	0	0.0%	0.0%
	Not stated	0	0.0%	-
	Total	**77**	**100.0%**	**100.0%**

Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

In regards to decision-making style, the most common dominant style (identified as the decision-making style with the highest average for its constituent items for each individual), was *Rational*; which dovetails with previous research on the GDMS within law enforcement (Calhoun, 2013; Crippen, 2018; Young et al., 2018). Overall, scores for decision-making indicated that officers identified with rational decision-making styles most strongly, followed by an intuitive style.

Table 5.2 *Diary Study: Average Decision-Making Style Scores*

	All registered Participants		
	Average Score	**% reporting this as their predominant style**	
Rational decision-making style	3.99	48	62.3%
Intuitive decision-making style	3.56	12	15.6%
Dependent decision-making style	3.15	5	6.5%
Spontaneous decision-making style	2.77	0	0.0%
Avoidant decision-making style	2.03	1	1.3%
No predominant decision-making style	-	11	14.3%
Total	**-**	**77**	**100.0%**

5.1.2 Descriptive statistics: Shift diary entries

Officer crewing levels appeared to be evenly split across shifts with 48.7% of shifts reportedly being worked entirely or mostly single-crewed, and a similar proportion (47.7%) being worked entirely or mostly double-crewed. Participants indicated a different type of crewing in 3.6% of diary entries by selecting the response option of 'Other' (n=21 shift diary entries across 14 individual officers; please see Table 5.3 for more details). When exploring the demographics for the 14 officers who had selected 'other' as their shift crewing type once or more, there were some statistically significant differences.[29] Though there were no statistical differences for age (χ^2 (2), p=.531), length of service (χ^2 (2), p=.071), or role (χ^2 (3), p=.261), there was a statistically significant difference between ranks (χ^2 (1)= p=.006, V=.341). A

[29] Due to the small sample sizes many expected values in these analyses were smaller than 5. As such, Fisher's exact test was used.

statistically significant difference between genders was also observed when using the original response scale (χ^2 (2), p=.037, V=.350). However, when reverting to a binary measurement of gender and removing those that had selected '*Prefer not to say*' and '*Other*' from the analysis, the relationship failed to reach statistical significance (χ^2 (1), p=1.000). When reviewing the proportions of the significant relationships it appears that there was a higher proportion of Sergeants (42.9% compared with 9.7%), a higher proportion of officers that preferred not to disclose their gender (14.3% compared with 0.0%) within the group of officers that indicated that they had one or more shifts where their crewing level was neither single nor double-crewed (for more details please see Table 5.4). The higher proportion of Sergeants within this group may be because at this rank, officers are less likely to go out on patrol as a matter of course (so are not 'crewed' in anyway during the shift) and are more likely to only attend the more serious of calls, which, by the very nature of being more serious, may warrant the dispatch of more than two officers. The relationship between gender and crewing, however, is less clear.

Overall, officers appeared to have access to body worn video equipment across most their shifts (86.6%), whilst access to TASER was much less frequent at only 50.0% of shifts. Encouragingly, the ratings indicated that the majority of time the workload during the shifts was felt to be '*About right'* (59.5%) and only 13.2% of shifts were rated as '*Very'* or '*Extremely'* stressful; perhaps slightly at odds with the baseline ratings whereby the only 29.9% of participants indicated that they felt that their workloads were '*About right'* overall, and 32.5% rated their jobs as '*Very'* or '*Extremely'* stressful overall.

Table 5.3 *Diary Study: Descriptive Statistics for Shift Diary Entries*

Outcome		Respondents		
		N	%	Valid %
Crewing levels	Single-crewed only	223	37.7%	37.8%
	Mostly single-crewed	64	10.8%	10.8%
	Mostly double-crewed	70	11.8%	11.9%
	Double-crewed only	211	35.7%	35.8%
	Other	21	3.6%	3.6%
	Not specified	2	0.3%	-
	Total	**591**	**100.0%**	**100.0%**
Body Worn Video availability during shift	Yes	511	86.5%	86.6%
	No	79	13.4%	13.4%
	Not specified	1	0.2%	-
	Total	**591**	**100.0%**	**100.0%**
TASER availability during shift	Yes	295	49.9%	50.0%
	No	295	49.9%	50.0%
	Not specified	1	0.2%	-
	Total	**591**	**100.0%**	**100.0%**

Table 5.3 *Diary Study: Descriptive Statistics for Shift Diary Entries*

Outcome		Respondents		
		N	%	Valid %
Workload during shift	Much too low	12	2.0%	2.0%
	Too low	68	11.5%	11.5%
	About right	351	59.4%	59.5%
	Too high	122	20.6%	20.7%
	Much too high	37	6.3%	6.3%
	Not specified	1	0.2%	-
	Total	**591**	**100.0%**	**100.0%**
Stressfulness of shift	Not at all stressful	141	23.9%	23.9%
	Mildly stressful	185	31.3%	31.4%
	Moderately stressful	186	31.5%	31.5%
	Very stressful	60	10.2%	10.2%
	Extremely stressful	18	3.0%	3.1%
	Not specified	1	0.2%	-
	Total	**591**	**100.0%**	**100.0%**

Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Table 5.4 *Diary Study: 'Other' Crewing Level Broken Down by Demographics where Statistically Significant Differences were found*

Socio-occupational demographic		Respondents reporting at least one shift where they were neither single nor double-crewed[30]			All other respondents		
		N	**%**	**Valid %**	**N**	**%**	**Valid %**
Gender	Female	2	14.3%	16.7%	11	15.3%	15.3%
	Male	10	71.4%	83.3%	61	84.7%	84.7%
	Other	0	0.0%	0.0%	0	0.0%	0.0%
	Preferred not to say or not specified	2	14.3%	-	0	0.0%	-
	Total	**14**	**100.0%**	**100.0%**	**72**	**100.0%**	**100.0%**
Rank	Constable	8	57.1%	57.1%	65	90.3%	90.3%
	Sergeant and above	6	42.9%	42.9%	7	9.7%	9.7%
	Not specified	0	0.0%	-	0	0.0%	-
	Total	**14**	**100%**	**100.0%**	**72**	**100.0%**	**100.0%**

Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

The mean shift length was calculated, as was the mean number of incidents that were attended per shift. The regularity with which use of force was also required was calculated as a mean per shift. Means were also calculated for subjective ratings of safety, physical fatigue, and mental exhaustion. Table 5.5 documents these findings.

[30] Indicated by selecting the response option of 'other'

Table 5.5 *Diary Study: Descriptive Statistics for Shift Diary Entries (Means)*

Outcome	**Average Score**
Average length of shift	10.02 hours (n=591: SD, 2.16)
Average number of incidents attended per shift	3.95 incidents (n=584: SD, 3.68)
Average number of times force was required per shift	0.34 uses of force (n=585: SD, 0.71)
Average score for how safe participants felt on shift (On a scale of 0 to 10, where 0 is *not at all* and 10 is *completely*)	6.94 (n=558: SD 2.11)
Average score for how physically tired participants felt at the end of their shift (On a scale of 0 to 10, where 0 is *not at all* and 10 is *completely*)	6.81 (n=575: SD, 2.22)
Average score for how mentally drained participants felt at the end of their shift (On a scale of 0 to 10, where 0 is *not at all* and 10 is *completely*)	6.22 (n=569: SD, 2.34)

Although the vast majority of shift diary entries indicated that no force was needed during the shift in question (n=440, 74.5%), 145 shift diary entries (24.5%) from 53 separate respondents indicated that force had been used at least once during the shift. Socio-occupational demographics for the 53 officers that reported using force at least once during their shift diary entries are displayed in Table 5.6.

Table 5.6 *Diary Study: Demographics for Use of Force Sample*

Socio-occupational demographic		All registered Participants		
		N	%	Valid %
Gender	Female	6	11.3%	11.3%
	Male	46	86.8%	86.8%
	Other	0	0.0%	0.0%
	Preferred not to say	1	1.9%	1.9%
	Not specified	0	0.0%	-
	Total	**53**	**100.0%**	**100.0%**
Age	<25	10	18.9%	18.9%
	26-40	29	54.7%	54.7%
	41 plus	14	26.4%	26.4%
	Not specified	0	0.0%	-
	Total	**53**	**100%**	**100.0%**
Rank	Constable	47	88.7%	88.7%
	Sergeant and above	6	11.3%	11.3%
	Not specified	0	0.0%	-
	Total	**53**	**100.0%**	**100.0%**
Length of service	0-9 years	38	71.7%	72%
	10-19 years	12	22.6%	23%
	20 years or over	3	5.7%	6%
	Not specified	0	0.0%	-
	Total	**53**	**100.0%**	**100.0%**

Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Where participants indicated they had to use force only once during their shift, they were asked to provide further details on that incident. Where participants had used force twice or more, they were asked to provide details for the incident with the highest force used, and the lowest force used.

Overall, additional data was collected via the 591 shift diary entries on a total of 181 (out of a possible 183) incidents where officers have used force in the line of duty.

In total, there were 443 tactical options applied over 180 incidents (information on tactical options was missing from one entry regarding use of force), with an average of 2.46 tactical options used per use of force encounter (n=180: SD, 1.14), a minimum of 1 and a maximum of 7.

Table 5.7 *Diary Study: Descriptive Statistics for Use-of-force incidents*

Outcome		**Respondents**		
		N	%	Valid %
Number of officers present when force was used	Just me	31	17.1%	17.1%
	One other officer	83	45.9%	45.9%
	Two or more officers	67	37.0%	37.0%
	Not specified	0	0.0%	-
	Total	**181**	**100.0%**	**100.0%**
Primary reason for use of force	To protect myself	22	12.2%	13.5%
	To protect other officers	11	6.1%	6.7%
	To protect the subject	20	11.0%	12.3%
	To protect the public	11	6.1%	6.7%

Table 5.7 *Diary Study: Descriptive Statistics for Use-of-force incidents*

Outcome		**Respondents**		
		N	%	Valid %
	To prevent an offence	7	3.9%	4.3%
	To secure evidence	3	1.7%	1.8%
	To effect a search	11	6.1%	6.7%
	To effect an arrest	70	38.7%	42.9%
	As a method of entry	2	1.1%	1.2%
	To prevent escape	11	6.1%	6.7%
	Other	4	2.2%	2.5%
	Not specified	9	5.0%	-
	Total	**181**	**100.0%**	**100.0%**
How stressful was the incident	Not at all stressful	41	22.7%	22.8%
	Mildly stressful	58	32.0%	32.2%
	Moderately stressful	66	36.5%	36.7%
	Very stressful	10	5.5%	5.6%
	Extremely stressful	5	2.8%	2.8%
	Not specified	1	0.6%	-
	Total	**181**	**100.0%**	**100.0%**

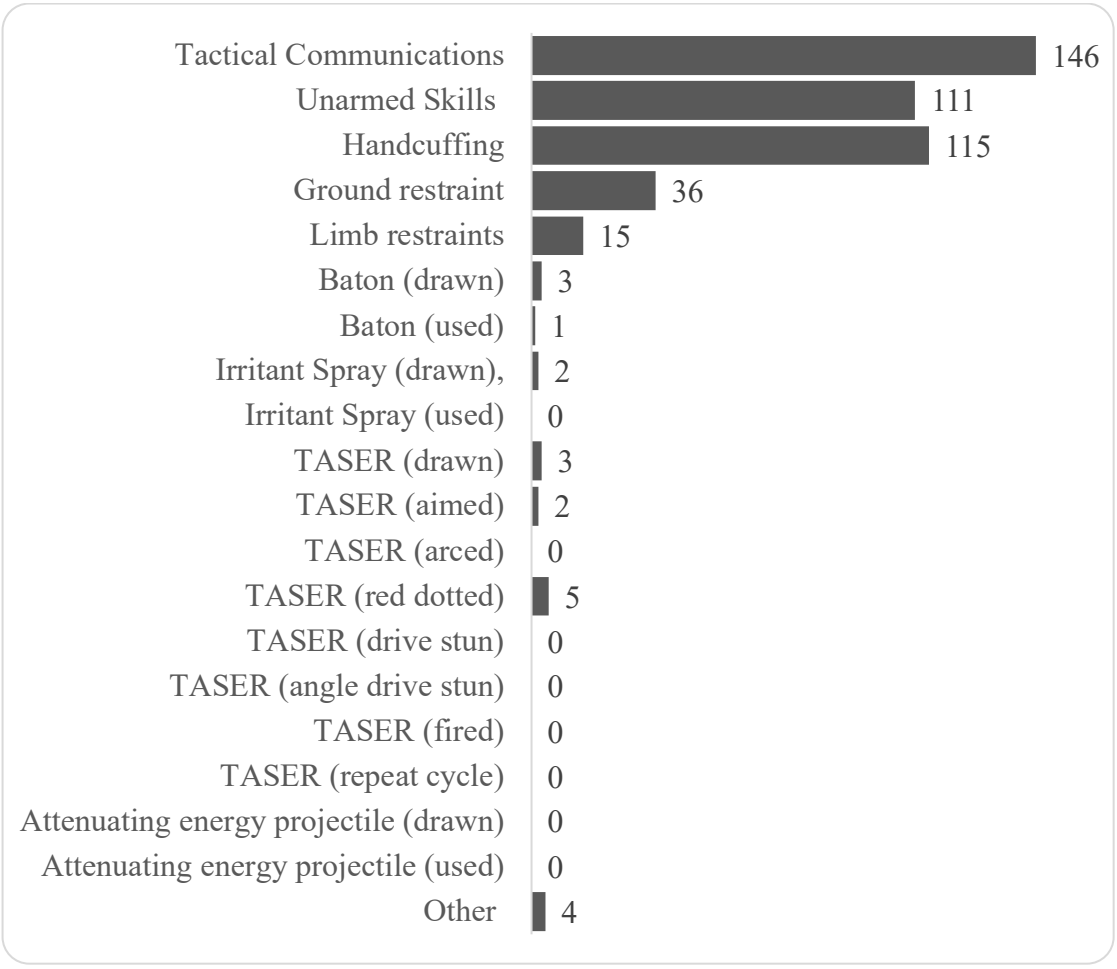
Table 5.7 *Diary Study: Descriptive Statistics for Use-of-force incidents*

Outcome		**Respondents**		
		N	%	Valid %
Level of threat posed by the subject (to the officer, member of the public or themselves)	Very Low	14	7.7%	7.8%
	Low	50	27.6%	27.9%
	Medium	77	42.5%	43.0%
	High	26	14.4%	14.5%
	Very High	12	6.6%	6.7%
	Not specified	2	1.1%	-
	Total	**181**	**100%**	**100.0%**

Please note: There may appear to be small discrepancies between the totals and the sums of the constituent items under valid % as the figures are rounded to 1 decimal point.

Tactical options and the overall frequency of their use can be seen in Figure 5.1; with '*Tactical Communications'* being the most utilised option, followed by '*Unarmed skills*' and then '*Handcuffing*.'

Figure 5.1 *Diary Study: Uses of Force*



When examining the type of force used in order of application, the most frequently used primary tactic (the type of force utilised first in an encounter) was '*Tactical Communications*,' whilst the most frequently reported secondary tactic was '*Unarmed skills*,' and the most frequently reported tertiary tactic was '*Handcuffing*.' When looking at the first three tactical options used, the pattern of use (presented in Figure 5.2) indicates that, as perhaps would be expected, the least invasive use of force is most frequently used and that the more tactical options are required the more intrusive the use of force becomes.

When looking specifically at TASER (please see Table 5.8) it is evident that only 10 uses of TASER, across 8 separate incidents, were captured during the diary study; all of which were non-discharge uses. Overall, this indicates that TASER was used in 4.4% of the use-of-force incidents submitted via the shift diary entries (8 out of

181); similar to the national rate for England and Wales between 2018 and 2019 (5%; Home Office, 2019c). TASER was used as the primary tactic on three occasions, three of the TASER uses were deployed as a secondary tactic, TASER was used as a tertiary tactic on three occasions, and on one occasion it was used as a quaternary tactic. It is also worth noting that four out of these eight separate TASER incidents were from the same participant, a male officer from Hampshire and his submissions accounted for all incidents where the officer was alone when the use of force began.

Figure 5.2 *Diary Study: Uses of Force by Order of Tactical Option (TO)*

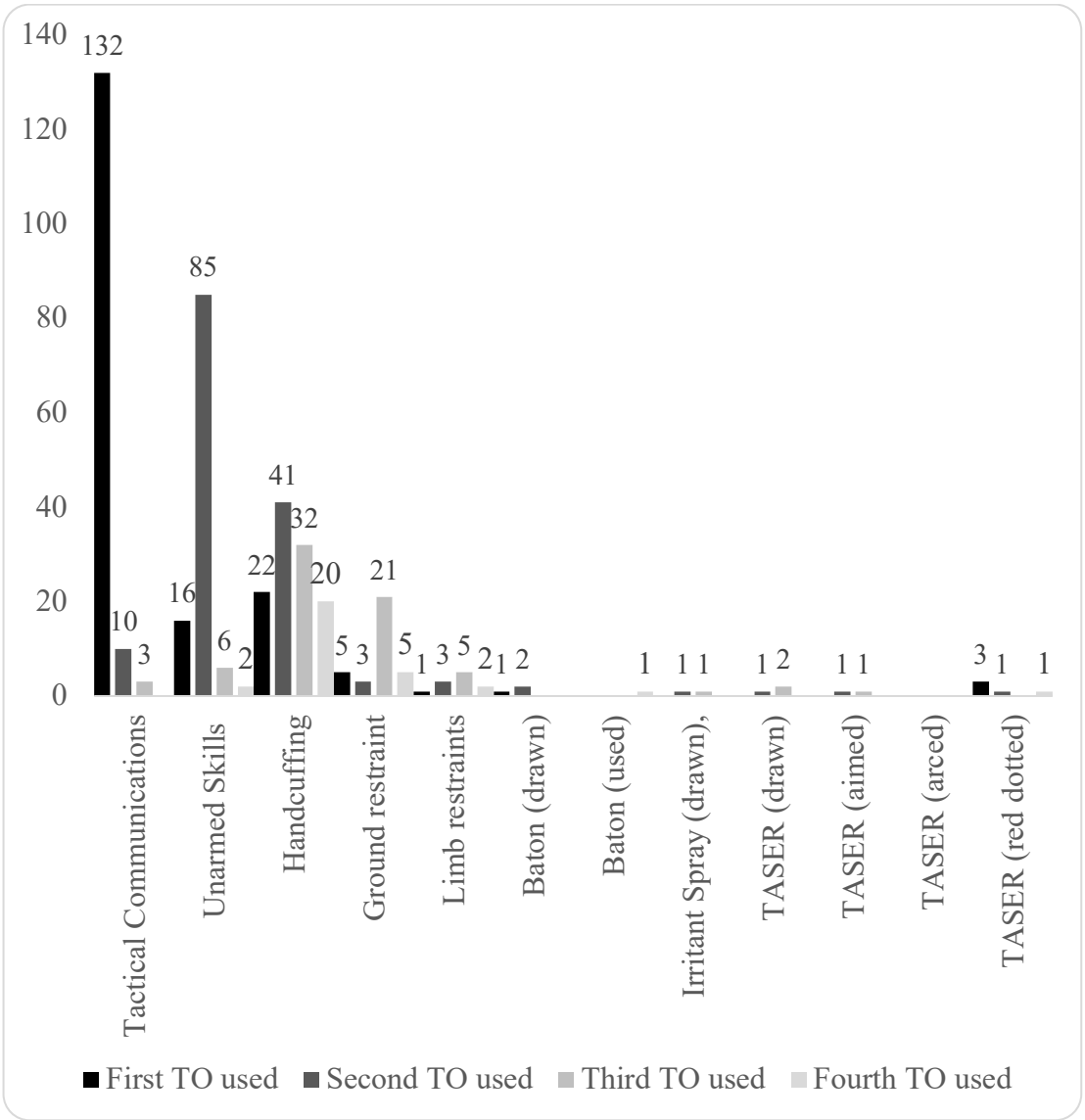


Table 5.8 *Diary Study: Tactical Options (TO) by Order of Use*

	First TO used	**Second TO used**	**Third TO used**	**Fourth TO used**	**Fifth TO used**	**Sixth TO used**	**Seventh TO used**	**Total**
Tactical Communications	132	10	3	0	0	1	0	**146**
Unarmed Skills	16	85	6	2	2	0	0	**111**
Handcuffing	22	41	32	20	0	0	0	**115**
Ground restraint	5	3	21	5	1	1	0	**36**
Limb restraints	1	3	5	2	1	1	2	**15**
Baton (drawn)	1	2	0	0	0	0	0	**3**
Baton (used)	0	0	0	1	0	0	0	**1**
Irritant Spray (drawn),	0	1	1	0	0	0	0	**2**
Irritant Spray (used)	0	0	0	0	0	0	0	**0**
TASER (drawn)	0	1	2	0	0	0	0	**3**
TASER (aimed)	0	1	1	0	0	0	0	**2**

Table 5.8 *Diary Study: Tactical Options (TO) by Order of Use*

	First TO used	**Second TO used**	**Third TO used**	**Fourth TO used**	**Fifth TO used**	**Sixth TO used**	**Seventh TO used**	**Total**
TASER (arced)	0	0	0	0	0	0	0	**0**
TASER (red dotted)	3	1	0	1	0	0	0	**5**
TASER (drive stun)	0	0	0	0	0	0	0	**0**
TASER (angle drive stun)	0	0	0	0	0	0	0	**0**
TASER (fired)	0	0	0	0	0	0	0	**0**
TASER (repeat cycle)	0	0	0	0	0	0	0	**0**
Attenuating energy projectile (drawn)	0	0	0	0	0	0	0	**0**
Attenuating energy projectile (used)	0	0	0	0	0	0	0	**0**
Other	0	1	0	1	1	0	1	**4**
Total	**180**	**149**	**71**	**32**	**5**	**3**	**3**	**443**

5.1.3 Descriptive statistics: post-participation questionnaire

Shift crewing preference

The first question that participants were asked in the post-participation questionnaire, was about their preferred crewing level whilst on shift. Officers could choose between one of three response options: (i) Single-crewed, (ii) Double-crewed, and (iii) Other. Participants were also given a large open text response box and asked to provide details on why they chose their selected response. Responses to the quantitative element of the question can be found in Table 5.9 below.

Table 5.9 *Diary Study: Shift Crewing Preference*	Respondents		
	N	**%**	**Valid %**
Single-crewed	3	7.7%	7.7%
Double-crewed	34	87.2%	87.2%
Other	2	5.1%	5.1%
Missing	0	0.0%	-
Total	**39**	**100.0%**	**100.0%**

National Decision Model (NDM) – Frequency of use in time pressured decision.

Participants were also asked about their use of the NDM. More specifically, officers were asked *"How often do you use the National Decision-Making Model when making time pressured decisions in the line of duty?'* Officers were provided with the following five-point likert response scale: (i) Never, (i) Rarely, (iii) Sometimes, (iv) Usually, and (v) Always. Results for this question can be found in Table 5.10.

Table 5.10 *Diary Study: Frequency of NDM Use*	**Respondents**		
	N	%	Valid %
Never	2	5.1%	5.3%

Table 5.10 *Diary Study: Frequency of NDM Use*	Respondents		
	N	%	Valid %
Rarely	2	5.1%	5.3%
Sometimes	5	12.8%	13.2%
Usually	14	35.9%	36.8%
Always	15	38.5%	39.5%
Missing	1	2.6%	-
Total	**39**	**100.0%**	**100.0%**

NDM – Efficacy in time pressured decisions

The final quantitative question posed to participants in the post-participation questionnaire was about their use of the policing NDM. More specifically, officers were asked *"How useful do you find the National Decision-Making Model when making time pressured decisions in the line of duty?"* Officers were provided with the following five-point likert response scale: (i) Not at all useful, (i) A little useful, (iii) Somewhat useful (iv) Very useful, and (v) Extremely useful. Results for this question can be found in Table 5.11.

Table 5.11 *Diary Study: Perceived NDM Utility*	Respondents		
	N	%	Valid %
Not at all useful	4	10.3%	10.8%
A little useful	3	7.7%	8.1%
Somewhat useful	15	38.5%	40.5%
Very useful	7	17.9%	18.9%
Extremely useful	8	20.5%	21.6%
Missing	2	5.1%	-
Total	**39**	**100.0%**	**100.0%**

5.2 INFERENTIAL ANALYSES AND RESULTS

Due to the sheer number of statistical tests applied to the diary study data, the inferential analyses were grouped into six sections based on the area of exploration and type of data collected to simplify analysis and facilitate the expression of a comprehensive and transparent narrative. The research questions that are being addressed by the inferential analyses described hereafter are listed below for ease of reference;[31] followed by a brief introduction to the six analysis clusters to describe their overarching purpose, and identify which of the research questions they were each intended to primarily address:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*
- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Four:*** *If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?*
- ***Research Question Five:*** *Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?*

The first array of analyses (Analysis Cluster One) primarily relates to Research Questions One and Four, and thus seeks to explore which incident-specific factors, such as crewing and levels of officer stress, are related to TASER use. However, as there is a distinct operational difference between crewing levels throughout an officer's shift and crewing levels at the time of an incident, these analyses concentrate on incident crewing only. Whilst it is less likely for an officer that is mostly double-crewed during their shift

[31] For more information on the Research Questions being addressed herein this thesis please see Chapters One and Two.

to be alone if they need to use force, this is still an operational reality (and visa-versa). For example, a double-crewed patrol could arrive at an incident but become separated, or a single-crewed officer could attend an incident, but another patrol could join them before force is used. In addition to crewing levels, this section also seeks to explore the impacts of incident stress, incident threat, and the reason for use of force on TASER use.

The second and third groups of analysis (Analyses Cluster Two and Analysis Cluster Three) relate to Research Question Three and, moreover, attempt to explore the wider officer impacts of crewing levels to supplement Research Question Six and Seven (which are primarily explored via qualitative data and reported in Chapter Six). As mentioned above, there is a distinct difference between crewing levels throughout an officer's shift and crewing levels at the time of an incident, and as such Analysis Cluster Two aims to explore the impact of *incident crewing*, whilst Analysis Cluster Three aims to explore the officer impacts of *shift crewing*.

The scope of the analyses was then expanded to explore officer factors with Analysis Cluster Four concentrating on socio-occupational demographics (such as gender, role and length of service), whilst Analysis Cluster Five focussed on officers' individual decision-making styles. Although the original inferential analysis schedule had planned to answer Research Question Five by testing for potential relationships between the officer factors listed above and their use of TASER, this was ultimately inappropriate. Given the small overall sample size and subsequent inability to manage nested data via multivariate analyses, data on the use of TASER was best considered at the incident level (please see Chapter Two and Four for more information). As such, using variables that represent individual-level data to predict TASER use would have been unsuitable, as this would likely violate the assumption of mutually independent observations and artificially weight or skew the analyses.

Whilst the data limitations outlined above meant that exploring the direct impact of officer factors on TASER use was impractical, the results from Analysis Cluster One indicated that there may be an indirect route for impact that could be tested. More specifically, the results indicated that officers' perceptions, which could be considered at the individual-level (such as their assessment of threat), were linked to their use of TASER. As such, Analysis Cluster Four and Five concentrated on expanding on these findings and further investigating Research Question Five by exploring the potential for enduring officer factors to *indirectly* affect TASER use by impacting on how an officer thinks and feels in order to help understand officer decision-making process in more depth.

The final assembly of analyses (Analysis Cluster Six) were conducted in response to an interesting result from Analysis Cluster One, which showed that the link between *incident threat ratings* and *TASER use* was potentially less meaningful than expected. Given that this analysis had only included incidents where TASER was available, it potentially indicated a relationship between *TASER availability* and *perceived threat*. As such, additional analyses – independent of the original Research Questions - were conducted to explore the link between TASER availability and incident stress, incident threat, shift stress and shift safety ratings.

5.2.1 Analysis Cluster One: TASER use

Given that one of the key aims of this study was to explore whether or not crewing levels affect an officers decision to use TASER, bivariate testing was used to determine whether crewing levels impacted on *TASER use*. However, as previously mentioned, there is a distinct operational difference between crewing levels throughout an officer's shift and crewing levels at the time of an incident, analyses within this section concentrate on *incident crewing* only. Given that another key aim of this study

was to understand more about the potential mechanisms that might underpin a relationship between TASER use and crewing, bivariate testing was also used to determine which, if any, of the other incident specific variables were associated with the use of TASER. The first tranche of bivariate testing was specifically concerned with which characteristics were related to whether TASER was used at all during an incident (TASER Outcome 1), whilst the second cluster was specifically interested in identifying characteristics which were associated with TASER being used as *the first tactical option within an incident* (TASER Outcome 2). TASER Outcome 2 was of particular import given that TASER is not used by officers in isolation, but as a part of a larger interpersonal and dynamic behavioural exchange between officers and members of the public. As such, the placement of TASER use within incident where force is used potentially holds additional insight into *how* and *why* TASER is used. For example, if TASER is only ever used after all other (lower impact) options have been unsuccessfully deployed this could indicate that TASER is seen as a last resort and only ever used when all other options have been exhausted; whilst if TASER is always utilised early on in the exchange, it may hint at a more permissive attitude towards its use.

Table 5.12 details the results for TASER Outcome 1, whilst Table 5.13, details those for TASER Outcome 2. To control for the effect of TASER availability, incidents were only included in the analysis if the participants had indicated that they, or their colleague, were carrying TASER during the shift when the incident took place.

Due to the categorical nature of outcome variables (whether TASER was used, and whether TASER was used as the first tactical option during the incident) contingency tables that considered that data at the incident-level were considered to be the best fit to explore the potential relationships within the data (please see Chapter Four, Section 4.2.6.1 for more information).

Given that contingency tables also require the predictor variables to be categorical, aggregate versions of the following variables were used in the analyses: incident crewing levels, incident stress ratings incident threat ratings, and the primary reason for using force (please see Appendix 26 for detail on data conversions),

Fisher's exact tests were used to test for any statistically significant differences in TASER use between groups. Fisher's exact test was selected over the Chi squared due to small numbers in some of the contingency table cells, and the exploratory nature of the analysis.

Overall, only two associations related to TASER use met the statistical thresholds outlined in Chapter Four, Section 4.2.6.1 (denoted by bold text and asterisks within Table 5.12 and 5.13) and can be considered as a meaningful statistical difference. More specifically, incident crewing was found to have a statistically significant association with TASER Outcome 1 (whether TASER was utilised during a use-of-force incident) and TASER Outcome 2 (whether TASER was the first tactical option utilised during a use-of-force incident); with TASER being used in a larger proportion of incidents when officers were alone at the beginning of the use of force than when they had other colleagues present. Though only two statistically significant associations were found, this may be due to the relatively small sample sizes, rarity of the observed event (i.e. TASER use) and subsequently underpowered analysis; meaning that the analyses may not have had enough sensitivity to detect any effects present in the data. As such, it is important that we also consider the *pattern* of results.

When looking at the pattern within the data across both TASER Outcome 1 and TASER Outcome 2, it appears that the use of TASER may be linked to how stressful officers find a use-of-force incident; with no officers that used TASER finding the incident highly stressful. At first this result may seem counterintuitive, as the expectation may be that an incident that requires the use of TASER would be more

intrinsically stressful; however, one explanation could be that using TASER might actually reduce the stressfulness of an encounter because it enables the incident to be resolved more efficiently (assuming that the use of TASER is successful in achieving the officers aim and no other force is needed). Interestingly, when exploring the data it appears that there is a weak but statistically significant (positive) correlation between the total number of tactics used and the self-reported stress levels associated with a use of force indecent; with higher levels of stress associated with incidents where more tactics are used ($r_s(179) = .247$, $p = .001$). Another possible explanation of this counterintuitive result could be driven by a sampling issue; more specifically, as this analysis only included cases where TASER was likely to be available to the officer on shift, it may be that the very presence of the TASER was enough to reassure officers and reduce the perceived level of threat - a hypothesis that was tested and supported later in the analysis process (please see Analysis Cluster Six).

Table 5.12 *Diary Study: Bivariate Analysis for TASER Outcome 1 (whether TASER was used during use-of-force incident)*

Independent variable	**Independent variable categories**	**% (n) of incidents where TASER was…**		**Total sample**	**Test result**
		Not used	*Used*		
Incident crewing	Officers that were alone when the use of force began	**81.8% (n=18/22)**	**18.2% (n=4/22)**	**94**	**p=.050, V=.226***
	Officers that were not alone when the use of force began	**95.8% (n=69/72)**	**4.2% (n=3/72)**		
Incident stress rating	Low to moderate levels of stress reported	92.0% (n=80/87)	8.0% (n=7/87)	94	p=1.000, V=.080
	High levels of stress reported	100.0% (n=7/7)	0.0% (n=0/7)		
Incident threat rating	Low to moderate levels of threat reported	92.6% (n=75/81)	7.4% (n=6/81)	93	p=1.000, V=.012
	High levels of threat reported	91.7% (n=11/12)	8.3%(n=1/12)		
Reason for using force	To protect themselves or another officer	87.5% (n=14/16)	12.5% (n=2/16)	90	p=.424, V=.178
	To protect the public (incl. subject)	94.4% (n=17/18)	5.6% (n=1/18)		
	To effect an arrest	88.9% (n=32/36)	11.1% (n=4/36)		
	Another reason	100.0% (n=20/20)	0.0% (n=0/20)		

Table 5.13 *Diary Study: Bivariate Analysis for TASER Outcome 2 (whether TASER was used as the first tactical option during use-of-force incidents)*

Independent variable	**Independent variable categories**	**% (n) of incidents where TASER was…** not the first tactical options used	the first tactical option used	**Total sample**	**Test result**
Incident crewing	Officers that were alone when the use of force began	**86.4% (n=19/22)**	**13.6% (n=3/22)**	**94**	**p=.011, V=.328***
	Officers that were not alone when the use of force began	**100.0% (n=72/72)**	**0.0% (n=0/72)**		
Incident stress rating	Low to moderate levels of stress reported	96.6% (n=84/87)	3.4% (n=3/87)	94	p=1.000, V=.052
	High levels of stress reported	100.0% (n=7/7)	0.0% (n=0/7)		
Incident threat rating	Low to moderate levels of threat reported	97.5%(n=79/81)	2.5% (n=2/81)	93	p=.343, V=.111
	High levels of threat reported	91.7% (n=11/12)	8.3% (n=1/12)		
Reason for using force	To protect themselves or another officer	100.0% (n=16/16)	0.0% (n=0/16)	90	p=.414, V=.227
	To protect the public (incl. subject)	100.0% (n=18/18)	0.0% (n=0/18)		
	To effect an arrest	91.7% (n=33/36)	8.3% (n=3/36)		
	Another reason	100.0% (n=20/20)	0.0% (n=0/20)		

Given that officers overtly described threat levels as an important factor when making decisions on the use of force within the qualitative data from the post-participation questionnaire (please see Chapter Six for a summary), and that the College of Policing (CoP) specifically instruct officers to take the nature and gravity of a threat into account when considering a use of force (College of Policing, 2013c), the lack of a statistically meaningful relationship between incident threat ratings and TASER use (for either TASER Outcome 1 nor TASER Outcome 2) was curious.

However, when looking at the pattern of results, it does lend support to the existence of such a relationship as larger proportions of officers used TASER (TASER Outcome 1) and used TASER as the first tactical option (TASER Outcome 2) when the reported threat level was high. Nevertheless, caution must be exercised when interpreting these results as very few officers perceived the threat level to be high overall, and in the vast majority of these high-threat incidents TASER was not used nor used as the first tactical option (92% in both cases). Given the curiously non-significant results for both incident stress and incident threat in relation to TASER use, additional exploration of these two variables were conducted. Interestingly, the distribution of the data within these two variables suggests that the null findings might have been due to the way in which they were aggregated for the purposes of analysis using contingency tables (please see Appendix 26 for detail on data conversions). When looking at the results for both of these variables (when excluding cases where TASER was not available), it indicates that neither variable was normally distributed and both appear to be positively skewed. Given the positive skew in the data, aggregating the two highest response categories, and comparing against the lower three response categories may have veiled significant differences between responses at the *lower end* of the scale. As means comparisons would provide increased sensitivity to any potential *overall differences* between incident stress and threat values (regardless of where the difference

in the scale lays), four means comparison tests were used to re-examine the relationship between these two variables and TASER use. Given the non-normal distribution of the data, a Mann Whitney U test was used to directly test the following four hypotheses: (i) the average incident stress level would be higher for incidents where TASER was used, (ii) the average incident stress level would be higher for incidents where TASER was used as the first tactical option, (iii) the average threat level would be higher for incidents where TASER was used, and; (iv) the average threat level would be higher for incidents where TASER was used as the first tactical option. However, as these two items had been presented to participants as a word-scale, each response within these items first needed to be converted into a numerical outcome score (please see Appendix 26 for detail on data conversions).

Unlike previous analyses, the one-tailed exact significance statistics were used as directional hypotheses were being tested. The only statistically significant result that met the thresholds described in Section 4.2.6.1 related to hypotheses three (i.e. that the average threat level would be higher for incidents where TASER was used, U=188.00, z=-1.769, p=.038, r=.18). However, the effect size was only small, an issue that is reflected by the central tendencies for these groups as the mean incident threat rating for incidents where TASER was used is only slightly larger than when TASER is not used (3.14 and 2.65 respectively), and there was no difference between their median scores (3.00 for both conditions). Given the importance placed on threat evaluation by the officers and the CoP, the limited effect size of this relationship seems almost as incongruent as a null result.

Without further analyses, the reason why the difference was not larger is unclear, however one explanation could be that the mere presence of TASER was enough to reassure officers and reduce the perceived level of threat; a hypothesis that was tested later in the analysis process (please see Analysis Cluster Five). Regardless of

the numerical size, the difference between these groups was statistically significant, indicating that incident threat levels are an important driver in relation to TASER use.

Although these analyses failed to unearth any significant findings, the pattern of results indicates that there may well be a relationship between TASER use and incident stress and threat rating. More specifically, mean incident stress ratings were slightly lower for incidents where TASER was used (mean=2.14), than incidents where TASER was not used (mean=2.32), and were also moderately lower for incidents where TASER was used as the first tactical option (mean=1.33) than when this was not the case (mean=2.34).

Whilst this is similarly counterintuitive to the results for the contingency table results for incident stress and TASER use, it does follow the potential hypothesis previously suggested in light of these surprising results; i.e. that using TASER could actually reduce the stressfulness by increasing the efficacy with which the incident can be managed (assuming that the use of TASER is successful and no other force is needed), or that the mere presence of TASER reduces how stressful an officer finds an incident. In addition, mean incident threat ratings were higher for incidents where TASER was used as the first tactical option (mean=3.33), than incidents where TASER was not used as the first tactical option (mean=2.68).

5.2.2 Analysis Cluster Two: The impact of incident crewing and incident interactions

This section of inferential results examines the impacts of *incident crewing* on how officers think and feel. As such, the first tranche of testing within this analysis cluster examines whether there are any statistically significant relationships between incident crewing and incident threat, stress and the primary reason for using force (Section 5.2.2.1 - Incident Crewing Impacts). In response to the qualitative findings from Chapter Six which imply that threat levels are linked to both the behaviour of the

subject and incident-related stress, a second group of tests were carried out to explore the relationship between a) the perceived level of threat during an incident and how stressful officers found the incident to be, and b) whether there was a relationship between the perceived level of threat during an incident and the reason for the use of force (Section 5.2.2.2 - Threat, Stress and Reasons for Use of Force). A final analysis was conducted to determine whether shift crewing levels were related to incident crewing to explore the assumption that an officer that is single-crewed during their shift are more likely to be alone when force is used (Section 5.2.2.3 - Shift Crewing vs Incident Crewing).

5.2.2.1 Incident Crewing Impacts

Incident crewing and reason for use of force.

Similarly to the TASER Outcome analyses in the previous section (Analysis Cluster One), the relationship between incident crewing and reason for use of force could be considered at the incident-level, or the individual-level. Given the categorical nature of the data, contingency tables were the best analytical tool to examine the relationship between these two variables, and as such the data would need to be considered at the incident-level or would require substantial processing (and loss of sample size) for the analyses to treat the data at an individual-level without violating the assumption of mutually independent observations.

As such, the analysis was conducted in line with the precedent set within the extant literature and considered the data at the incident-level. Given that the predictor variable relates to whether or not a respondent was alone or with other officers when the use of force began, the reason for use of force was aggregated differently than in the previous analyses in order to be able to differentiate initiating a use of force in order to protect oneself and to protect another officer (please see Appendix 26 for detail on data conversions).

Fisher's Exact Tests was used instead of Chi Squared due to the small number of values in some of the contingency table cells. Results can be found in Table 5.14 and indicate that there was no statistically significant difference (p=.131, V=.119).

When examining the proportions in Table 5.14, the results appear to present a logical pattern, however; with a larger proportion of use-of-force incidents being instigated in order for an officer to protect themselves when the officer was alone when the use of force began (24%), than when other officers were also present (11%).

Incident crewing, stress, and incident threat ratings.

Similar to all prior analyses that have been discussed, the relationship between incident crewing and these two outcome variables (incident stress ratings and incident threat ratings) could be considered at the incident or individual level. As previously mentioned, in order to consider data at the individual-level, the data would need to be amended so that each officer had a single score for each predictor condition. However, unlike previous analyses, this could easily be achieved as the outcome variables are continuous in nature and as such, each individual participant outcome scores could be *averaged* across each predictor condition. Given the benefits of considering data at the individual-level (please see Section 4.2.6.1 for more information) and the relative ease with which the data could be amended to enable such treatment (please see Appendix 26 for detail on data conversions), it was deemed to be the most appropriate way forward for these two analyses. The staged approach developed for analyses conducted at the individual-level was applied (please see Section 4.2.6.1 for more detail), however no statistically meaningful relationships were found between the number of officers present when a use of force began and participants' average ratings of how stressful they found the incident to be, nor the level of threat they perceived (Table 5.15).

When looking at the pattern of the results however, it appears as though average incident stress is rated slightly higher when officers were alone, than when more

officers were present when the use of force began; whilst the perceived level of threat appeared to be rated slightly lower when officers were alone, than when more officers were present when the use of force began. The pattern in relation to the perceived level of threat may seem counterintuitive (as one might expect officers that are alone to consider themselves more vulnerable, and thus any potential threats as more dangerous). However, this could be an operational artefact, as it may be that the higher the incident threat, the more officers are sent to attend by the control room.

Table 5.14 *Diary Study: Incident Crewing and Reasons for Using Force*

		What was the primary reason for using force?				
		To protect myself	To protect another officer	To protect the public	To effect an arrest	Another reason
Incident crewing	Officers that were alone when the use of force began	24.10% (n=7/29)	0.0% (n=0/29)	24.10% (n=7/29)	31.00% (n=9/29)	20.70% (n=6/29)
	Officers that were not alone when the use of force began	10.50% (n=15/143)	7.70% (n=11/143)	16.80% (n=24/143)	42.70% (n=61/143)	22.40% (n=32/143)

Table 5.15 *Diary Study: Incident Crewing, Stress, and Incident Threat Ratings*

Outcome variable	**Predictor variable condition**	**Mean**	**Median**	**SD**	**Parametric assumptions**	**Parametric results**[32]	**Non-parametric result**[33]
Average **incident stress** rating	Alone	2.53	2.55	.90	Not met	t(64)=.996, p=.323	U=353.00, z=-.711, p=.483
	Other officers present	2.29	2.30	.80			
Average **incident threat** rating	Alone	2.61	2.75	.89	Not met	t(64)=-1.099, p=.276	U=329.50, z=-1.071, p=.289
	Other officers present	2.87	2.80	.81			

[32] Levene's test for equality of variance was non-significant for all of the t-tests in this table, as such the 2-tailed significance value for equal variance assumed was used.
[33] Exact significance (2-tailed) used.

5.2.2.2 Threat, Stress and Reasons for Use of Force

Threat ratings and reason for use of force

As with all prior analyses discussed, the relationship between incident crewing and incident stress and threat levels could be considered at the incident or individual level. However, given the benefits of considering the data at an individual-level (please see Section 4.2.6.1 for more information) and the relative ease with which the data could be amended to enable such treatment due to the continuous nature of the outcome variable (please see Appendix 26 for detail on data conversions); this was deemed to be the most appropriate way forward for these analyses.

Given that the analyses needed to compare differences between more than two groups and exploration of the data revealed non-normal distributions (thus violating the assumptions of parametric testing) a Kruskal-Wallis test was chosen over a one way independent ANOVA.

The staged approach developed for analyses conducted at the individual-level was applied (please see Section 4.2.6.1 for more detail) and when running the primary analysis a statistically significant difference in the average incident threat rating by reason for use of force ($H(4)=16.418$, $p=.003$) was found (please see Table 5.16): With a mean rank of 69.29 for officers indicating that the primary reason that they use force was to protect themselves; a mean rank of 68.00 for officers indicating that the primary reason that they use force was to protect another officer; a mean rank of 55.61 for officers indicating that the primary reason that they use force was to protect the public (incl. the subject); a mean rank of 42.66 for officers indicating that the primary reason that they use force was to effect an arrest, and finally; a mean rank of 40.10 for officers indicating other reasons for using force. Given a statistically significant result was found, a follow-up test was required. When examining the data, it was clear that far fewer officers that had provided outcome data for all five of the predictor conditions

(n=1), than had provided outcome data for just one predictor variable (n=24). As such, the follow-up analysis also treated the data as independent, but filtered the dataset to only include individuals that had a score for one of the predictor conditions only. A Kruskal-Wallis test was chosen for the same reasons as the primary analyses, but a statistically significant difference was not found in the follow-up analyses (H(3)=3.118, p=.374).[34]

Threat and stress ratings

Given the advantages of treating the data at an individual-level (please see Section 4.2.6.1 for more information), the simplicity with which a single score for each variable could be created (please see Appendix 26 for detail on data conversions), and that the direction of any potential relationship could not be determined due to a lack of control over the experimental conditions, it was determined that simple correlation analyses that considered the data at the individual-level would best suit the data in this instance.

Given that the distributions were found to be non-normal, a Spearman's Rho correlation was used over a Pearson correlation; resulting in a statistically significant finding. More specifically, a positive correlation was found between incident stress ratings and incident threat ratings at the individual-level (rs(51)=.271, p=.049); indicting that as a participants average *incident threat rating* increases, so does their a*verage incident stress rating*.

[34] Please note, there were only four groups in this analysis as after filtering out repeated measurements there were no data for the group 'to protect another officer.'

Table 5.16 *Diary Study: Threat Associations - Reason for Using Force*

		Mean	Median	SD	Parametric assumptions	Test statistic
Reason for use of force	To protect myself	3.58	3.50	1.026	Not met	**H(4)=16.418, p=.003**
	To protect another officer	3.39	3.00	.601		
	To protect the public (incl. subject)	3.09	3.00	1.269		
	To effect an arrest	2.65	2.67	.629		
	Another reason	2.58	2.00	.805		

5.2.2.3 Shift Crewing vs Incident Crewing

Similar to the TASER Outcome analyses in Analysis Cluster One, the relationship between incident crewing and shift crewing could be considered at the incident-level, or the individual-level. Given the categorical nature of the data, contingency tables were the best analytical tool to examine the relationship between these two variables, and as such the data would need to be considered at the incident-level or would require substantial processing (and loss of sample size) in order for the analyses to treat the data at an individual-level without violating the assumption of mutually independent observations. As such, the analyses were conducted in line with the precedent set within the extant literature by considering the data at the incident-level.

Aggregate versions of the variables for incident crewing levels and shift crewing level were utilised in the analyses (for more information on data conversions please see Section 4.2.6.1 and Appendix 26) and Fisher's Exact Test was selected over Chi Squared due to the exploratory nature of the analysis. The results revealed a statistically significant difference between groups; with a higher proportion of incidents where officers were alone when a use of force began had also occurred during a shift where the officer was single-crewed (31%, 22 out of 72 incidents) compared to double-crewed (8.4%, 9 out of 107 incidents; p=.000, V=.287). This implies that whilst shift crewing does not always equate to incident crewing, there is a statistically significant relationship between the two; whereby officers that were alone when they started using force were also more likely to be *predominantly single-crewed* throughout the shift in question.

5.2.3 Analysis Cluster Three: The impacts of shift crewing and shift level interactions

This section of inferential results examines the impacts of *shift crewing* on how officers think and feel. As such, bivariate testing was used to determine whether shift crewing was associated with officer stress, fatigue, workloads, and shift safety ratings. The first tranche of testing specifically addressed whether the level of shift crewing impacted on the above (Section 5.2.3.1 - Shift Crewing Impacts). In response to the findings from the qualitative results (please see Chapter Six) implying that incident threat levels are linked to officers stress and feelings of vulnerability, a second group of tests were carried out to explore the relationship between: a) how safe officers felt during their shift and how stressful they found their shift, b) how safe officers felt during their shift and how stressful they found use-of-force incidents, c) how safe officers felt during their shift and incident threat levels, d) how stressful an officer found their shift and levels of incident stress, and finally e) how stressful an officer found their shift and incident threat ratings (Section 5.2.3.1 - Safety and Stress Interactions). Table 5.17 details the results for Shift Crewing Impacts, whilst Table 5.18 displays the results for the Safety and Stress Interactions analyses.

5.2.3.1 Shift Crewing Impacts

Given the advantages of treating the data at an individual-level (please see Section 4.2.6.1 for more information) and the simplicity with which a single score for each variable could be created due to the outcome variables being continuous in nature (please see Appendix 26 for detail on data conversions); it was felt that considering data at the individual-level would be most appropriate.

Means comparisons were considered to be the appropriate test to use for this particular battery of analyses due to the categorical nature of the predictor variable and the continuous nature of the outcome variables.

The staged approach developed for analyses conducted at the individual-level was applied (please see Section 4.2.6.1 for more detail) and overall, only one statistically significant result meeting the thresholds discussed in Section 4.2.6.1 was found (indicated in Table 5.17 denoted by an asterisk and bold text). More specifically, a statically significant difference in average shift workload ratings were found between those that were *predominantly single-crewed* compared to those that were *predominantly double-crewed*; with officers that were primarily single-crewed during their shifts having slightly higher average shift workload ratings. Given the staged approach to analysis adopted here, a more judicious follow-up test was required. When examining the data, it was clear that far fewer officers that had provided outcome data for both predictor conditions (n=19), than had provided outcome data for just one predictor variable (n=34). As such, the follow-up analyses also treated the data as independent,[35] but filtered the dataset to remove those participants that had provided data for both predictor conditions. The follow-up analyses supported the original result and found that the average shift workload rating was significantly higher for those who were primarily single-crewed (Mdn=4.00) than for those who were primarily double-crewed (Mdn=3.00; U=65.00, p=.01, r=-.44). Though the average shift workload rating for those that were primarily single-crewed was found to be significantly higher than those that were primarily double-crewed, this finding was not replicated in relation to the number of incidents that they attended; meaning that though officers' subjective workload ratings were found to be significantly affected by crewing levels, the number of incidents they attended was not.

These findings could indicate a number of things; first, they could imply that workloads may not be entirely determined by the *number* of incidents an officer attends

[35] A Mann-Whitney test was used as the was chosen over a t-test as the data was not normally distributed.

during their shift and that other factors, such as the type of incident that officers are sent to and the number of officers present at the incident, may impact on an officer's workload. When exploring the data further using a simple correlational design, support for this notion was provided as no statistically meaningful relationship was found between the average number of incidents that an officer attended and their average shift workload ratings ($r_s(51) = .208$, $p = .135$). [36] Another possibility, however, is that objectively the workload may not differ but merely the *perception* of the workload changes. A differentiation which perhaps, on a practical level, is moot; given that further ad-hoc exploration of the data revealed a statistically significant correlation at the individual-level between average shift stress ratings and average shift workload ratings ($r_s(51) = .594$, $p = .000$), but not with the average number of incidents attended per shift ($r_s(51) = .205$, $p = .140$));[37] indicating that the number of incidents is not as important as self-rated workloads when considering some of the key negative psychological impacts of the modern day workforce such as stress.

The relationship between average shift workload ratings and average shift stress ratings indicates that shift crewing levels could also potentially impact on other officer variables *indirectly* via workloads and provides an impetus to test for a relationship between shift workload ratings and other psychosocial variables such as physical fatigue and mental exhaustion. As such, a brief exploration between shift workload ratings and these two psychosocial variables was conducted using Spearman's Rho, which found a strong positive correlation between average shift workload ratings and physical fatigue at the end of a shift ($r_s(51) = .463$, $p = .000$)); and mental exhaustion at the end of a shift ($r_s(50) = .358$, $p = .009$)).[38] However, when examining the general pattern of median

[36] Spearman's correlation was chosen over Pearson's correlation as the data was not normally distributed and analysis was run at the individual-level.
[37] As above.
[38] Spearman's correlation was chosen over Pearson's correlation for both these analyses as the data was not normally distributed and analysis was run at the individual-level.

results[39] for this group of analyses, it does appear that on average, those that are primarily single-crewed rated their shifts as slightly more stressful, slightly more mentally exhausting and slightly less safe than their colleagues that were primarily double-crewed during their shift.

[39] Given the non-normal distribution of the data, the medians were considered as opposed to the means.

Table 5.17 *Diary Study: Shift Crewing Impacts*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[40]	Non-parametric result[41]
Average **shift stress** rating	Predominantly single-crewed	2.95	3.0	0.97	Not met	t(70)=.959, p=.341	U=551.50 z=-.963, p=.339
	Predominantly double-crewed	2.72	2.5	1.03			
Average **shift workload** rating	Predominantly single-crewed	3.66	3.4	0.73	Not met	**t(70)=.2.115, p=.038, *g*=0.5***	**U=466.00, z=-2.028, p=.042, r=-.24***
	Predominantly double-crewed	3.31	3.0	0.65			
Average **no. of incidents** attended per shift	Predominantly single-crewed	5.90	4.0	8.41	Not met	t(70)=1.013, p=.315	U=612.00, z=-.268, p=.792
	Predominantly double-crewed	4.51	4.0	2.29			

[40] Unless otherwise indicated (via footnotes) Levene's test for equality of variance was non-significant, as such the 2-tailed significance value for equal variance assumed was used.
[41] Exact significance (2-tailed) used.

Table 5.17 *Diary Study: Shift Crewing Impacts*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[40]	Non-parametric result[41]
Average no. of **use-of-force incidents per shift**	Predominantly single-crewed	2.23	2.0	0.41	Not met	t(70)=-.1.594, p=.116[42]	U=559.50, z=-1.060, p=.293
	Predominantly double-crewed	2.44	2.0	0.73			
Average rating for end of shift **physical fatigue**	Predominantly single-crewed	7.27	8.0	1.69	Not met	t(70)=-1.249, p=.216	U=531.00, z=-1.194, p=.235
	Predominantly double-crewed	7.76	8.0	1.60			
Average rating for end of shift **mental exhaustion**	Predominantly single-crewed	7.04	7.0	1.67	Met	t(69)=.306, p=.760	U=587.50, z=-.378, p=.709
	Predominantly double-crewed	6.91	6.9	1.89			
Average **shift safety** rating	Predominantly single-crewed	5.51	5.0	1.81	Not met	t(70)=-.652 p=.517	U=546.50, *z*=-1.020, p=.311
	Predominantly double-crewed	5.78	6.0	1.76			

[42] Levene's test for equality of variance was significant and as such the assumption of equal variance must be considered to be violated. Consequently, the 2-tailed significance value for equal variance *not* assumed was used.

5.2.3.2 Safety and Stress Interactions

Given that the variables being considered as part of the Safety and Stress Interactions analyses are all continuous in nature, and the direction of any potential relationships have not been hypothesised due to the exploratory nature of these analyses, it was determined that simple correlation analyses would best suit the data.

As with all previously described analyses, these correlations could either consider the data at the incident-level, or at the individual-level. Given the advantages of treating the data at an individual-level (please see Section 4.2.6.1) and the simplicity with which a single score for each variable could be created (please see Appendix 26 for detail on data conversions); the data were considered at the individual-level. Given that the distributions were found to be non-normal, Spearman's Rho were chosen as the method of analyses.

Full results can be found in Table 5.18, however a statistically significant negative correlation was found between average shift safety ratings and the average incident stress ratings ($r_s(51)=-.325$, $p=.001$), and between average shift safety ratings and average incident threat ratings ($r_s(51)=-.231$, $p=.023$); meaning that the average score for shift safety *reduces* as average ratings for incident threat and incident stress *increase.* Perhaps unsurprisingly, a strong positive correlation was also found between average incident stress ratings and average shift stress ratings; with participants average shift stress ratings increasing as their average ratings for incident stress increased ($r_s(51)=.538$, $p=.000$).

Table 5.18 *Diary Study: Safety and Stress Interactions*

Correlation variables	**Correlation results**
a) Average shift safety rating x Average shift stress rating	rs(51)=-.258, p=.062
b) Average shift safety rating x Average incident stress rating	**rs(51)=-.325, p=.001***
c) Average shift safety rating x Average incident threat rating	**rs(51)=-.231, p=.023***
d) Average shift stress rating x Average incident stress rating	**rs(51)=.538, p=.000***
e) Average incident threat rating x Average shift stress rating	rs(51)=-.162, p=.248

5.2.4 Analysis Cluster Four: The impacts of officer characteristics

Although the original inferential analysis schedule had planned to test for potential relationships between enduring officer factors and the use of TASER, this was ultimately inappropriate. Due to the small sample size and the small number of overall TASER uses, these variables were best considered at the incident-level, rendering any analysis including this data and any variables that represented individual-level data (e.g. officer characteristics) ill-advised, as this would most likely violate the assumption of mutually independent observations and artificially weight or skew the analyses. However, given the potential impacts of officer characteristics identified by the literature review in Chapter Three and the qualitative results for this study, officer gender, role, and length of service were explored in relation to officer stress, incident threat ratings, shift workload ratings, shift safety ratings, fatigue, and their ratings of the NDM. Given the mutually exclusive nature of the predictor variables (e.g. officers could not be both male and female), an independent measures approach to analysis had to be taken and the data needed to be considered at the individual-level (please see Appendix 26 for detail on relevant data conversions).

Given the continuous nature of the outcome variables and the differing natures of the predictor variables (some categorical and some continuous), a combination of correlation analyses and means comparisons were used to explore the potential relationships within the data. The results for the impacts of officer gender are displayed in Table 5.19, whilst Table 5.20, details those for office role, and Table 5.21 displays the results for test exploring the impacts of length of service on stress, incident threat ratings, workload ratings, fatigue, safety, and NDM ratings.

In regards to officer gender, there were two results that met the statistical thresholds detailed in Section 4.2.6.1; with male officers having a lower average incident stress ratings (Mdn=2.15) compared to the female officers (Mdn=2.75;

U=66.50, z=-2.063, p=.037, r=-.29), and male officers having a higher average shift safety rating (Mdn=6.00) than female officers (Mdn=4.25; U=37.50, z=-2.887, p=.002, r=-.40). Indicating that male officers within the study found their shifts to be safer and less stressful than their female colleagues. Though it might be easy to view these results as the expression of stereotyped gender differences (e.g. differences in body mass, size, strength, experiences of stress etc), gender was not a key theme identified through the qualitative data, and without further exploration the reason for these differences are unclear. Rather than phenotypic sex differences, these results could be due to more cultural, organisation or social elements. For examples, higher levels of stress could be due to higher rates of sex discrimination, harassment or prejudice experienced by female officers (Brown et al., 2019; Brown & Daus, 2015). There were no results that met the statistical thresholds in relation to role nor length of service.

Table 5.19 *Diary Study: The Impacts of Officer Characteristics – Gender*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[43]	Non-parametric result[44]
Average **incident stress** rating	Male	2.20	2.15	0.75	Not met	**t(50)=-1.968, p=.055, *g*=.85***	**U=66.50, z=-2.063, p=.037, r=-.29***
	Female	2.83	2.75	0.61			
Average **shift stress** rating	Male	2.69	2.55	0.93	Met	t(50)=-1.553, p=.127	U=89.00, z=-1.409, p=.165
	Female	3.33	3.75	1.08			
Average **incident threat** rating	Male	2.85	2.70	0.83	Not met	t(50)=-.577, p=.566	U=101.50, z=-1.057, p=.303
	Female	3.05	3.00	0.61			
Average **shift safety** rating	Male	5.93	6.00	1.56	Not Met	**t(50)=2.943, p=.005, *g*=1.27***	**U=37.50, z=-2.887, p=.002, r=-.40***
	Female	4.00	4.25	1.05			

[43] Levene's test for equality of variance was non-significant for all of the t-tests in this table, as such the 2-tailed significance value for equal variance assumed was used.
[44] Exact significance (2-tailed) used.

Table 5.19 *Diary Study: The Impacts of Officer Characteristics – Gender*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[43]	Non-parametric result[44]
Average rating for end of shift **mental exhaustion**	Male	6.82	6.85	1.77	Met	t(49)=-1.186, p=.242	U=82.00, z=-1.047, p=.308
	Female	7.80	8.00	1.60			
Average rating for end of shift **physical fatigue**	Male	7.57	8.00	1.57	Not met	t(50)=-.759, p=.451	U=128.00, z=-2.87, p=.785
	Female	8.08	7.25	1.50			
Average shift **workload rating**	Male	3.48	3.30	0.69	Not Met	t(50)=.790, p=.433	U=108.50, z=-.870, p=.401
	Female	3.25	3.00	0.42			
NDM use (frequency)	Male	4.09	4.00	1.03	Not met	t(36)=1.443, p=.158	U=46.00, z=-1.11, p=.280
	Female	3.25	3.50	1.71			

Table 5.19 *Diary Study: The Impacts of Officer Characteristics – Gender*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[43]	Non-parametric result[44]
NDM perceived utility	Male	3.42	3.00	1.23	Not met	t(35)=1.445, p=.157	U=37.50, z=-1.457, p=.165
	Female	2.50	3.00	1.00			

Table 5.20 *Diary Study: The Impacts of Officer Characteristics – Role*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[45]	Non-parametric result[46]
Average **incident stress** rating	Response & Neighbourhood policing	2.29	2.30	0.77	Not met	t(51)=-.125, p=.901	U=128.50, z=.353, p=.735
	Roads policing	2.33	2.30	0.80			
Average **shift stress** rating	Response & Neighbourhood policing	2.78	2.60	0.93	Met	t(51)=.383, p=.703	U=125.00, z=.451, p=.665,
	Roads policing	2.62	2.60	1.24			
Average **incident threat** rating	Response & Neighbourhood policing	2.86	2.70	0.84	Not met	t(51)=-.074, p=.941	U=122.50, z=5.25, p=.614
	Roads policing	2.88	2.85	0.26			
Average **shift safety** rating	Response & Neighbourhood policing	5.60	5.70	1.62	Met	t(51)=-.916, p=.364	U= 111.00, z=.845, p= .412
	Roads policing	6.25	6.50	1.72			

[45] Unless otherwise indicated (via footnotes) Levene's test for equality of variance was non-significant, as such the 2-tailed significance value for equal variance assumed was used.
[46] Exact significance (2-tailed) used.

Table 5.20 *Diary Study: The Impacts of Officer Characteristics – Role*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[45]	Non-parametric result[46]
Average rating for end of shift **mental exhaustion**	Response & Neighbourhood policing	7.09	7.00	1.67	Not met	**t(50)=2.024, p=.048, *g*=.28***	U=85.00, z=1.520, p=.133
	Roads policing	5.60	6.45	1.97			
Average rating for end of shift **physical fatigue**	Response & Neighbourhood policing	7.69	8.00	1.55	Met	t(51)=.733, p=.467	U=116.00, z=.704, p=.495
	Roads policing	7.20	7.75	1.53			
Average shift **workload rating**	Response & Neighbourhood policing	3.47	3.30	0.69	Not met	t(51)=.825, p=.413	U=110.50, z=.884, p=.392
	Roads policing	3.23	3.00	0.41			
NDM use (frequency)	Response & Neighbourhood policing	4.03	4.00	1.06	Not met	t(36)=.394, p=.696	U=92.00, z=-.170, p=.833
	Roads policing	3.83	4.00	1.47			

Table 5.20 *Diary Study: The Impacts of Officer Characteristics – Role*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[45]	Non-parametric result[46]
NDM perceived utility	Response & Neighbourhood policing	3.35	3.00	1.23	Not met	t(35)=.340, p=.736	U=86.00, z=-.301, p=.779
	Roads policing	3.17	3.00	1.33			

Table 5.21 *Diary Study: The Impacts of Officer Characteristics – Length of Service*

Correlation variables	**Parametric assumptions**	**Parametric test**	**Non-parametric test**
Average incident stress rating x Length of service	Not met	r(51)=.105, p=.452	rs(51)=.091 p=.516,
Average shift stress rating x Length of service	Not met	**r(51)=.325, p=.018***	rs(51)= .215, p=.122,
Average incident threat rating x Length of service	Not met	r(51)=-.031, p=.825	rs(51)=-.057, p=.685
Average shift safety rating x Length of service	Not met	r(51)=.176, p=.207	rs(51)=.136, p=.333
Average rating for end of shift mental exhaustion x Length of service	Not met	r(50)=.241, p=.086	rs(50)=.213, p=.130
Average rating for end of shift physical fatigue x Length of service	Not met	r(51)=.229, p=.099	rs(51)=.220, p=.113
Average shift workload rating x Length of service	Not met	**r(51)=.406, p=.003***	rs(51)=.162, p=.247
NDM use (frequency) x Length of service	Not met	r(36)=-.063, p=.709	rs(36)=.006, p=.969
NDM perceived utility x Length of service	Not met	r(35)=.058, p=.735	rs(35)=.082, p=.628

5.2.5 Analysis Cluster Five: Decision-making

Given that data had been collected on officers' decision-making styles and their use of the NDM promoted by the CoP as applied professional practice, it felt prudent to briefly explore whether officers' individual decision styles impacted on whether they found the NDM useful and how frequently they applied the model when making time pressured decisions in the line of duty.

Unlike some previous analyses, data on officer decision-making styles and NDM use could only be considered at the individual-level as this information was only captured once (for more details on relevant variable creation and data conversions please see Appendix 26).

Due to the exploratory nature of the analyses and the continuous nature of all the variables, a simple correlation design was used to explore the potential relationships within these data. Within this particular set of analyses, data collected from the baseline survey (officer decision-making styles) and the post-participation questionnaire (use and efficacy of the NDM) were drawn together. However, only 34 individuals that filled in the baseline survey went on to also complete the post-participant questionnaire, resulting in a fairly small sample with non-normally distributed data. Consequently, Spearman's Rho was chosen over Pearson's correlation for these analyses. Full results can be found in Table 5.22, however, as one might expect, there was a strong positive correlation between the perceived usefulness of the NDM and the reported frequency of use; with those rating the tool as more useful also reporting a higher frequency of use ($r_s(35)=.767$, $p=.000$).

Only the overall rational decision-making score met the analysis thresholds described in Section 4.2.6.1, and could be considered as being *positively* correlated with using the NMD when making time pressured decisions in the line of duty. Officers who

scored higher on the rational decision-making dimension of the GDMS reported that they used the NDM more frequently (rs(31)=.381, p=.029).

However, two decision-making styles were found to be *negatively* correlated with using the NMD when making time pressured decisions in the line of duty; with those scoring higher on avoidant (rs(31)=-.475, p=.005) and dependent (rs(31)=-.397, p=.022) decision-making dimensions of the GDMS reporting that they used the NDM less frequently.

A strong negative association was also found between avoidant decision-making styles and the perceived usefulness of the tool; with those scoring higher on avoidant decision-making dimensions of the GDMS also rating the NDM as less useful (rs(31)=-.345,p=.049).

Finally, potential relationships between these five decision-making styles and NDM use, NDM utility, as well as against average incident stress and average incident threat ratings were explored on an individual-level. Only one statistically significant association was found. Spontaneous decision-making scores were positively and significantly associated with average incident threat ratings; with those scoring higher on the spontaneous decision-making dimension of the GDMS also reporting higher average ratings for incident threat (rs(44)=.355, p=.015). No other statistically significant correlations were found.

Table 5.22 *Diary Study: Bivariate Analysis for NDM Use – General Decision-Making Style*

Correlation variables	**Non-parametric test**
Intuitive GDMS score x NDM use (frequency)	rs(31)=.074, p=.681
Dependent GDMS score x NDM use (frequency)	**rs(31)=-.397, p=.022***
Rational GDMS score x NDM use (frequency)	**rs(31)=.381, p=.029***
Spontaneous GDMS score x NDM use (frequency)	rs(31)=.240, p=.179
Avoidant GDMS score x NDM use (frequency)	**rs(31)=-.475, p=.005***
Intuitive GDMS score x NDM perceived utility	rs(31)=-.001, p=.995
Dependent GDMS score x NDM use perceived utility	rs(31)=-.249, p=.163
Rational GDMS score x NDM use perceived utility	rs(31)=.201, p=.263
Spontaneous GDMS score x NDM use perceived utility	rs(31)=.298, p=.092
Avoidant GDMS score x NDM use perceived utility	**rs(31)=-.345, p=.049***
NDM use (frequency) x NDM use perceived utility	**rs(35)=.767, p=.000***

Table 5.22 *Diary Study: Bivariate Analysis for NDM Use – General Decision-Making Style*

Correlation variables	**Non-parametric test**
Intuitive GDMS score x Incident Stress	rs(44)=-.004, p=.977
Dependent GDMS score x Incident Stress	rs(44)=-.172, p=.253
Rational GDMS score x Incident Stress	rs(44)=.204, p=.174
Spontaneous GDMS score x Incident Stress	rs(44)=.108, p=.474
Avoidant GDMS score x Incident Stress	rs(44)=-.141, p=.350
Intuitive GDMS score x Incident Threat	rs(44)=.008, p=.960
Dependent GDMS score x Incident Threat	rs(44)=-.100, p=.507
Rational GDMS score x Incident Threat	rs(44)=.053, p=.725
Spontaneous GDMS score x Incident Threat	**rs(44)=.355, p=.015***
Avoidant GDMS score x Incident Threat	rs(44)=-.057, p=.704

5.2.6 Analysis Cluster Six: The impacts of TASER availability

Though the impacts of TASER availability were not originally one of the focal points of the analysis, the results from the TASER Outcome analyses (Analysis Cluster One) indicated that there may have been value in some exploratory tests. More specifically, although a statistically significant relationship between perceived threat and the use of TASER was found – the effect size was much smaller than anticipated given the importance placed on threat evaluation by the officers' qualitative accounts (please see Chapter Six) and the College of Policing (CoP, 2013c).

However, given that these analyses only included incidents where TASER was likely to have been available, it could be that the mere presence of TASER was enough to reassure officers and reduce the perceived level of threat. As such, an additional set of bivariate tests were conducted to explore the impacts of TASER availability on how stressful officers found their shift to be, how safe they felt during their shift, how stressful they found incidents where force was used, and the perceived level of threat during incidents where force was used.

Given the benefits of considering the data at the individual level (please see Section 4.2.6.1) and the relative simplicity with which a single score for each outcome variable could be created (please see Appendix 26 for detail on data conversions), the data were analysed at the individual-level.

The staged approach detailed in Section 4.2.6.1 was applied to resolve the consequent challenge of whether to treat the data as independent or repeated measures and given the categorical nature of the predictor variables (i.e. TASER accessibility) and the continuous nature of the outcome variable, a series of means comparisons were used to explore the potential relationships within the data.

In total, three out of the four tests met the statistical thresholds set out in Section 4.2.6.1 and thus could therefore be considered as a meaningful statistical difference

(indicated in Table 5.23 by an asterisk and bold text). In particular, the average shift ratings for stress significantly reduced when TASER was available to officers, whilst the average rating for shift safety increased; implying that the participants found shifts safer and less stressful when they had access to TASER. Moreover, the average threat ratings for incidents where force was required were also, on average, rated as lower when officers had access to TASER; supporting the hypothesis that the mere presence of TASER may indeed provide officers with some reassurance.

Given three statistically significant results were found, a series of three follow-up tests was required. When examining the data, it was clear that far fewer officers that had provided outcome data for both the predictor conditions (n=9), than had provided outcome data for just one predictor variable (n=44). As such, the follow-up analyses also treated the data as independent, but filtered the dataset to only include individuals that had a score for one of the predictor conditions only.

Only two out of these three findings were upheld by the secondary analyses; with the average rating for shift stress being confirmed as significantly lower for those with ready access to TASER (mean=2.43), compared to those without (mean=3.04; $t(42)=-2.092$, $p=.043$, $g=0.64$), and the average threat rating for use-of-force incidents was also confirmed as significantly higher for officers that did not have access to TASER (Mdn=3.00) than for those that did (Mdn=2.70; $U=151.50$, $p=.034$, $r=-.32$).[47]

The difference found between those that had access to TASER and those that did not in relation to average shift safety ratings was not confirmed as a statistically meaningful result after filtering out participants that had provided data for both predictor conditions ($t(42)=1.097$, $p=.279$); implying the previous effect was likely to be an type I error, and may have been an artefact of an breaching the of independent

[47] A Mann-Whitney test was chosen over a t-test as the data was found to be non-normally distributed; violating one of the key assumptions of an independent t-test.

observations. However, as filtering out participants that had provided data for both predictor conditions resulted a fairly sizable loss of sample size, this would have reduced the test's power. Nonetheless, the overall patterns of the results still supported the notion that the presence of TASER provides a sense of security for officers, regardless of statistical significance.

Table 5.23 *Diary Study: Bivariate Analysis for TASER Availability Impacts*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[48]	Non-parametric result[49]
Average **incident stress** rating	TASER available	2.28	2.30	0.75	Not met	t(60)=-.938, p=.352	U=414.50, z=-.909, p=.368
	TASER not available	2.47	2.50	0.90			
Average **shift stress** rating	TASER available	2.42	2.40	0.94	Met	**t(60)= -2.722, p=.008, *g*=.70***	**U=309.50, z=-2.40, p=.016, r=-.30***
	TASER not available	3.09	3.00	0.99			
Average **incident threat rating**	TASER available	2.64	2.70	0.72	Not met	**t(60)=-2.644, p=.010, *g*=.67***	**U=310.50, z=-2.407, p=.016, r=-.31***
	TASER not available	3.18	3.00	0.90			

[48] Levene's test for equality of variance was non-significant for all of the t-tests in this table, as such the 2-tailed significance value for equal variance assumed was used.
[49] Exact significance (2-tailed) used.

Table 5.23 *Diary Study: Bivariate Analysis for TASER Availability Impacts*

Outcome variable	Predictor variable condition	Mean	Median	SD	Parametric assumptions	Parametric results[48]	Non-parametric result[49]
Average **shift safety** rating	TASER available	6.12	7.00	1.77	Not met	t(60)=1.965, p=.054	**U=333.00, z=-2.062, p=.039, r=-.26***
	TASER not available	5.26	5.70	1.67			

5.2.7 Summary of inferential analyses

Due to the sheer number of the exploratory bivariate tests, a brief summary of the results from the incident-level analyses (Analysis Clusters One and Two) and shift-level analyses (Analysis Cluster Three) are presented first in order to address Research Questions One, Three and Four. This is followed by a summary of results relevant to Research Question Five and will conclude by drawing all the inferential analyses together to develop a wider, more detailed picture of the associations between officer crewing levels and how they think, feel and act. Relevant Research Questions are listed below for ease of reference:

- ***Research Question One:*** *Do crewing levels affect the frequency and type of TASER use by police officers?*
- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Four:*** *If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?*
- ***Research Question Five:*** *Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?*

Research Questions One, Three and Four

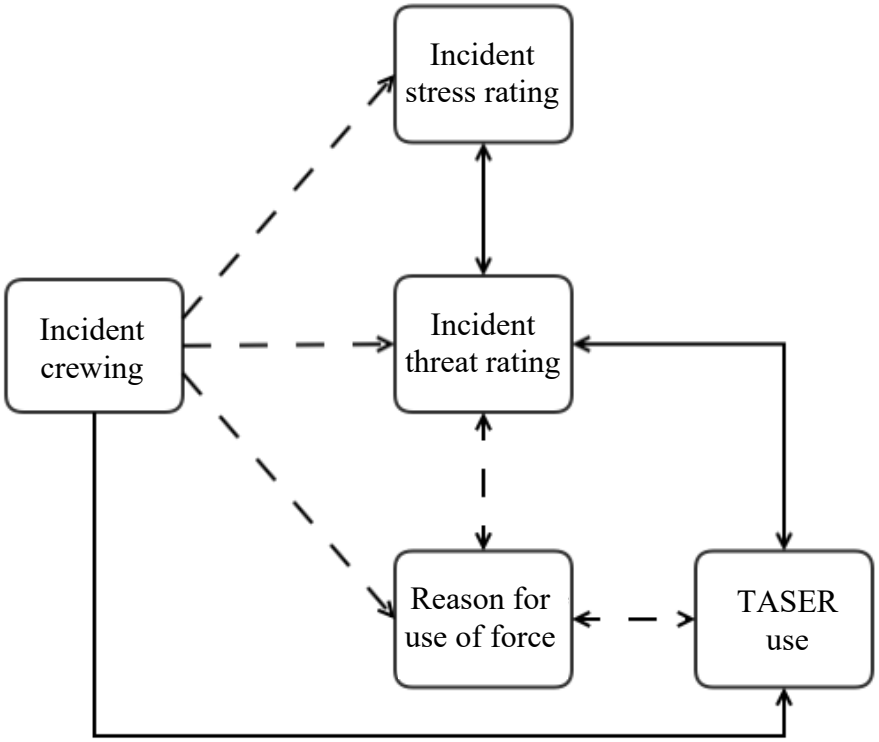
The results indicate that crewing levels during an incident where force is required did have a statistically significant impact on TASER use, with bivariate analyses indicating that a larger proportion of officers *used TASER*, and *used TASER as the first tactical option* when they were alone when the use of force began. However, the underlying mechanisms for such an effect remain unclear. Average incident threat level ratings were also higher for incidents where TASER was used, however when

comparing central tendencies the difference was numerically very small; a counterintuitive finding given that officers are directed to evaluate threat and risk as part of their decision-making process when considering the use of force (College of Policing, 2013c).

However, the magnitude of this interaction may well be muted by another significant relationship, as officers that had access to TASER during their shift also reported lower average threat level ratings than those that did not have TASER access; perhaps indicating that the mere presence of TASER was enough to moderate the threat level either by reducing the odds of a negative outcome (such as injury or death) *and/or* by reassuring the officer and reducing their perception of the threat. Nevertheless, average threat level ratings were found to be higher when TASER was used and as such, it could be an important underlying driver of TASER use. Given this finding, an additional set of tests were run to determine which of the incident specific variables (i.e. incident crewing, reason for use of force, and incident stress) were related to incident threat; however only *incident stress ratings* met the thresholds required to be considered as having a statistically significant relationship with *incident threat ratings.*

Nonetheless, it is important to note that the analysis that yielded non-significant results were consistently under-powered; meaning that the null hypothesis should not be accepted without caution and the pattern of results should be considered carefully. The below diagram indicates the pattern of results found in relation to the incident-level variables, with relationships meeting the thresholds required to indicate statistically meaningful results being depicted by full lines, and those that are just indicated by the pattern of results being depicted by dotted lines.

Figure 5.3 *Diary Study: Conceptual Map of Incident-level Bivariate Results*



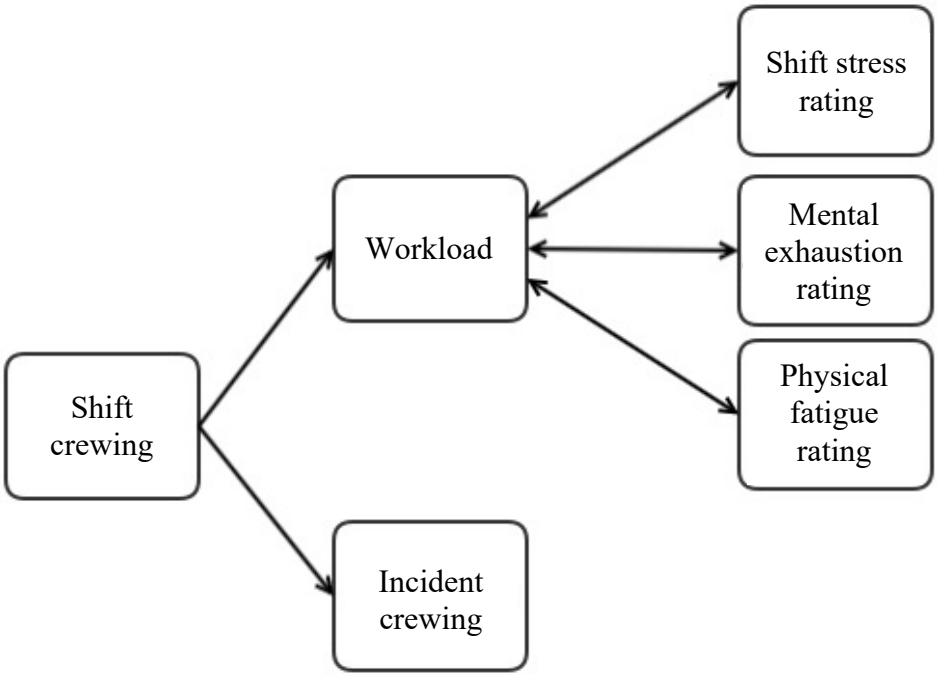
In regard to shift-level variables, the bivariate analyses only found average shift workload ratings to have a statistically significant relationship with shift crewing; with officers that were predominantly single-crewed rating the overall workload during their shift significantly higher than those that were predominantly double-crewed. However, similar to the analyses pertaining to incident-level variables (discussed above), retrospective power analyses identified that the tests resulting in non-significant finding were consistently underpowered. As such, the failure to find a significant effect may have been due to the sample size rather than the absence of a relationship between variables; thus, the pattern of results should also be considered, albeit cautiously, when evaluating the overall findings.

Although the average shift workload rating was the only variable found to have significant relationship shift crewing; shift crewing was not the only variable that the average shift workload ratings were associated with. Through ad-hoc analyses driven by

the development of the results in Analysis Cluster Three, a significant relationship was also found between average shift workload ratings and ratings of shift stress, as well as ratings of physical fatigue, and ratings of mental exhaustion at the end of the shift. Perhaps even more importantly, a significant relationship was also found between shift crewing and incident crewing. These additional findings are important as they indicate that shift crewing may *indirectly* impact on a number of psychological, physiological and operational variables.

As with the summary for incident-level variables, a diagram was developed to visualise the pattern of results found in relation to shift-level variables; with relationships meeting the thresholds required to indicate statistically meaningful results being depicted by full lines (Figure 5.4). However, due to the sheer number of variables and analyses conducted at this level, non-significant relationships and those that do not pertain to the core research question (i.e. the potential impact of crewing practices on officers think, feel and act) have been excluded from Figure 5.4.

Figure 5.4 *Diary Study: Conceptual Map of Bivariate Results for Shift-level Variables*



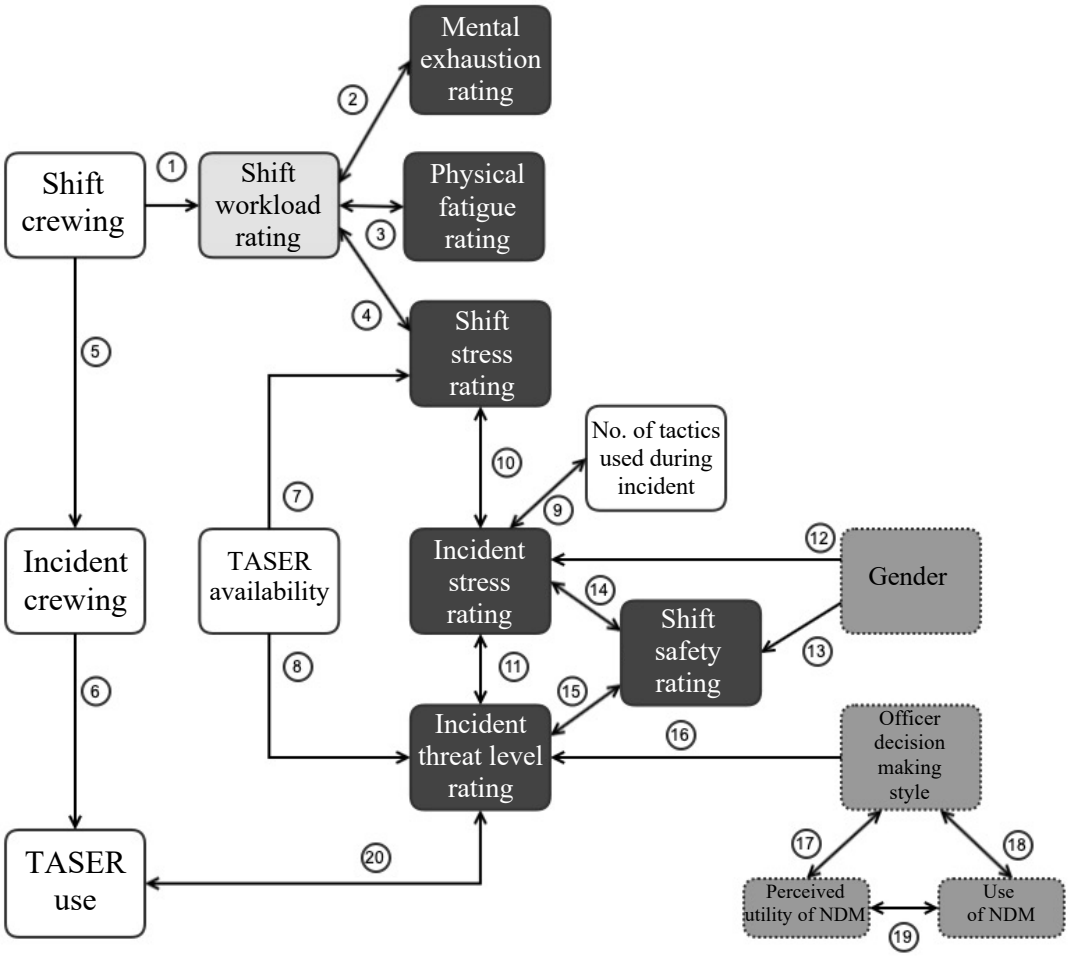
Research Question Five

Due to the lack of statistical agility permitted by the sample (please see Chapters Two, Four and the beginning of this Chapter for more information), it was not possible to explore enduring officer factors in relation to TASER use. However, their potential for indirectly impacting TASER use by augmenting how officers think and feel was explored instead. Nonetheless, few results met the statistical thresholds outlined in Section 4.2.6.1; with only five analyses regarding officer gender or decision-making styles meeting these stipulations. More specifically results indicated that male officers found their shifts to be *safer and less stressful* than their female counterparts; that officers who scored higher on the rational decision-making dimension of the GDMS reported that they used the NDM *more* frequently; that those scoring higher on avoidant and dependent decision-making dimensions reported that they used the NDM *less frequently*; that officers scoring higher on the avoidant decision-making dimension also rated the NDM as *less useful*, and; finally, those scoring higher on the spontaneous decision-making dimension of the GDMS also reporting *higher average ratings for incident threat.*

Integrated inferential findings

Due to the large number of analyses conducted and the exploratory and data driven approach used drive the analysis process, an integrated conceptual map was created (Figure 5.5) to help visualise the pattern of results found across the full analytical gambit; with relationships meeting the thresholds required to indicate statistically meaningful results being indicated by full lines (please see Appendix 28 for a table providing top-level detail on each of the relationships depicted in Figure 5.5). Similar to Figure 5.4, only those relationships that were statistically significant are included due to the sheer number of analyses.

Figure 5.5 *Diary Study: Conceptual Map of Integrated Inferential Findings*



It is important to note that the figure above represents a conceptual map and not a statistical model. Although additional multivariate analyses could have been conducted in order to test some of the potential relationship models depicted in the map above, the data that would be used in such analyses would be subject to the same limitations as those described in Section 4.2.6.1. As such, it is likely that any multivariate test would be under-powered, rendering the results of the analyses to be a challenge to interpret and of questionable value, and, in any case, would not further evidence the core research questions for Study Two (please see Chapter One and Two).

CHAPTER SIX: THE DIARY STUDY – QUALITATIVE COMPONENT

Due to the depth and breadth of the data collected and analysed as part of Study Two, i.e. the diary study, the results were divided into quantitative and qualitative findings; with quantitative results reported in Chapter Five, and qualitative results reported herein Chapter Six. Though the qualitative data collected by this study were primarily designed to answer Research Questions Three, Six and Seven from this thesis (please see below), the exploration of officers' experiences also helped to enrich the findings from the analyses described in Chapter Five.

- ***Research Question Three:*** *Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?*
- ***Research Question Six:*** *How do officers think crewing impacts them, and how they do their job?*
- ***Research Question Seven****: How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

Due to the wide topical expanse of the qualitative question posed within the diary study, the answers to each individual question were coded and grouped into themes separately as part of the analytical process. However, it became apparent that there was considerable overlap between the context and content of the responses across questions, and as such, the emergent themes. Consequently, a broader review of the data was conducted, resulting in the recoding, regrouping, and reorganizing of the emergent themes in a more holistic manner across participant responses, both within and between questions. This reorganization resulted in the five following focal areas of enquiry, termed within this thesis as 'Empirical Domains:' 1) Stress, threat, and confidence at an incident-level; 2) The impact of crewing in use-of-force incidents; 3) The impact of crewing on officers; 4) Threat assessment and use of force decision-making processes;

and 5) Influential factors relating to threat assessment and use of force (for more details on analytical process and approach, please see Chapter Two and Four).

Whilst the data-driven analytical approach mentioned above is arguably more comprehensive and explorative than allowing the analysis to be led solely by the Research Questions, this does mean that the findings need to be retrospectively mapped onto the Research Questions (please see below).

The first Empirical Domain relates to officer stress, threat and confidence at an incident-level and can be mapped onto all three of the research questions listed above given that officers highlighted that: crewing levels emerged as an influential factor in how stressful they find an incident (relevant to Research Question Three); how confident they are when responding to an incident (relevant to Research Question Six), and; as an important consideration within their threat assessments (Research Question Seven).

Empirical Domains Two and Three specifically concentrate on the impact of crewing on officers (Empirical Domain Three) and their use of use of force during an incident (Empirical Domain Two), and as such both directly map onto Research Question Six.

The fourth and fifth Empirical Domains focus on the process of making threat assessments and use of force decisions (Empirical Domain Four), and the factors that are most important to officers when doing so (Empirical Domain Five); which both can be directly mapped onto Research Question Seven.

This chapter will start by outlining the qualitative questions posed to respondents within the diary study before systematically presenting the findings from the five Empirical Domains discussed above. In addition, the results presented hereafter will be briefly summarised at the end of the chapter and discussed within Chapter Seven alongside the quantitative results presented in Chapter Five.

6.1 QUALITATIVE QUESTIONS

In total, the diary study asked 11 qualitative questions; two of which were presented in the shift diary, whilst the remaining nine were presented in the post-participation questionnaire.

6.1.1 Qualitative questions presented in the Shift Diary

The two qualitative questions posed within the shift diary both pertained to the impact of crewing on any use-of-force incidents that the officers attended during their shift. To ensure that the questions about any uses of force were appropriate, the following filter question was applied: *'How many times did you have to use force during your shift?'* Officers indicating that they had to use force during their shift once or more were asked several follow-up questions about the incident(s), including whether the officer was on their own when the use of force began.

When officers indicated being alone when the use of force began, they were asked '*If you had been double-crewed, would you have responded to the incident differently and if so, how?'* Conversely, when respondents indicated that other officers had also been present, they were asked *'If you had been single-crewed, would you have responded to the incident differently and if so, how?'.*

If participants indicated that they had used force more than once during their shift, they were asked to complete the above questions twice – once for the incident where they used the highest level of force, and once for the incident where they used the lowest level of force. For more information on the questions contained in the shift diary, please see Chapter Four and Appendix 16.

Response frequencies to the question 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'

Over the course of the diary study, this follow-up question was posed to 16 individuals across 31 separate incidents. In total, 15 respondents provided information across 30 of these incidents. Of these respondents, 80% were male, 80% held the rank of Constable, and whilst the vast majority indicated that they were over 25 years old (80%), the majority also had less than ten years of service (60%). For a full account of respondent demographics please see Appendix 29 and 30

Responses frequencies to the question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'

Over the course of the diary study, this follow-up question was posed to 50 separate individuals across 150 incidents in total. Overall, 48 respondents provided information across 133 separate incidents. 88% of these respondents were male, 90% held the rank of Constable, and whilst the vast majority indicated that they were over 25 years old (79%) the majority also had less than ten years of service (73%). As with the question above, respondent demographics can be found in Appendix 30.

6.1.2 Qualitative questions presented in the post-participation questionnaire

In total, 39 participants completed the post-participation questionnaire, basic socio-occupational demographics of this sample can be found in Table 4.8 in Chapter Four (Section 4.4.4).

The first question in the post-participation questionnaire asked officers what crewing practice they preferred; with the option of selecting '*double-crewed,'* '*single-crewed'* or '*Other.*' Officers were also presented with an open text box and were asked to use the space to explain the reason for selecting their response. There were 36 responses to the qualitative element of this question (i.e. Question 1b); of which, 32

indicated that they preferred double crewing, two indicated preferring single-crewing and two indicated that they preferred another type of crewing (non-specified).

As part of the post-participation questionnaire, officers were also asked the following additional open-ended questions and were provided with a free-text box within which to leave their responses (number of responses in brackets):

- Question 2: *'How does crewing level affect you, and your fellow officers?'* (38).
- Question 3: *'How do crewing levels affect officers and your ability to do your job?'* (37).
- Question 4: *'What factors influence your stress levels the most when responding to an incident?'* (39).
- Question 5: *'What factors influence your confidence the most when responding to an incident?'* (38).
- Question 6: *'How do you go about assessing the threat level during an incident, and what factors are most important?'* (39).
- Question 7a and 7b in the post-participation questionnaire both related to use of force. Participants were asked to think back to the last time they had to use force in the line of duty, and were then asked: a)*'Please describe how you made the decision to use force, and what type of force to use.....,'* and b) '*What factors were the most influential when you were making the decision on how and when to use force?'.* Participants were provided with two comment boxes, one for each part of the question, with a total of 36 individuals providing a response to part a, and 37 providing a response to part b.
- Question 10: *'If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below,'* (22).

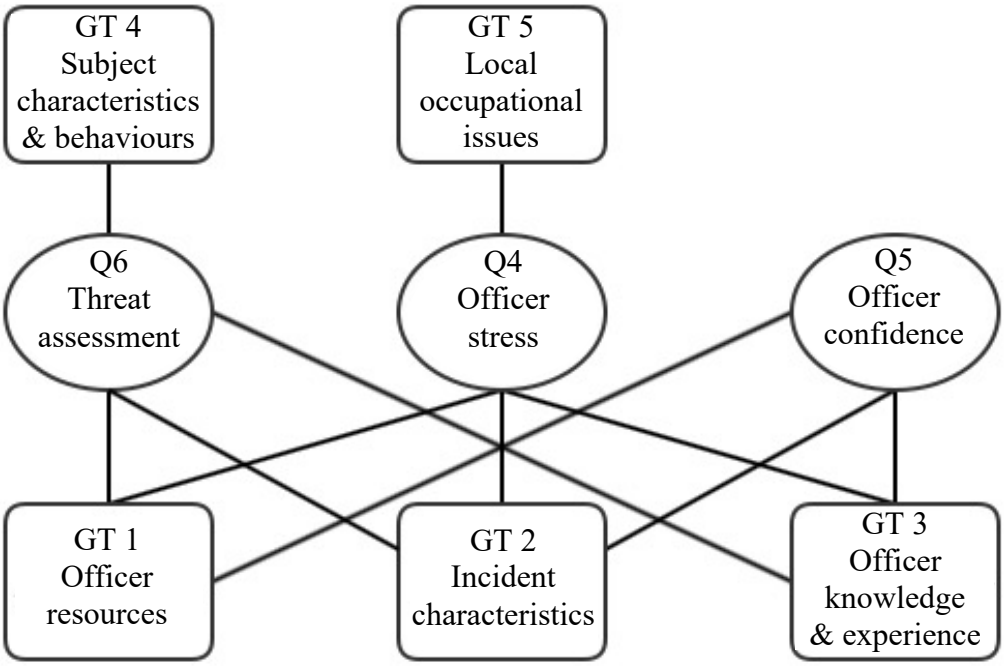
6.2 RESULTS

6.2.1 First Empirical Domain: Stress, threat and confidence at an incident-level

The findings from the quantitative analysis described in Chapter Five, indicated that ratings of incident-related stress and ratings of overall shift safety were significantly related to an officer's incident threat rating; with higher levels of threat associated with higher ratings of incident stress, and lower overall shift safety ratings. Given that officer ratings of incident threat was also the only variable to have a statistically significant association with an officer's use of TASER, it was felt important to explore these relationships further via the qualitative data as the first Empirical Domain. In consequence, the data gathered from the following three questions were combined and analysed together during phase four of the analytic process to search for overarching themes and relationships:

- Question 4: *'What factors influence your stress levels the most when responding to an incident?'*
- Question 5: *'What factors influence your confidence the most when responding to an incident?'*
- Question 6: *'How do you go about assessing the threat level during an incident, and what factors are most important?'*

Figure 6.1 *Diary Study: Global Theme Emergence for Empirical Domain One. Incident-level Stress, Threat and Confidence*



Global themes (GTs) are depicted by white rectangles which are linked, by solid lines, to the questions (Qs) from which they emerged.

This analysis revealed five global themes and 13 subthemes; Table 6.1 lists each of the emergent subthemes grouped by their global themes and in order of declining magnitude.[50] Figure 6.1 provides a visual representation of these themes and the post-participation questionnaire items from which they emerged (please note, this is not intended to present a thematic map; but merely a representation of the data origins).

Each global theme will be presented in turn; starting with a brief overview of the global theme and any associated subthemes, followed by a more detailed examination.

[50] Within the scope of this analysis magnitude refers to the number of individual officers that generated a code included within the theme or subtheme, rather than the total number of codes themselves.

Quotations will be used as illustrative examples and to ground the subthemes within the data. Where quotations are provided, the specific question from the post-participation questionnaire that elicited the response is indicated in brackets e.g. (Q4).

Table 6.1 *Diary Study: Theme Table for Empirical Domain One: Incident-level Stress, Threat and Confidence*

Global theme	Subtheme	Frequency[51]
1. Officer resources	(i) Crewing level	25 (64%)
	(ii) Back-up	23 (59%)
	(iii) Equipment	8 (21%)
2. Incident characteristics	(i) Volatility, violence and victimisation	30 (77%)
	(ii) Environment, location, and time of incident	19 (49%)
	(iii) Incident type	12 (31%)
3. Officer knowledge and experience	(i) Individual knowledge and experience	11 (28%)
	(ii) Available intelligence	9 (23%)
4. Subject(s) characteristics and behaviour	(i) Behaviour and perceived state-of-mind	11 (28%)
	(ii) Weapons	8 (21%)
	(iii) Physical characteristics	3 (8%)
5. Local occupational issues	(i) Workload	7 (18%)
	(ii) Organisational culture	3 (8%)

[51] Frequency refers to the number of individual officers that generated a code included within the subtheme. Figures in brackets indicates the proportion of post-participation questionnaire respondents (total n=39) that contributed to the subtheme.

Global theme 1 - Officer resources

The largest global theme that emerged from the data related to the resources that were available to the officer at the time of the incident. More specifically, officers highlighted that incident crewing levels and the availability of back-up were key determinants of officer confidence, threat assessment, and incident related stress. Some officers also mentioned that the availability of appropriate equipment played a part in their assessment of threat and impacted of their level of confidence. Overall, this global theme comprised of three subthemes: (i) Crewing level, (ii) Back-up, and (iii) Equipment.

(i) **Crewing level.** This was the largest subtheme within the global theme of *Officer Resources* and was mentioned 41 times across the responses from 25 separate officers.

(ii) **Back-up.** This was the second largest subtheme and comprised of 40 codes, generated across the responses from 23 individual officers.

(iii) **Equipment.** This was the smallest of the three subthemes, with only eight individual codes across the responses from eight officers.

Crewing practices and availability of back-up were the most prominent officer resources listed by participants, with officers linking these factors to officer stress, confidence and their threat assessment processes. Without exception, where the direction of the relationship was discussed, respondents described single-crewing as having a negative impact on both officer stress and confidence and/or double crewing having a positive impact. Or, more specifically, single-crewing was considered to increase levels of stress and decrease officer confidence, whilst double crewing was considered to have the opposite effects:

> *"I am influenced by the type of incident I am going towards, whether I am likely to face conflict and whether I am being supported by fellow officers. I feel less stressed*

if I am with a colleague because I know there will be someone there to have my back and be an extra pair of hands when dealing with the job" (Q4).

Whilst the number of officers in attendance can easily be understood as a potentially influential factor in how stressful an officer might find an incident, *which* officers were in attendance was also raised as a potentially influential factor: *"Whether I am responding alone or with other officers, who those other officers are."* (Q4). This is particularly interesting as it may suggest the presence of additional officers may not, in itself, protect officers from increased stress and that this potentially protective factor may be contingent on the characteristics of the other officer(s) in attendance.

Whilst not as frequent, crewing levels were also raised as an influential factor in officers assessment of threat and although the majority of respondents raised this in general terms only, one respondent specifically identified that having additional officers on scene reduced the risk associated with the incident: "*I think the risk level is reduced when you're double crewed, as there's an extra pair of hands to help you immediately, rather than waiting those extra minutes"* (Q6). One officer also identified that although they are happy to attend most incidents alone, they actively avoid using force if they are on their own – perhaps lending some support to the supposition that single-crewed officers are at reduced risk of injury because they are more conservative with their use of force (Decker & Wagner, 1982):

"If I am alone, I will think through an incident to bring it to a conclusion by avoiding the use of force at all costs. Although I am happy to attend most incidents single crewed, I will verbally make it clear on the radio if I feel that a second officer should be present." (Q6)

Although *Equipment* was the smallest subtheme within the global theme of *Officer Resources* it is nonetheless of interest, given the context, and emerged in relation to both officer confidence and threat assessment. Moreover, TASER was specifically mentioned in five out of the eight comments, with officers highlighting that

access to TASER could improve their confidence and would feed into their threat assessment: e.g. *"I carry TASER which is quite comforting,"* (Q5); "*is a TASER officer available,*" (Q6); "*Attending with a competent like-minded officer and if required, someone who is carrying a TASER,"* (Q5). The remaining comments merely referred to "PPE", "equipment" or "kit."

Finally, it may also be important to highlight that one officer specifically discussed TASER as a potentially moderating (or preventative) factor in relation to incident-related stress. More specifically, they implied that the mere presence of TASER might be enough to reduce officer vulnerability, and thus stress: *"Being at a job alone with potentially violent, unprectiable [sic] people. I police a rural area and backup could be miles away when you are single crewed. TASER would help if they were given to all officers"* (Q4).

Global theme 2 - Incident characteristics

This global theme encompasses three subthemes: (i) Volatility, violence and victimisation, (ii) Environment, location, and time of incident, and (iii) Incident type. Though many officers reported incident characteristics as having an impact on officer stress and confidence, some also listed incident characteristics as a key factor in assessing threat. Some of these characteristics related to the volatility and potential for violence in an incident, whilst others were perhaps more pragmatic, e.g. the time of day, distance to the incident, incident type, and the amount of traffic on the way to the incident.

Although this theme emerged across each of these three domains relevant to this analysis (officer stress, officer assessments of threat, and officer confidence), it was much more frequently mentioned in relation to officer stress and officer assessments of threat than in relation to their confidence.

(i) Volatility, violence and victimisation. This was the largest subtheme for the global theme of Incident characteristics, with 46 references across the responses from 30 separate officers.

(ii) Environment, location, and time of incident. This was the second largest subtheme, with 31 references across the responses from 19 separate officers.

(iii) Incident type. This is the smallest and last subtheme; with 17 references from 12 separate officers.

Overall, *Volatility, violence and victimisation* was the largest subtheme contained within the global theme of *Incident Characteristics*. Officers highlighted that incident-related stress and officer threat assessment were linked to the perceived volatility of the situation or the likelihood of conflict or harm, and whether violence had already been reported: "*Violence and aggression,"* (Q4); "*I look at the amount of people at scene when I arrive and try and gauge how agitated/angry etc they are*" (Q6). Several officers also highlighted that the presence of weapons and the potential target of violence was a key factor in their threat assessment: "*Most important factors are whether the person is armed and who is at risk of that subject and why*" (Q6).

It is interesting to note that several of these comments also highlighted this factor in tandem with crewing levels or the availability of back-up: *"Knowing there is no back up or it is a long way off when the subject is armed or volatile*" (Q4).

Environment, location, and time of incident was the second largest subtheme and identified that environmental factors could also impact officers and their behaviour. The location, time of day, and distance were all mentioned as key factors in threat assessment and officer experiences of stress: "*Location is second concern dependent on situation type*" (Q6); "*Distance to travel to it, time of day, traffic congestion*" (Q4); "*Time of day Location type (club, private dwelling)*" (Q6). Several officers also emphasised the importance of the number or type of people present at an incident when

assessing the threat levels at an incident:*"If no info then when I arrive at scene, I typically like to know my surroundings, know who is around, their friends, family or violent people"* (Q6).

Incident type was the smallest subtheme and was mostly mentioned in generic terms, with officers highlighting the incident classification: "*What the response has been graded, type of incident"* (Q6); *"Type of call (e.g. domestic)*" (Q6). However, on some occasions, respondents referred to the seriousness and/or the complexity of the incident or situation instead: "*How complex will this incident be, how serious is the threat"* (Q4).

Global theme 3 – Officer knowledge and experience

Officer knowledge and experience emerged as the third largest global theme; with respondents highlighting experience and knowledge were important factors in determining their level of confidence when responding to an incident and how stressful they find the encounter overall. *Officer knowledge and experience* consists of two separate, but related, subthemes: (i) Individual knowledge and experience, and (ii) Available intelligence.

(i) **Individual knowledge and experience**. This was the slightly larger of the two subthemes and comprised of 13 references that emerged from 11 separate participants.

(ii) **Available intelligence.** This was the smaller of the two subthemes, containing nine codes from nine separate officers.

Individual knowledge and experience was the largest of the two subthemes and comprised comments from respondents that emphasised how their own abilities influenced their confidence and stress levels when responding to an incident. In particular, officers indicated that they are more confident if they have engaged in a similar type of incident before and if they felt they had the prerequisite skills for such an

encounter: "*If I have dealt with a similar incident before, if I understand fully what has happened, who I am working with"* (Q5); *"knowing I have the skills and ability to deal with the incident I am being sent to"* (Q5). Interestingly, one officer also highlighted a more complex relationship between experience, confidence, stress and crewing. More specifically, they highlighted that one of the factors that influenced their stress levels when responding to an incident was how confident they felt in dealing with the situation, which, in turn, was influenced by a combination of their experience and crewing level: "*Confidence in dealing with a job, if I've not dealt with a similar job before and I'm single crewed I will start to stress*" (Q4). This comment may be of particular import considering that it was made by an officer that had been serving for less than a year – perhaps indicating that crewing impacts are more salient for newer recruits.

Availability of intelligence was also raised by several officers as being an influential factor in regard to confidence and stress when attending an incident, highlighting the importance of dispatchers and their role: *"how accurate is the information that is being passed if the reports are vague"* (Q4); *"lack of info from control when en route"* (Q4).

Global theme 4 - Subject characteristics and behaviour

Subject characteristics and behaviour was the second smallest global theme to emerge from the data, and relates to how a subject's behaviour, demeanour, and physical characteristics impact on an officer's assessment of threat during an incident. This global theme is comprised of three subthemes**:** (i) Behaviour and perceived state-of-mind**,** (ii) Weapons, and (iii) Physical characteristics.

(i) Behaviour and perceived state-of-mind. This was the largest subtheme within the global theme of *Subject characteristics and behaviour* and comprised of 13 extracts from the comments of 11 separate officers.

(ii) Weapons. Eight separate officers specifically identified that a subject being armed or having access to weapons was a key factor in assessing threat.

(iii) Physical characteristics. This was the smallest subtheme and comprised of three comments from three separate respondents.

Overall, the subject's *Behaviour and perceived state of mind* was the most frequently cited factor related to the incident subject in relation to the process of threat assessment and how stressful an officer might find an incident. Moreover, subject volatility, mental health, and intoxication were all specifically mentioned within this subtheme: "*The subject and whether they are volatile*" (Q4); "*Warning markers help me with the assessment but I find it's how the person is behaving at the time. The most important thing is mental health"* (Q6); "*intoxication of subject"* (Q6).

Weapons was the second largest subtheme, with officers identifying that a subject being armed or having access to weapons was an important factor in their assessment of threat: *"History of violence with those involved and access to weapons"* (Q6); *"Most important factors are whether the person is armed and who is at risk of that subject and why"* (Q6). One respondent even went so far as to highlight that weapons should be assumed as being present until evidence to the contrary is established: *"a constant awareness that there may be a concealed weapon is required until confirmed otherwise"* (Q6).

Although only three individuals identified the *Physical Characteristics* of subject as being an important factor in their assessment of threat, they are nonetheless important to include. In particular, participants mentioned that a subject's size, gender and perceived strength was important: "*Past experience of a suspect, sex, size and behaviour of suspect are they armed"* (Q6); *"I also assess the size of the subject*" (Q6); "*The size/strength of the person"* (Q6).

Global theme 5 – Local occupational issues

This was the smallest of all the global themes within this analysis and comprised of two separate subthemes that relate only to how stressful officers find an incident: (i) Workload, and (ii) Organisational culture.

(i) **Workload.** Officer workloads was the biggest subtheme within the global theme of *Local Occupational Issues* and is comprised of seven quotations, each from a separate respondent.

(ii) **Organisational culture.** This subtheme comprised of only three comments from three separate respondents, all of which related to a lack of management support and concerns over criticism and/or blame.

On the whole, the majority of the references in this global theme were related to the subtheme *Officer workloads*, with officers identifying that the level of stress associated with an incident was influenced by whether or not they would be able to deal with the incident within their working hours, the amount of follow-up work that would be required, and the overall workloads during their shifts: *"Stress if I feel that I cannot deal with the matter within my working hours"* (Q4); *"Will I have to cancel appointments and will this incident add to my protractions for the rest of my day/week/month etc"* (Q6); *"balancing increasing workloads"* (Q6).

Whilst Organisational culture was the smallest subtheme within the whole analysis for this Empirical Domain, it is nonetheless important as it identified that some officers felt unsupported by management and that fear of blame added to their levels of stress when attending incidents: "*Fear of making a mistake and being criticized"* (Q6); *"blame culture within the job fear of making mistakes"* (Q6); *"apparent lack of interest from supervisors as to my safety, lack of comprehension from comms staff as to what they are sending me to and how that may impact on my safety"* (Q6).

6.2.2 Second and Third Empirical Domains: The impact of crewing on officers and their use of force

As mentioned in Chapter One, there is currently a gap in the extant literature regarding the officer-related impacts of crewing practices, and the existing evidence is singularly quantitative in nature. Moreover, Study One of this thesis (please see Chapter Three) identified that this paucity extended to the impacts of crewing on an officer's decision to use TASER. As such, the diary study specifically included a number of quantitative and qualitative questions focussing on the impact of crewing on officers and their use of force, that were primarily designed to answer Research Questions Six and Seven from this thesis (below):

Research Question Six: *How do officers think crewing impacts them, and how they do their job?*

Research Question Seven*: How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

The quantitative results from the diary study, described in Chapter Five, highlighted statistically significant relationships between both shift crewing and workloads, and incident crewing and the use of TASER. Whilst these findings confirm a relationship, they cannot necessarily determine the direction of these relationships and cannot proffer any explanations as to why these phenomena are observed. Consequently, to address the sixth research question of this thesis and expand on the findings from Chapter Five, the second and third Empirical Domains concentrated on the impact of crewing on officers (Empirical Domain Three) and their use of use of force during an incident (Empirical Domain Two).

To better understand how crewing practices might impact on officers, both the shift diary and the post-participation questionnaire asked officers questions about crewing practices. As mentioned earlier in this chapter, the shift diary asked participants

that had used force during their shift to indicate how many officers were present when the use of force began. Respondents that indicated being alone when they began to use force were asked the following question, and were provided with an open-text box to record their answers: '*If you had been double-crewed, would you have responded to the incident differently and if so, how?*' Those that had indicated that there was at least one other officer present when the use of force began were asked a very similar question and were, again, provided with an open-text box to record their responses: '*If you had been single-crewed, would you have responded to the incident differently and if so, how?*'

The post-participation questionnaire also included several questions regarding the impact of crewing on officers, their ability to do their job, and their crewing preferences (please see Chapter Four and Section 6.1.2 for more details). Though all these questions directly relate to the impact of crewing on officers, when analysis of the individual questions had been completed, it was clear that the pattern of results that emerged from the two questions contained in the shift diary were fairly consistent; whilst the results that emerged from the first three questions within the post-participation questionnaire dovetailed with each other.

However, the emergent patterns of these two sets of questions (i.e. those from the shift diary and those from the post-participation questionnaire) did not complement each other as strongly. This is likely to be because the shift diary questions are predicated on a specific and recent scenario; whilst the post-participation questionnaire items were, in most cases, more abstract and talk about the impacts of crewing more generally.

Due to these differences, the responses to the two questions from the shift diary were used to form the dataset for the second Empirical Domain, i.e. the impacts of crewing on the use-of-force incidents; whilst the responses gathered by the first three

questions within the post-participation questionnaire were used to form the dataset for the third Empirical Domain, i.e. The general impacts of crewing on officers.

Each of these Empirical Domains will be discussed separately and in turn, starting with the results from the analysis of the two shift diary questions.

6.2.2.1 Empirical Domain Two: The impacts of crewing on use-of-force incidents

Data derived from the two qualitative questions on use of force from the shift diary were analysed together to help answer the sixth and seventh research questions of this thesis and to expand on the findings from Chapter Five. When viewing the data holistically across these two questions the picture that emerged was, overall, fairly consistent; with the officers linking crewing practices to the level of risk, the level of force required, and overall performance. Table 6.2 below lists the emergent themes in order of magnitude, whilst Figure 6.2 depicts these groupings visually. Each global theme will be presented in turn; with a brief overview of the global theme and any associated subthemes being presented first, followed by a more detailed examination. Quotations will be used as illustrative examples and to ground the subthemes within the data.

Table 6.2 *Diary Study: Theme Table for Empirical Domain Two: The Impacts of Crewing on Use-of-force Incidents*

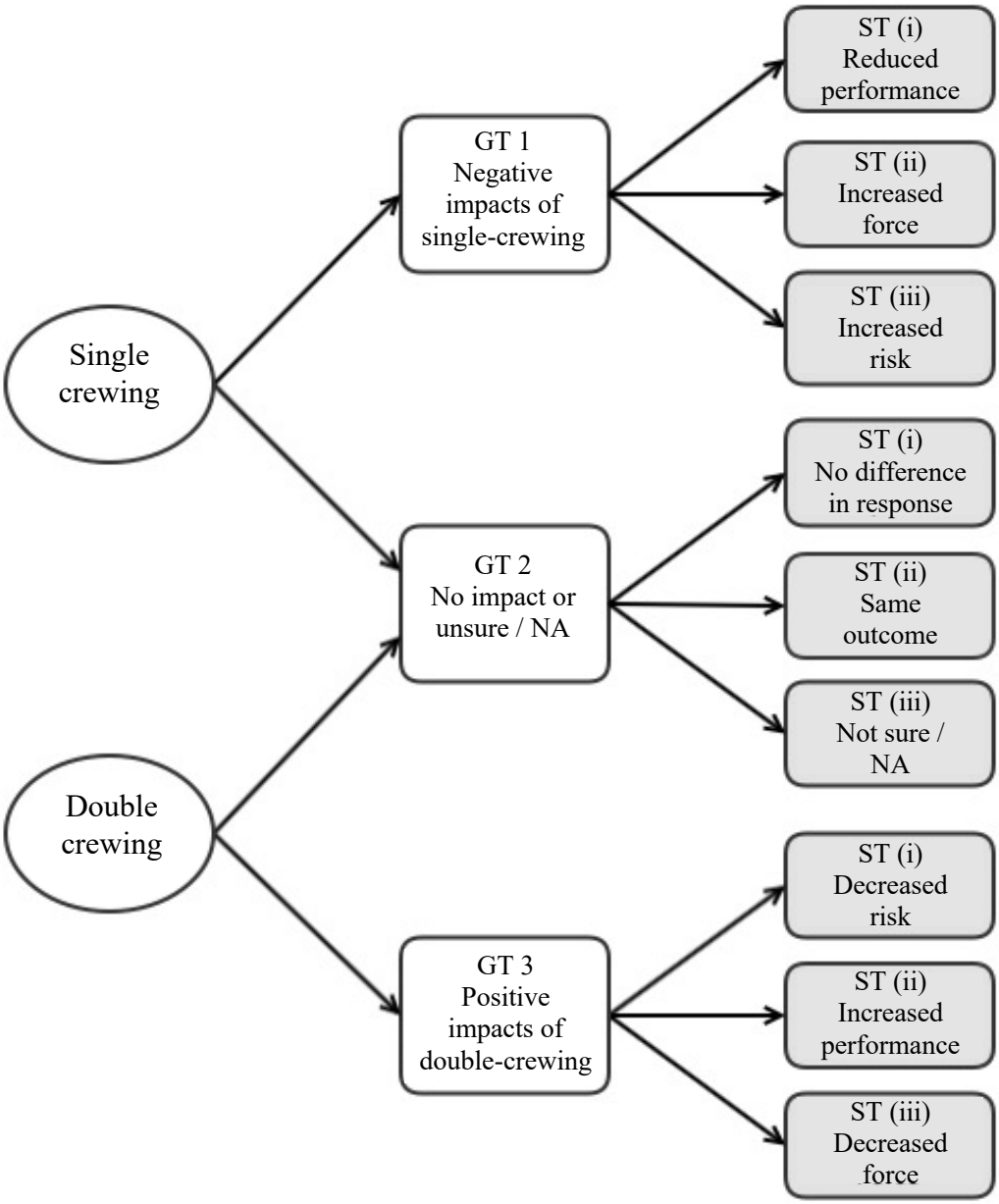
Global themes	**Subthemes**	**Frequency[52]**
1. Negative impacts of single-crewing	(i) Reduced performance	25 (49%)
	(ii) Increased force	24 (47%)
	(iii) Increased risk	14 (27%)
	(i) No difference in response (minimal detail)	18 (35%)

[52] Frequency refers to the number of individual officers that generated a code included within the subtheme. Figures in brackets indicate the proportion of participants that contributed to the subtheme from those that responded to the questions under observations (total n=51).

Table 6.2 *Diary Study: Theme Table for Empirical Domain Two: The Impacts of Crewing on Use-of-force Incidents*

Global themes	**Subthemes**	**Frequency[52]**
2. No impact or unsure/not applicable	(ii) Same outcome	11 (22%)
	(iii) Not sure / NA	6 (12%)
3. Positive impacts of double crewing	(i) Decreased risk	9 (18%)
	(ii) Increased performance	4 (8%)
	(iii) Decreased force	4 (8%)

Figure 6.2 *Diary Study: Thematic Hierarchy for Empirical Domain Two. The Impacts of Crewing on Use-of-force Incidents*



Global themes (GTs) are depicted by white rectangles, subthemes (STs) are depicted by grey rectangles, and the crewing style being discussed is indicated by a white oval. Solid lines depict the hieratical relationships between the global themes and their subthemes.

Global theme 1 – Negative impacts of single-crewing

This was the largest emergent theme when asking officers what they might have done differently if their crewing level had been different during the use-of-force incident. Many officers highlighted that if they had been single-crewed during the incident in question (rather than having other officers present), this would have likely increased the level of risk associated with the incident, increased the level of force required to deal with the situation effectively, and would have, overall, led to a reduction in performance. Each of these consequences are represented by one of the following three subthemes that comprise this global theme: (i) Reduced performance, (ii) Increased force, and (iii) Increased risk.

(i) **Reduced performance.** This is the largest subtheme to be included within this global theme; with 50 mentions across 43 incidents, from 25 individual participants.

(ii) **Increased force.** This was the second largest subtheme; with 56 references across 47 separate incidents, from 24 individual officers.

(iii) **Increased risk.** This was the smallest of the three subthemes and comprised of 22 mentions across 19 incidents, described by a total of 14 individual officers.

Overall, the projected outcome cited by the most respondents was a *Reduction in performance*, with officers indicating that had they been alone during the incident in question they might have needed additional units to attend the scene: *"I would not have been able to deal with the situation and would have had to call for urgent assistance. I was surrounded, as was the other officer;"* the incident might have taken longer to resolve: "*would have probably wrestled with the subject a lot longer than I did;"* it would have been a more challenging task, or they may not have engaged with the incident to begin with: *"If I was single-crewed I may not have stopped to speak to the male in the first place."*

Although *Increased use of force* was the second largest subtheme, it was only marginally smaller than the first, potentially indicating a similar level of salience to respondents. Officers highlighted that if they had been single-crewed at the time of the incident they would have used a greater level of force to take control of the situation and ensure the safety of those involved:

> "*I would have had to have used a lot more force as the subject was resisting. The 4 of us were able to pick the subject up and carry them to the car. If I had been on my own I would have had to have used wrist locks, handcuffs and basically would have had to fight the subject to arrest her."*

Some participants even mentioned that they would have been more likely to use TASER if they had been single-crewed during the incident: *"The subject was suffering from ABD*[53] *and actively and aggressively resisting. He may have been TASERED to cause incapacitation and gain control."*

Although *Increased risk* was the smallest subtheme under the global theme *Negative impacts of single-crewing*, over a quarter of respondents contributed to this code (27%). Participants highlighted that if they had been single-crewed at the time of the incident they would have been less safe, outnumbered, or outmatched:

> *"This incident would have been extremely difficult and unsafe if only a single officer was on scene due to the amount of people present. If single crewed I may have had to wait for additional units to become free or handcuff the subject immediately before the use of tactical communications."*

Some officers also indicated concerns that these risks could lead to physical assault or injury: *"I would not have been able to deal with this on my own. Serious injury would have occurred if single crewed with no back up."*

[53] Assumed to stand for 'acute behaviour disturbance.' For more information on acute behaviour disturbance please see: https://library.college.police.uk/docs/appref/acutebehavedisturbance_jan16.pdf

Global theme 2 – No impact or unsure/not applicable.

Interestingly, in many instances the participants indicated that there would have been no difference in the way that they responded to the situation, had they been crewed differently. These responses are reflected by one of the following three subthemes that comprise this global theme: (i) No difference in response, (ii) Same outcome, and (iii) Not sure / NA, will now be explored in sequence.

(i) **No difference in response.** This was the largest subtheme with 35 codes generated from 18 individuals across 35 separate incidents.

(ii) **Same outcome.** This was the second largest subtheme, with a total of 19 codes generated from 11 different participants, across 19 separate incidents.

(iii) **Not sure / NA:** The last subtheme comprised of nine codes generated across nine incidents, from six individual officers.

Whilst *No difference in response* was the largest subtheme within the global theme of *No impact or unsure/not applicable*, these codes were minimalistic and comprised of short answers with limited to no detail, such as: "*No*," "*No change*," or "*No difference*."

The second largest subtheme, *Same outcome*, however, was only marginally smaller and comprised of participants indicating that they would have attempted to achieve the same outcome, or were unable to respond differently, regardless of their crewing level:

> *"I had to restrain a mother who was having her 2 year old child removed under the Police Protection Procedure (PPP) I had no choice but to deal with the situation the way I did, it would have been the same outcome if it was a two officer event."*

It must be noted, however, that although these responses indicate that the intended outcomes would have remained the same, this does not necessarily mean that

the actions taken by officers to *reach* their intended outcomes would not have differed, nor how they *felt* during those actions.

Lastly, in a small number of cases participants indicated that a different type of crewing was not applicable in the circumstances, or, that they were unsure whether or not they would have responded differently to the situation had they been crewed differently – creating the third and final subtheme, e.g.: "*Hard to say as this was an assistance call so there was plenty of officers I just helped restrain the suspect."*

Global theme 3 – Positive impacts of double crewing

The last global theme is the smallest of the three within this particular Empirical Domain. Although there were far fewer codes generated via the Shift Diaries relating to the positive impacts of double crewing than the negative impacts of single-crewing, this is likely to be because the majority of use-of-force incidents recorded by participants were attended whilst double-crewed (83%, please see Chapter Five); meaning that there were far fewer opportunities to present the question **'***If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Nonetheless, some officers did directly discuss the positive impacts of double crewing and in most cases, these were thematically similar to those that emerged in relation to single-crewing; merely presented from the opposing angle. Overall, this global theme consists of three separate subthemes: (i) Decreased risk, (ii), Increased performance, and (iii) Decreased force.

(i) **Decreased risk.** This was the largest subtheme within the global theme of *Positive impacts of double crewing;* with 12 codes generated by nine separate participants across 10 individual incidents.

(ii) **Increased performance.** This was the second largest subtheme with seven codes generated by four separate participants, across six individual incidents.

(iii) Decreased force. This was the last and smallest subtheme and was mentioned on five separate occasions, by four separate officers.

Overall, the majority of this global theme is comprised of codes that contributed to the first subtheme, with participants highlighting that being double-crewed during an incident where force was used could help to reduce risk by facilitating de-escalation, enabling the physical separation of subjects, and/or preventing an attack: *"My colleague would have been able to cover me during the incident and prevent the decamper from attacking;" "It would have allowed me to isolate both parties and de-escalate the situation faster and maybe not have to use force on the subject."*

Interestingly, it was not just the risk of violent victimisation that officers were concerned over. A small number of respondents also believed that they might be at lower risk from some specific types of work-related accidents or hazards if they were double-crewed: "*Would have had an officer to watch traffic as I was dealing on the hard shoulder."*

The second subtheme highlighted that officers believe double crewing to enhance performance when attending incidents. Reasons given for this included being able to spend more time conducting searches, collecting evidence, and being able to split the workload: "*Would have felt safer, would have enabled the search to be carried out more effectively and ensure no evidence was able to be disgarded [sic]*."

Moreover, some officers identified that they would be more likely to engage in physical responses or pursuit if they were not alone during the incident:

> *"Although there were three males running away from me only one was detained. On two occasions during the chase I hesitated and considered whether I should continue chasing as I was on my own and at risk if I caught up with the three together. Had I been double crewed there would have been no hesitation and at least two males would have been apprehended."*

Though *Decreased force* was the smallest subtheme contained within this global theme, it is nonetheless important as it mirrors the narratives that are discussed in global theme one, subtheme two: *Negative impacts of single-crewing, Increased force* (please see page 297). Officers felt that they would have required less force during the incident if they had been double-crewed for a number of reasons. For example, one respondent indicated that having more officers present may offer a deterrent as it is a greater '*show of strength'* whilst others identified that it would have been easier to successfully separate and/or contain the subjects with more officers. Interestingly, one officer specifically discussed the use of TASER in their response:

> "*I was facing two suspects who were contained but for a single door. It is unlikely I would have used TASER if double crewed as containing and restraining one suspect each would have been easier, but that was not an option to me alone."*

6.2.2.2 Empirical Domain Three: The impacts of crewing on officers

Data derived from the following four questions from the post-participation questionnaire were also analysed to help answer the sixth research question of this thesis and to expand on the findings from Chapter Five.

- Question 1b: *"Please use the space below to tell us why you selected your choice above.'* This is a follow-up question after presenting participants with a multiple-choice question on their preference in relation to crewing practices.
- Question 2: *'How does crewing level affect you, and your fellow officers?'*
- Question 3: *'How do crewing levels affect officers and your ability to do your job?'*
- Question 10: *'If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below.'*

Analysis resulted in 15 subthemes, which were subsequently grouped into six overarching global themes and are displayed in order of magnitude in Table 6.3 below.

Table 6.3 *Diary Study: Theme Table for Empirical Domain Three: The Impacts of Crewing on Officers*

Global themes	Subthemes	Frequency[54]
1. Safety and risk	(i) Overall safety	26 (67%)
	(ii) Threat of violence	10 (26%)
2. Practical impacts	(i) Efficacy	20 (51%)
	(ii) Efficiency	18 (46%)
3. Psychosocial impacts	(i) Morale	11 (28%)
	(ii) Mental health and wellbeing	9 (23%)
	(iii) Stress	9 (23%)
	(iv) Loneliness and isolation	7 (18%)
	(v) Confidence	6 (15%)
4. Outcomes and performance impacts	(i) Proactivity and productivity	16 (41%)
	(ii) Stage delays	4 (10%)
5. Impacts of officer availability	(i) Overall staffing numbers	11 (28%)
	(ii) Availability of back-up	8 (21%)
6. Officer decision-making	(i) Identification of alternates	10 (26%)
	(ii) Crewing as a situational decision factor	5 (13%)

[54] Frequency refers to the number of individual officers that generated a code included within the subtheme. Figures in brackets indicate the proportion of Post-participation questionnaire respondents (total n=39) that contributed to the subtheme.

As with previous Empirical Domains, each global theme will be presented in turn; starting with a brief overview of the global theme and any associated subthemes, followed by a more detailed examination. Quotations will be used as illustrative examples and to ground the subthemes within the data. Where quotations are provided, the specific question from the post-participation questionnaire that elicited the response is indicated in brackets e.g. (Q4).

Global theme 1 – Safety and risk

The largest global theme that emerged from the data related to the impacts of crewing on officer safety and perceived risks, with officers highlighting that they felt more vulnerable when alone compared to when they were crewed with other officers. In total, the global theme of *Safety and risk* comprised of two related subthemes, the first being overall safety (i), and the second being safety specifically in relation to the threat of violence (ii).

(i) **Overall safety.** This was the largest of the two subthemes that comprise the global theme of *Safety and risk* with a total of 34 mentions, across 26 separate officers.

(ii) **Threat of violence.** The second subtheme related specifically to the risks associated with violence; with 14 mentions across the responses from ten separate officers.

Overall safety was the largest subtheme within the global theme of *Safety and Risk*, and encompasses comments about the overall safety associated with different crewing practices and, in most cases, the benefits to safety that accompany double crewing: *"Being double crewed is no doubt safer and better for officers (and myself)"* (Q1b); *"All officers I know prefer to be double crewed and feel safer than when they are single crewed"* (Q1b); *"I'd be a liar if I said I prefer single crewed, I feel safer with a partner"* (Q2).

One participant specifically mentioned that they felt safer if their partner was carrying TASER, whilst another acknowledged that it was not just *officer* safety that was improved by being double-crewed: "*Feel far safer, particularly if my crewmate is carrying TASER as I am not qualified"* (Q1b);*"To be double crewed would give us the ability to face an array of incidents without having to compromise safety of us or the public"* (Q1b).

Though the second subtheme, *Threat of violence,* was smaller than the first, it represents a number of more descriptive comments where participants identified or implied a link between crewing practices and risk of violent victimisation. More specifically, officers identified that double crewing leads to a *decrease* in the risks associated with violence and/or that being single-crewed is associated with an *increase* in such risks: "*Safer for officers to be in twos when dealing with violent or dangerous situations"* (Q1b); *"[single-crewing] Leaves us vulnerable to assault and often calls are unsuitable for a lone officer to attend"* (Q2).

Global theme 2 – Practical impacts

The second largest global theme to emerge comprises of the following two subthemes and relates to the practical limitations and advantages associated with differing crewing practices:

(i) **Efficacy.** This was the largest subtheme within the global theme of *Practical impacts;* with 30 separate mentions from the responses from 20 individual officers.

(ii) **Efficiency.** A total of 18 officers generated 26 codes generated relating to the impact of crewing on officer efficiency.

Efficacy was the larger of the two subthemes from the global theme *Practical Impacts*, with officers highlighting a range of efficacy issues with single-crewing and

promoting the advantages of double crewing. Many officers pointed out the physical limitations of working alone, and the benefits of having a second pair of eyes or hands:

> *"You have an additional set of eyes to be alert to more things than can possibly be taken in by one person, who is driving, listening to the radio for jobs, potentially searching for a person or vehicle and alert and aware of live unfolding incidents whilst on patrol."* (Q1b)

Other examples provided by officers on the benefits of being double-crewed highlighted that officers have more latitude when responding to an incident when in a two-person team and that, in some instances, this advantage can have life-saving results: *"Double crewing allows for so much more flexibility when dealing with incidents, you have support and backup immediately available if required"* (Q1b); *"being double crewed allows you to undertake more of the functions of a police officer, making that unit more productive"* (Q3); *"when dealing with incidents requiring medical assistance a second officer can quite literally be a lifesaver when it comes to summonsing [sic] further help"* (Q1b).

Although *Efficiency* was the smaller of the subthemes, the difference was marginal, perhaps indicating that these two subthemes are of equal import and/or are intrinsically linked. Codes within this subtheme reflect the respondents' beliefs that being double-crewed enables officers to deal with incidents more quickly and provides more flexibility, making officers more efficient: *"Being double crewed enables you to address incidents quicker and more efficiently" (Q1b); "When double crewed I believe officers feel more confident and will utilise their resourcing more efficiently towards targeting local issues" (Q3).*

Some officers also felt that double crewing could lead to improved efficiency because their local policy dictates that certain incidents and activities (such as domestic violence incidents and prisoner transport) *requires* the attendance of two officers and, as

such, single-crewing may represent a false economy due to the creation of stage delays[55] and officers having to wait for their colleagues to arrive before proceeding:

> *"Making an arrest is the is the bread and butter of policing yet many times arrests are made single crewed and officers have to then request an additional unit. This can expose the officer to uneccesary* [sic] *risk and cause undue delay to the overall process"* (Q1b).

A few officers took the opposite approach, however, by describing the same concept from the inverse angle, i.e., indicating that it was less efficient to work alone: *"Harder, typically, it takes more time to investigate a crime when single crewed"* (Q3); *"When you're single crewed, it slows down your ability to deal with incident where there are multiple people present"* (Q3).

Global theme 3 – Psychosocial impacts

This global theme consists of the following five individual subthemes and reflects the viewpoint, expressed by many, that crewing practices can have a number of psychosocial impacts: (i) Morale, (ii) Mental health and wellbeing, (iii) Stress, (iv) Loneliness and isolation, and (v) Confidence.

(i) **Morale.** This was the largest subtheme within the global theme of *Psychosocial impacts;* with 14 codes generated from the responses from 11 separate officers.

(ii) **Mental health and wellbeing.** This was one of the second largest subthemes and comprised of 11 codes generated from the responses of nine individual officers.

(iii) **Stress.** This was the other second largest subtheme, with 12 codes also generated from nine separate officers.

[55] This is when a policing response is delayed from progressing to the next stage. For example, a single police officer may arrive at an incident, but is unable to engage until another officer arrives due to local policy.

(iv) Loneliness and isolation. The third largest subtheme comprised of seven codes generated from the responses of seven individual officers.

(v) Confidence. This was the smallest subtheme, with eight codes generated from the responses of six individual officers.

Overall, the narratives left by participants emphasised that double crewing had a positive impact on various elements of their psychosocial wellbeing, whilst the impacts of single-crewing were seen in a negative light. For example, within the subtheme of *Morale*, respondents either drew a link between single-crewing and poor morale: *"Single-crewing across my team reduces morale and gives the 'can't be bothered' attitude"* (Q2); or they approached the concept from the opposite angle and highlighted the positive impact of double crewing on morale: *"Double crewing raises morale and effectiveness"* (Q2). One respondent even implied that single-crewing could damage team morale by causing division within the group: *"More often than not morale is heavily effecting the team as a result of solo crewing which places divides between colleagues as we don't get to explore one another's working methods"* (Q2).

A similar pattern was reflected within the second largest subtheme, *Mental health and wellbeing* where, overall, the consensus amongst participants was that single-crewing had negative impacts on officer mental health and wellbeing, and double crewing had a positive impact. Officers mentioned the impact of crewing on their wellbeing in general, as well as specifically mentioning the effects of crewing on a number of distinct aspects of wellbeing, including officer fatigue, motivation, and positive affect, e.g. happiness or joy: *"Double crewing, and the knowledge that there are other units nearby, increases confidence, well-being and motivation"*(Q2); *"Generally I find everyone is happier when double crewed"* (Q2); *"Very tiring when you are single crewed driving for 12 hrs, covering a large rural area"* (Q2).

It may also be worth noting that one of the officers suggested that there may be a cumulative aspect to the negative impacts of single-crewing on an officer's mental health and wellbeing due to increased exposure to distressing incidents. Though this was only mentioned by a single officer, the insight provided by their supposition was considered too unique and profound to omit from the narrative of this subtheme:

> *"I am a Roads Policing Officer and due to the shortage of staff we are now normally single crewed. This means that officers are routinely dealing with motorway incidents on their own which is highly dangerous. It also means that now there are so few officers available each officer will now be attending numerous fatal and serious injury collisions whereas before they would attend 2-4 per year. There has been no change in policy to protect officers' mental health, they are invited to self refer for an assessment"* (Q2).

Although the concept of stress could be considered as sitting beneath the umbrella term of '*mental health and wellbeing,'* it was thought to be appropriate to consider this particular aspect of mental health and wellbeing as a separate subtheme for two reasons. Firstly, the concept of stress is a core interest within the thesis, and secondly, both subthemes (*Stress*, and *Mental health and wellbeing*) had a similar number of codes and were mentioned by almost a quarter of the respondents (23%). As such, if *Stress* was subsumed by *Mental health and wellbeing*, it may represent a disproportionate amount of the subtheme overall.

The dispositional trends within the subtheme of *Stress* were, nonetheless, no different to its earlier counterparts; with the narratives left by respondents highlighting that officers believe single-crewing to have a negative impact on officer stress, and double crewing to have a positive impact: *"Increases stress and danger if short staffed and single crewed"* (Q3);*"Work wise, we can spread the crimes, the common thing we do when double crewed is one job for me one job for you so on so forth. This would decrease the amount of stress imposed on us with workload"* (Q1b).

The final two subthemes, i.e. *Confidence* and *Loneliness and isolation*, were similarly orientated; with respondent narratives indicating that officers linked single-

crewing with negative impacts and double crewing with positive ones. For example, comments left by participants highlighted the bolstering effect of double crewing on officers, helping to provide both confidence and companionship: "*I feel a lot safer when double crewed which in turns make me more confident in dealing with situations"* (Q1b); *"[Double crewing] Promotes a feeling a wellbeing / prevents loneliness (when I am single crewed in rural areas I can go a whole shift without human contact... Except with offenders)"* (Q1b).

Global theme 4 – Outcomes and performance impacts

This global theme is specifically concerned with the policing outcomes and performance and comprises of the following two subthemes: (i) Proactivity and productivity, and (ii) Stage delays. As with prior themes, the narratives left by many respondents identified a negative relationship between single-crewing and these two subthemes and/or a positive relationship between double crewing and the same outcomes.

(i) **Proactivity and productivity.** This was the largest subtheme within the global theme of *Outcomes and performance*; with 25 codes that were generated from 16 individual officers.

(ii) **Stage delays.** This was a smaller subtheme, with five codes generated from the responses from four separate officers.

Proactivity and productivity was the largest subtheme within this global theme, with many sharing the view that officers were less likely to engage in proactive policing[56] when single-crewed or, conversely, that they were more likely to engage in proactive policing when double-crewed. Moreover, participants often linked this pattern of behaviour directly to officer safety, and the use of crewing as an explicit situational

[56] Whilst proactive policing can be defined in more than one way, it is generally used to refer to policing practices that aim to prevent criminal activity before it occurs.

decision factor: "*When single crewed I will not actively look for priority targets as I would when double crewed simply because these people are often dangerous and back up can be considerable time away*" (Q2).

Whilst many officers only spoke about productivity in general terms, a few provided specific examples of how crewing could impact productivity, with examples including enhanced operational functionality and the ability to multi-task when double-crewed: *"Being double crewed is 100% more productive and whilst one is dealing with someone the other can be writing a report etc,"* (Q3).

Whilst *Stage delays* is a much smaller subtheme and is inherently linked to overall performance, it felt important to include separately due to the serious nature of the consequences that could result from delayed police intervention in response to an emergency call. Officers discussed stage delays as a symptom of single-crewing, and indicated that this can not only create attendance delays, it can also increase risk and impacts on the service received by the general public:

> *"For many jobs we end up sending two single crewed units in two cars anyway and the officers who is first on scene isn't able to achieve much at scene until the second unit arrives."* (Q1b).

> *"It's not great for stress and anxiety levels when sent to this kind of thing and does not give a god* [sic] *service to the public when we have to refuse to attend until other units are available,"* (Q2).

Global theme 5 – Impacts of officer availability

This global theme is slightly different to its precursors as it is not directly concerned with the *impacts* of crewing practices but relates to potential drivers and moderators instead. More specifically, officer availability was not discussed as an impact of single-crewing, but instead was raised within respondent narratives as a potential *driver* for single-crewing and as a potential *moderator* for the impacts of single-crewing. Many officers also used the open text space to raise concerns with their current staffing levels and how this can impact on their work. The two subthemes that

comprise this global theme are: (i) Overall staffing numbers, and (ii) Availability of back-up.

(i) Overall staffing numbers. This was the largest subtheme within the global theme of *Officer availability* with 14 codes generated via the responses from 11 separate officers.

(ii) Availability of back-up. This was the smaller of the two and encompassed 10 codes that were generated from the responses of eight individual officers.

Overall staffing levels was the larger of the two subthemes, with officers highlighting that their overall staffing levels were too low and the subsequent negative outcomes associated with this issues, such as the inability to go on patrol double-crewed:

> *"Would like to be double crewed but it's virtually impossible when there's only three on each shift at the station i work out from. It's not unheard of for me to cover 250 plus miles per shift as it's a vast rural location so we are single crewed to cover more jobs and ground"* (Q1b).

Availability of backup was the slightly smaller of the two subthemes and comprised of comments that highlighted the importance of having back-up readily available when out on patrol. Several of these comments also emphasised a relationship between this particular resourcing factor and crewing; with some indicating the availability of back-up could have a potentially moderating effect on how crewing effects officer safety, decision-making, and/or the psychosocial state of officers:

> *"When solo crewed I am less likely to actively target known criminals or persons of interest in particular if they are dangerous individuals especially as half of my (often minimum staffed) team are not response drivers meaning back up is a long delay" (Q2).*

Global theme 6 –Officer decision-making

Finally, several officers drew attention to the relationship between crewing and decision-making within their narrative responses, resulting in the emergence of the sixth

and final global theme within this analysis. Officers either highlighted the impact of crewing on their ability to *generate and select* appropriate courses of action when faced with operational decisions, or that crewing levels were considered explicitly as a *situational factor* when making operational decisions. As such, the following two subthemes serve as the foundations of this final global theme: (i) Identification of alternates, and (ii) Crewing as a situational decision factor.

(i) Identification of alternates. This was the largest of the two subthemes within the global theme of *Officer decision-making* and is comprised of 13 codes that emerged from the comments from ten individual officers.

(ii) Crewing as a situational decision factor. This was the smaller of the two subthemes, with nine codes generated by five separate officers.

Identification of alternates was the largest of the two subthemes and comprised of comments where officers identified the impact of crewing on their ability to generate and select courses of actions when making operational decisions. Overall, officers viewed double crewing more favourably as it allows for discussion and collaboration, as well as providing opportunities for shared learning and to benefit from others' experiences: *"It [double crewing] also allows officers to discuss an incident between themselves before deciding on the best method to deal with it if they are unsure or it is complicated"* (Q1b); "*Double crewing would reduce the number of 'wrong' decisions made as officers can discuss options with someone accountable at the scene"* (Q10); *"Enables newer officers to see differing ways of approaching incidents"*(Q1b).

Crewing as a situational factor was the smaller of the two subthemes and highlighted that many officers regarded crewing as a situational decision factor in and of itself – predominantly in regard to assessing threat and/or risk:

> *"Officers who are solo crewed will, quite naturally, avoid putting themselves in danger. i.e. I'm solo crewed in a rural area at 0200hrs and see a vehicle with 4 males in it and my closest back up is 10 minutes away. Am I going to stop this*

vehicle? As a supervisor I have to make allowances for officers making these decisions" (Q3).

6.2.3 Fourth and Fifth Empirical Domains: Threat assessment and use of force decisions

Given the emphasis placed on threat and risk assessment within the National Decision Model (NDM; CoP, 2013a) and the likely impact of this on officers' use of force, the diary study specifically included a number of questions that focussed on threat assessment and officers' use of force in order to address research question seven from this thesis (please see below):

- ***Research Question Seven****: How do officers go about assessing threat and making use of force decisions, and what factors are most important?*

The quantitative results from the diary study described in Chapter Five identified a statistically significant relationship between threat assessment and the use of TASER; whereby the average level of threat was rated as slightly higher for incidents where TASER was used. Whilst these findings may confirm that retrospective ratings of perceived threat are likely to be related to an officer's use of TASER, they cannot necessarily determine the direction of this relationship nor provide any explanations as to why this relationship exists. Therefore, to address the seventh research question of this thesis and expand on the findings from Chapter Five, the fourth and fifth Empirical Domains concentrated on the process of making threat assessments and use of force decisions (Empirical Domain Four), and the factors that are most important to officers when doing so (Empirical Domain Five).

As mentioned above, the diary study included several questions in relation to threat assessment and use of force. However, the data analyses for both the fourth and fifth Empirical Domains were taken from the following four questions in the post-participation questionnaire:

- Question 6*: 'How do you go about assessing the threat level during an incident, and what factors are most important?'*
- Question 7a and 7b in the post-participation questionnaire both related to use of force. Participants were asked to think back to the last time they had to use force in the line of duty and were then asked a) *"Please describe how you made the decision to use force, and what type of force to use....."* and b) "*What factors were the most influential when you were making the decision on how and when to use force?"* Participants were provided with two comment boxes, one for each part of the question.
- Question 10: *'If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below.'*

Each of these Empirical Domains will be discussed separately and in turn, starting with threat assessment and the use of force decision-making process.

6.2.3.1 Empirical Domain Four: Threat assessment and use of force decision-making process

Data derived from the four post-participation questionnaire items listed in the section above were analysed to help answer the seventh overall research question of this thesis and to expand on the findings from Chapter Five.

Interestingly, only a few officers – approximately one in three from the post-participation questionnaire – described their decision-making process in any detail. Many respondents provided details about the *reasons* that they use force, influential factors in their decision-making, and where their information came from.

It is possible that this response pattern was a reflex driven by the influence of operational police processes; as officers are routinely asked *why* they chose a particular course of action when justifying their uses of force, but not routinely asked *how* they

made the decision to use force. Another possible reason for the paucity of information regarding the actual *processes* of threat assessment and decision-making is that officers may have found it difficult to consciously examine a largely unconscious process without probative questioning or additional structure. As such, this may well be an example of attribute substitution; whereby the question was too computationally complex, and so some officers answered a related but different, easier and more familiar question (Kahneman & Frederick, 2002).

Regardless of the reason, these details still provide some insight into which considerations might be particularly salient for officers when making these decisions and were included in the analyses regardless – with the exception of influential factors. Given that influential factors are the focal point of the next Empirical Domain, they have been omitted from this analysis to avoid repetition.

In total four global themes emerged from the data, two of which comprised of several subthemes: Table 6.4 lists each of these themes and subthemes in order of magnitude. The last two global themes were much smaller than the others, but were important to include as they directly referenced the decision-making process and had not emerged elsewhere within the study.

Table 6.4 *Diary Study: Theme Table for Empirical Domain Four: Threat Assessment and Use of Force Decision-Making Processes.*

Global themes	**Subthemes**	**Frequency**[57]
1. Pre-attendance information	(i) Intelligence and information from control	19 (49%)
	(ii) Information from the emergency call and type of incident	7 (18%)

[57] Frequency refers to the number of individual officers that generated a code included within the subtheme. Figures in brackets indicate the proportion of post-participation questionnaire respondents (total n=39) that contributed to the subtheme.

Table 6.4 *Diary Study: Theme Table for Empirical Domain Four: Threat Assessment and Use of Force Decision-Making Processes.*

Global themes	Subthemes	Frequency[57]
2. National Decision Model (NDM)	(i) How the NDM is used	8 (21%)
	(ii) When the NDM is used	5 (13%)
	(iii) Non-specific NDM use	5 (13%)
3. Officer experience and ability		8 (21%)
4. On-scene information		7 (18%)

Global theme 1 - Pre-attendance information.

The first global theme, *Pre-attendance information,* consists of two interrelated subthemes, each of which are discussed in more detail below: (i) Intelligence and information from control, and (ii) Information from the emergency call and type of incident.

(i) Intelligence and information from control. This was the larger of the two subthemes within the theme of *Pre-attendance information;* encompassing a total of 22 codes generated by 19 individual officers.

(ii) Information from the emergency call and type of incident. The second subtheme was smaller than the first, and is comprised of seven codes generated from seven separate officers.

Overall, this global theme highlights the power of officers being primed ahead of arriving at the incident, and refers to the existing information that could be used to help contextualise the subject and the situation prior to attendance.

Many officers discussed how the impact of existing *Intelligence and information from control* (outside of the emergency call) could impact on their initial threat assessment, and potentially, their decision to use force. This was the larger of the two

subthemes for the global theme of *Pre-attendance information* and included reference to information gleaned from checking the Police National Computer (PNC), CCTV, and any information of previous incidents involving the same location or subjects: *"Being passed a good update from Comms and any previous incidents at the address or involving the named people"* (Q6); "*Communication with the Dispatchers to get as much info as possible from them, whether it can be seen on CCTV, whether there is more than one call"*(Q6).

Interestingly, a few officers also drew attention to the benefits of being double-crewed when accessing intelligence prior to arrival at an incident: *"I rely heavily on information passed over the radio to any fast time incident, and hope that no warning signals are missed if I'm solo crewed. When double crewed, your colleague is able to check this en route"* (Q6).

The second largest subtheme comprised of codes relating to *Information from the emergency call and type of incident* and included potentially influencing factors such as the specific incident type, and the numbers of people involved: *"I assess threat on my way towards a job depending on what information has been given during 999 call"* (Q6); *"Type of call (e.g. domestic)"* (Q6).

Small though this particular subtheme may be, that does not mean that it is any less important, and it may be that fewer officers emphasised particular elements as this sort of information (i.e. information gathered via the emergency call) would likely be included in the information passed on to the officer by the dispatcher or the control room as standard. As such, officers may have assumed that the importance of this information may have already been covered and did not need to be singled out as an influencing factor.

Global theme 2 – The National Decision Model (NDM)

The second global theme that emerged across the qualitative data collected in relation to how officers decide to use force was the NDM. As discussed in Chapter One, the NDM is a broad-based prescriptive approach towards police decision-making that was introduced in 2011 and is promoted as providing a simple, logical, and evidence-based approach to making any and all policing decisions (College of Policing, 2013b). Overall, this particular global theme consists of the following three subthemes, each of which will be explored in more depth sequentially: (i) How the NDM is used, (ii) Non-specific NDM use, and (iii) When the NDM is used.

(i) **How the NDM is used.** This subtheme centres around officers describing *how* they use the NDM and was the largest subtheme within the global theme of *The National Decision Model*; with a total of 11 codes generated via the responses from eight separate officers.

(ii) **When the NDM is used.** The second subtheme refers to *when* the NDM is used and is comprised of six codes across the responses from five individual officers.

(iii) **Non-specific NDM use.** The third and final subtheme also comprised six codes generated by five individual officers, all of which referred to using the NDM in more general terms.

Overall, *How the NDM is used* was the largest subtheme and comprised of comments describing how officers utilise the NDM in practice; with some participants describing it as merely a narrative framework used to help retrospectively conceptualise the process of decision-making, whilst others indicated that it was a practical process utilised when making decisions in the field – either subconsciously or as a more deliberate process:

> *"The National decision model simply puts into words how we make decisions all the time. If I'm dealing with something there and then, I don't stop to think about the model, I just make the decision based on the information I have at the time"* (Q10).

> *"Subconsciously we may be using the NDM due to our training, assessing the various steps in quick time, but in reality, an officer just reacts to what happens in front of them and do not necessarily have the time to move through the NDM"* (Q10).

Whilst the first subtheme reflects *how* officers utilise the NDM, the second subtheme centres around *when* the NDM is used. Though somewhat smaller than many of the other subthemes discussed in this chapter, it is nonetheless useful as it provides detail in regard to the situations in which officers believe the NDM to be most and least useful. In particular, officers seemed to differentiate between time-critical situations and those where time is a more abundant commodity. Though the use of NDM for slow-time decisions was viewed quite positively, some indicated that they found it to be less useful when decision-making was more reflexive or involved high-stakes:

> *"NDM is an interesting concept when making decisions. It is fantastic when rationalising slow paced decisions, however I think it is less useful when making instant decisions."*(Q10).

> *"Decision-making - when someone is aggressive and threatening, the NDM is not exactly the first thing on your mind. There is an immediate need to neutralise the threat and then begin appropriate procedures. Having said that, there may be a few minutes en route to an incident to assess intel, risk assess and consider a plan if possible"* (Q10).

The last subtheme was much less descriptive and reflects responses from officers where they merely referred to using the NDM as part of their threat assessment process, or when deciding to use force, but did not expand upon the issue any further: *"I utilised the NDM in deciding to use force"* (Q7a); *"Using the NDM, coming up with plans"* (Q6).

Global themes 3 and 4 – Officer experience and ability*, and *On-scene information.

The third and fourth global themes are much smaller than the previous two, and do not sit above any associated subthemes. Whilst it is unusual to include such disproportionately small themes at a global level, their inclusion was important due to their unique contribution to the question at hand. Global theme three, *Officer experience and ability,* includes eight codes from eight separate officers and details the impact of

officer experience and ability on their decision to use force and their assessment of threat, including previous experience of a particular offender, their skills and abilities, and the level of expertise that comes with working as an officer for many years: *"Past experience of a suspect"* (Q6);*"An important factor is the equipment/skills I have to deal with the situation"* (Q6); *"My 23 years' experience helps !!"* (Q6).

Global theme 4, *On-scene information*, contains seven codes from seven separate officers and underscores the value of information gathered by officers themselves once they arrive at an incident**.** Whilst pre-attendance information is helpful to generate an initial assessment of risk and threat, these officers also highlighted that they seek additional information once they attend an incident which also feeds into their assessments: *"Assess threat level based on info passed on way to job as well as dynamic assessment when on scene"* Q6; *"There is a combination of static and dynamic risk. The assessment is influenced by information from the scene and our previous information"* (Q6).

6.2.3.2 Empirical Domain Five: Influential factors in threat assessment and the decision to use force

As in Section 6.2.3.1, data derived from the four post-participation questionnaire items listed in the section above were analysed to help answer the seventh overall research question of this thesis and to expand on the findings from Chapter Five.

In total four global themes emerged from the data, three of which comprised of several subthemes: (i) *Situational factors*, (ii) *Subject characteristics and behaviour* (iii) *Safety and risk*, and (iv) *Officer experience and skill*. Table 6.5 lists each of these global themes and their relevant subthemes in order of magnitude. Though the last global theme*, Officer experience and skill,* was much smaller than the others, it was still important to include given that this thesis is focussing on the impact of the decision-

maker (and their internal psychological and biological processes) on the decision to use TASER.

Table 6.5 *Diary Study: Theme Table for Empirical Domain Five: Influential Factors in Threat Assessment and the Decision to Use Force*

Global themes	Subthemes	Frequency[58]
1. Situational factors	(i) Officer resources	20 (51%)
	(ii) Immediate environment	15 (38%)
	(iii) Members of the public	12 (31%)
	(iv) Context	8 (18%)
2. Subject characteristics and behaviour	(i) Subject affect and state of mind	21 (54%)
	(ii) Subject behaviour and actions	16 (41%)
	(iii) Weapons	13 (33%)
	(iv) Physical characteristics	6 (15%)
	(v) Previous for violence	5 (13%)
3. Safety and risk	(i) Threat to self or other officers	22 (56%)
	(ii) Threat to members of the public	15 (38%)
	(iii) Containment and control	6 (15%)
4. Officer experience, knowledge, and ability		8 (21%)

As in previous Empirical Domains, each global theme will be presented in turn; starting with a brief overview of the global theme and any associated subthemes, followed by a more detailed examination. Quotations will be used as illustrative examples and to ground the subthemes within the data. Where quotations are provided,

[58] Frequency refers to the number of individual officers that generated a code included within the subtheme. Figures in brackets indicate the proportion of post-participation questionnaire respondents (total n=39) that contributed to the subtheme.

the specific question from the post-participation questionnaire that elicited the response is indicated in brackets e.g. (Q4).

Global theme 1 – Situational factors

Situational factors were highlighted by many officers as having an influential role in their threat assessment and decision to use force, with key aspects relating to resourcing and the incident itself. Overall, the global theme of *Situational factors* comprised of four subthemes: (i) Officer resources, (ii) Immediate environment, (iii) Members of the public, and (iv) Context.

(i) **Officer resources.** This was the largest subtheme within the global theme of *Situational factors* with 36 codes generated from 20 individual officers.

(ii) **Immediate environment.** Codes relating to the physical environment that the incident was taking place generated the second largest subtheme; with 18 codes across the responses from 15 individual officers.

(iii) **Members of the public.** 13 references from 12 separate officers emphasised the importance of the people present at an incident.

(iv) **Context.** This was the smallest of the four subthemes and comprised of nine codes generated from seven individual respondents, all of which highlighted the importance of other circumstances associated with the wider operational context of the incident.

Officer resources was the largest subtheme within the global theme of *Situational Factors,* and were listed by just over half of the respondents to the post-participation questionnaire as an influential factor when assessing threat and deciding to use force. This included whether the officers are single or double-crewed, how far away their back-up is, and whether they have the appropriate equipment and wider operational support to deal with the situation: *"Decision was made based on what*

equipment available (no MOE kit),[59] *what other resources available and suspect's behaviour"* (Q7a); *"availability of support or taser"*(Q7b); *"whether I am alone or with another officer and if single crewed - availability of backup"* (Q6).

The second largest subtheme relates to the *Immediate environment,* and is concerned with aspects of the incident setting, with many officers highlighting that location, surroundings, time of day and other on-scene aspects of an incident (such as lighting) were key factors when assessing risk and decisions about use of force: *"Location is second concern dependent on situation type"* (Q6); *"Time of day Location type (club, private dwelling)"* (Q6); *"The environmental factors such as lighting or lack of lighting"* (Q7b).

Members of the public was the third subtheme and reflected comments where officers emphasised the importance of the presence of the general public during an incident when assessing threat and making use of force decisions. Officers highlighted that the number of people present, their behaviour, injuries, and/or vulnerabilities were often at the forefront of their thoughts: "*numbers of those involved*" (Q6); *"The behaviour of the parties on scene"* (Q6); *"being aware of the victim injury I still chose to compliantly handcuff the suspect to the front to maintain control of them and negate further injuries to anyone*" (Q7a).

Interestingly, some officers indicated that the number of officers present was considered in tandem with the number of officers available to support – indicating that the number of officers or subjects alone is not enough to assess risk, but that an officer to subject ratio may be more important: *"Similarly - assessing the threat with regards to numbers of individuals dealing with vs police assets on hand"* (Q6).

[59] Assumed to stand for 'Method of Entry Kit' - a generic term used to describe equipment designed to effect a forced entry through the outer fabric of a structure, such as a residential door.

Whilst *Context* was the smallest of the subthemes it underscored the importance of the wider operational considerations within which the use of force sat, such as whether force would be effective or not, how others might view the use of force in retrospect, and whether it would be legal and appropriate in the circumstances: "*How it will be perceived after the events"* (Q7b); *"If it is reasonable and justified. How effective it will be in the aim I am trying to achieve"* (Q7b).

Global theme 2 – Subject characteristics and behaviour

This subtheme underscored how the subject of the officer's attention was perceived to directly influence their assessment of threat and their decision to use force. Overall, this predominantly related to the subject's physical and psychological presentation, as well as their current behaviour and previous history. Overall, five subthemes are included as part of this global theme: (i) Subject affect and state of mind, (ii) Subject behaviour and actions, (iii) Weapons, (iv) Physical characteristics, and (v) previous for violence.

(i) **Subject affect and state of mind.** This was the largest of the subthemes within the global theme of *Subject characteristics and behaviour*, comprising of 26 individual codes across the responses from 21 individual officers.

(ii) **Subject behaviour and actions.** This was the second largest subtheme; comprising of 21 codes generated by 16 separate officers**.**

(iii) **Weapons.** The third subtheme related to whether a subject was armed, or might have access to weapons, and contains a total of 18 codes from 13 separate officers.

(iv) **Physical characteristics of the subject.** This subtheme was smaller than the previous three; with six codes being generated across the same number of unique participants.

(v) Previous for violence. The smallest subtheme within the global theme of *Subject characteristics and behaviour* related to whether the subject had a previous history of using violence and comprised of six codes generated from five separate officers.

Subject affect and state of mind was the largest subtheme within this particular global theme, with over half of the post-participation questionnaire respondents identifying this as an influential factor in use of force decision and when assessing threat. Many respondents highlighted anger, agitation or aggression in particular, as being key influential factors, whilst others indicated that mental health difficulties and intoxication were also important aspects to consider: *"Male was extremely verbally aggressive and threatening members of public"* (Q7a); *"I assess threat on a case by case basis. Warning markers help me with the assessment but I find it's how the person is behaving at the time. The most important thing is mental health"* (Q6).

A subject's affect and state of mind was not the only influential subject-related factor reported by officers in regard to threat assessment and their use of force decisions. The physical behaviour and actions of the subject were also highlighted as being extremely important and were mentioned by just over two fifths of the post-participation questionnaire participants (41%); making this the second largest subtheme under the global theme of *Subject characteristics and behaviour*. Though many of the officers that raised this as an influential factor mentioned it in general terms. Those that did provide further detail mentioned violent behaviour, resisting arrest, and/or non-compliance:

> *"Subject had already used force during a robbery and had run away from me. The victim had been struck with some form of weapon, causing a GBH injury to his head. I did not know where the weapon was. I therefore used force, once I'd caught up with him, to stop him from running further and to stop him from attacking me"* (Q7a).

The third subtheme, *Weapons,* reflected officers' concerns over whether a subject was armed or had access to weapons. Whilst this was, comparatively, a relatively small subtheme, officers appeared to take the risk of weapons very seriously:

> *"I attended a serious assault whereby a suspect was identified to be within a dwelling. The suspect had already used a weapon to assault someone. I entered the property with a colleague and had taser drawn to negate any further threat of weapons"* (Q7a).

One respondent even highlighted that this was one of the most important factors when assessing threat: *"Most important factors are whether the person is armed and who is at risk of that subject and why"* (Q6).

The fourth subtheme, *Physical characteristics of the subject,* was considerably smaller than the previous subthemes, and was mentioned by only 15% of the post-participation questionnaire respondents. Overall, these officers highlighted that the subject's gender, size, build, or strength were key issues when assessing threat or during their use of force decisions: "*The size/strength of the person"* (Q6); *"The size and build of the suspect"* (Q7b); "*my ability/their ability, size and gender"* (Q7b).

The fifth and final subtheme under the global theme of *Subject characteristics and behaviours* reflects whether the subject had a previous history of using violence and/or had PNC 'warning markers:'[60]

> *"I had arrested a male who had several previous convictions for assault police. I had to transport to custody, on my own and in a car. Handcuffs were used in order to prevent his escape and to protect me during the journey"* (Q7a).

Although this subtheme consisted of only six codes from five separate participants, one of these officers listed this as a key factor to consider when assessing threat: *"The factors most important are what has happened, previous intelligence, history of violence with those involved and access to weapons"* (Q6).

[60] 'Warning' markers on police records are special information indicators that alert users to important warnings or hazard information that officers, and other police staff need to be aware of to help ensure the safety of officers and the public. Warning markers can be added to an addresses, individuals and vehicles.

Global theme 3 – Safety and risk

The third global theme specifically related to the role of *Safety and risk*. Officers highlighted that the safety of themselves, their colleagues, and members of the public were at the forefront of their minds when assessing threat and when making use of force decisions. Overall, this global theme consists of three individual subthemes: (i) Threat to self or other officers, (ii), Threat to members of the public, and (iii) Containment and control.

(i) **Threat to self or other officers.** This was the largest of the three subthemes that sit within the global theme of *Safety and risk* and consists of 41 codes generated across the comments from 22 separate officers.

(ii) **Threat to members of the public.** This was the second largest subtheme and consists of 21 codes generated across the responses from 15 separate officers.

(iii) **Containment and control.** Consisting of seven codes from six individual officers, this was the smallest of the three subthemes.

Threat to self or other officers was the largest subtheme within the whole of this Empirical Domain, with over half of the respondents to the post-participation questionnaire raising this as a key factor when assessing threat and making use of force decisions (56%): *"My safety and the safety of my colleagues. Ultimately, any force used will be to ensure that my colleagues or I are not getting hurt"* (Q7b).

Moreover, some officers indicated that there was a hierarchy of importance in regards to who was at risk: "*My safety is most important, then public, then subject, then reputation"* (Q6); and others identified that their own personal safety was paramount: *"As I am single crewed the most important factors for me when arriving at scene are my own personal safety so I always assess the levels of violence, or potential for violence that I may be met with"* (Q6).

Officers, however, were not only concerned with the safety of themselves and their colleagues; *Threat to members of the public* was the second largest subtheme and reflected officers' concerns over the safety of the general public, including the subject of the officer's attention: *"keeping all parties safe (including the subject) is the most important factor"* (Q7b).

The last subtheme within the global theme of *Safety and risk* related to risks of a different nature. Several officers identified a need to take control of the situation to reduce the risks of losing evidence or of a subject successfully making-off. The subtheme *Containment and control* reflects operational risks and highlights the need to gain or maintain control, to secure evidence and prevent escape as key decision factors when using force: *"To retain control of the situation and the subject"*(Q7b); *"Securing the suspect soonest to prevent evidential losses"*(Q7b); *"Personal safety and to prevent escape which could have caused harm to public if male tried to make off in car at speed"*(Q7b).

Global theme 4 – Officer experience, knowledge and ability

The fourth and final global theme related to *Officer experience, knowledge and ability*, and was much smaller than the previous global themes, with only eight codes generated from eight separate officers. As mentioned on page 321, although this global theme is much smaller than the others, it was important to include given that one of the main aims of this thesis is to examine the impact of individual factors, intrinsic to the officers themselves, on their use of force. Several officers indicated that having previous experience with the subject factored into their threat assessment or decision to use force, whilst a few others highlighted that assessing threat was easier due to their length of service: "*Threat assessment for me now comes with experience (20 years in)"* (Q6); *"Single or double crewed, my ability/their ability, size and gender, type of offence"* (Q7b).

6.2.4 Qualitative analysis summary

Given the number of analyses undertaken to explore the qualitative data, this chapter will now conclude with a summary to draw the reader's attention to the principal findings that emerged from these results in relation to each of the Research Questions examined as part of the qualitative component of the diary study. Results relating to Research Question Three are presented first before presenting the emergent evidence that addresses Research Questions Six and then Seven.

RESEARCH QUESTION THREE: Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers?

Officer resources, including crewing levels were raised as a key determinant of incident-related stress within two separate Empirical Domains. Crewing first emerged as key determinant of incident-related stress from within Empirical Domain One; with respondents depicting single-crewing as having a negative impact on incident-related stress (i.e., they found incidents more stressful when single-crewed), whilst double-crewing was viewed as having a positive impact (i.e. they found incidents less stressful when double-crewed). This effect was so pronounced for one individual, they even suggested that all single-crewed officers should be given TASER as this would presumably reduce their level of vulnerability (or perceived vulnerability) and, subsequently, alleviate officer stress.

The relationship between crewing and officer stress also emerged from Empirical Domain Three, with stress often being cited as one of the key psychosocial impacts of crewing; with single-crewing once again being perceived negatively and double crewing being perceived positively. A few officers' comments also indicated

that this relationship may be mediated, in some way, by the subsequent increase in perceived vulnerability or overall workloads when single-crewed.

RESEARCH QUESTION SIX: How do officers think crewing impacts them, and how they do their job?

One of the key findings that emerged from each of these analyses, is that the impact of officer resources appeared to be a universal trend throughout the Empirical Domains. Crewing levels and availability of back-up, in particular, were frequently discussed as having a key role in an officer's confidence when responding to an incident, how stressful they find the incident that they are responding to, and as being an important factor when assessing the risk and level of threat associated with the incident (Empirical Domain One). Officers also frequently portrayed a relationship between crewing levels and use of force, overall performance, and their wider psychosocial wellbeing; whilst a few also indicated that crewing levels also had an impact on their operational decisions (Empirical Domains 2 and 3). Crewing, it seems, is a fundamental operational practice that has far reaching consequences for both the officers that are on patrol, as well as the public which they serve.

The second prevailing message that arose from the majority of Empirical Domains was that single-crewing is overwhelmingly perceived and portrayed negatively, whilst double crewing was perceived by the vast majority of respondents as being beneficial and associated with a wide range of positive outcomes. More specifically, single-crewing was seen as increasing the physical risk and the level of force required during incidents, as well as having a detrimental impact on decision-making, outcomes, performance, and an officer's psychosocial wellbeing. Conversely, double crewing was seen to be physically safer, and as reducing the level of force required during interaction with members of the public, as well as having a positive

impact on decision-making, outcomes, performance, and the psychosocial wellbeing of the officers out on patrol.

Interestingly, the availability of back-up was often mentioned in tandem with crewing levels, and several officers specifically indicated a potentially moderating effect of the availability of back-up on the relationship between crewing and officer safety, psychosocial wellbeing, and their decision to engage with an incident. More specifically, officers indicated that absent or limited access to officer back-up exacerbated the risks inherent in single-crewing, whilst having other units nearby would enhance confidence and reduce perceived risks when attending incidents. This may indicate a protective factor that could be employed to reduce some of the negative impacts associated with single-crewing, if and when, this particular crewing practice is seen as an operational necessity.

RESEARCH QUESTION SEVEN: How do officers go about assessing threat and making use of force decisions, and what factors are most important?

Research Question Seven was predominantly explored through Empirical Domains Four and Five, with several interesting narratives emerging from these analyses. One of which was the tendency for officers to raise subject characteristics much less frequently than their own behaviour and state of mind when officers discussed assessing threat and making use of force decisions.. However, this is perhaps unsurprising given that Study One (the systematic literature review, please see Chapter Three) found strong evidence to suggest that a subject's mental health, intoxication, and level of resistance were predictive factors of the use of TASER; whilst the evidence regarding age, ethnicity, height, and weight was less consistent. Nonetheless, subject's size has been discussed as part of PC Monk's decision-making during the use of force

that lead to the unlawful killing of ex-Premier League striker Dalian Atkinson (Cooper, 2021), so perhaps these aspects should not be dismissed entirely.

Although it is important to look at the features that emerged universally throughout participant responses, it is arguably just as important to look at the features that were universally *absent*, i.e. officer factors, and detailed information on the threat assessment and decision-making processes.

Whilst the analyses found that the factors that influence an officer's threat assessment and decision-making process were very similar, very few officers provided a detailed description of the assessment and/or decision-making processes that these factors feed into. Although one could argue the underlying reason for this response pattern could be linked to attribute substitution, officers are taught to use the NDM during their training and it is part and parcel of their approval professional practice; as such, one might expect it to be more frequently mentioned. However, given that the second step of the NDM process is *'Assess threat and risk and develop a working strategy;'* it perhaps makes sense that officers did not raise the NDM more frequently in relation to their threat assessment process, as they may see threat assessment as being an element of the NDM rather than the NDM being a driver in their assessment of threat.

The only officer factors that emerged from the analysis in relation to threat assessment and use of force decision-making were knowledge, experience and ability, and even these were not mentioned all that frequently. Interestingly, most officers did not consider how their own physical characteristics or behaviour might be perceived by the subject; preferring to present themselves as merely responding to the situation in front of them, rather than being an active participant in an interpersonal exchange. These omissions may be driven by social desirability, or it may genuinely not have occurred to them given the context within which the questions were presented. Alternatively, this could be an artefact of operational practice as officers are often asked

to *justify* their decision to use force as part of standardised reporting, rather than *reflect* on it. This is particularly interesting as many officers highlighted that, from their perspective, a subject being armed is an influential factor in their assessment of threat and decision to use force, and perhaps the same could be said from the perspective of the subject. If they see that an officer is carrying TASER, this may represent an increased level of threat from their perspective, and this might subsequently influence how they too decide how to respond.

Finally, it is worth noting that some respondents specifically mentioned TASER within their narratives. When looking at these independently of all the other analyses, most codes that were generated about TASER were produced via the shift diary in relation to how the officers might have responded differently to an incident, had they been differently crewed. More specifically, in 11 separate incidents logged by eight individual participants, officers stated that if they had attended the incident alone (instead of being supported by other officers at the time), then they would have used or considered using TASER.

CHAPTER SEVEN: THE DIARY STUDY - DISCUSSION

The aims of the diary study were to explore and evidence how crewing levels might affect how police officers think and feel, and in what manner this might relate to the factors that drive the decision to use TASER. By way of reminder for the reader, this chapter will start with a brief summary of the diary study and key descriptive findings, before reviewing the evidence for each of the six key research questions associated with this study (please see Chapter One, Two and Four for more information) and discussing them within the context of the overall aims of the diary study. Implications for current practice and future research will be discussed throughout the body of this chapter, as will the main strengths and limitation of the study.

7.1 DIARY STUDY SUMMARY

This piece of research was a unique, multi-staged, mixed-methods quasi-experimental diary study using self-reported field observations. Participants were asked to complete a baseline survey, a shift diary, and a post-participation questionnaire. A diary study was chosen so that officers could share their experiences within their natural setting, in (or close to) real time, and on repeated occasions over a defined period. Data was collected via a bespoke phone app developed specifically for this research.

Overall, in total, the diary study asked 11 qualitative questions and 89 quantitative questions[61] across a range of topics, including (but not restricted to): Socio-occupational demographics, decision-making styles, shift characteristics, characteristics of incidents where force was used, the psychological and biological impacts of crewing, crewing preferences, threat perception, and using the National Decision Model (NDM).

[61] Excluding operational questions such as asking officers to confirm their usernames, passwords etc.

Over one hundred and fifty potential participants signed up to take part in the study with 64.9% (n=98) completing at least one part of the study or more, and 20.6% (n=33) competing all three parts of the study. This was unfortunately far fewer participants than had originally been anticipated when designing the Diary Study and the associated multivariate analysis plan, and was the result of an unexpected and unavoidable barrier to recruitment. This reduction in sample size not only led to extremely low observation rates for some of the target phenomenon (i.e. TASER use), but it also necessitated the use of bivariate testing instead of the original multivariate approach and reduced the power of the analyses that were conducted; meaning the pattern of results from the Diary Study should be considered carefully alongside the statistical analyses (please see Chapter Two, Section 2.2.2, and Chapter Four Section 4.2.2 for a full discussion of the recruitment barriers and the subsequent impact on analyses).

Regardless of the above, the participant sample was broadly representative of the wider police population in England and Wales for gender, age rank and length of service; meaning that respondents were mostly male, mostly Constables, mostly between the ages of 26 and 40 years, and had a length of service between 0 and 9 years. The vast majority of participants were from a Response-type role, two fifths (40.8%) were authorised TASER officers and a very small number were authorised firearms officers (3.1%). In addition, overall scores for decision-making indicated most officers identified with rational decision-making styles most strongly, followed by intuitive styles.

Most officers felt that their workloads over the previous year were '*Too high'* or '*Much too high'* (70.1%), whilst just under a third felt that their job was '*Very'* or '*Extremely'* stressful (32.5%). Violent victimisation from the public was commonly reported within the sample, with the vast majority of respondents reporting to have been

the recipient of an unarmed physical attack at least once in the last 12 months (e.g. struggling to get free, wrestling, hitting, kicking; 98.7%), and 48.0% respondents reporting experiencing this on a monthly basis.

Perhaps, considering the rate of violent victimisation highlighted above, it is unsurprising that the majority of respondents completing the post-participation questionnaire indicated that they preferred to be double-crewed when on shift. Indeed, when examining the qualitative data, participants reported feeling at greater physical risk when single-crewed. Participants also reported negative psychosocial (such as morale, stress and loneliness) and operational (such as higher workloads and poorer efficiency) impacts when single-crewed.

Findings also indicated that it was relatively unusual for officers not to have access to body worn video (BWV) during their shift (13.4%), whilst TASER was only accessible in 50.0% of the shifts recorded via the respondents' shift diary entries. Overall, shift diary entries indicated that the average shift length was just over 10 hours, the average number of incidents attended during the shift was approximately 4, and force was only used approximately once every three shifts (an average of 0.34 use-of-force incidents per shift). When using force, the results indicate that the most common reason for doing so was to effect an arrest (42.9%) followed by protecting oneself (13.5%), and the most frequently used tactical options were '*Tactical communications'* followed by '*Unarmed skills'* and then *'Handcuffing.'*

Ultimately, TASER use was very infrequent, with only ten uses of TASER across eight separate incidents recorded during the diary study; all of which were non-discharge uses. Overall, this indicates that TASER was used in 4.4% of the use-of-force incidents recorded via the shift diaries (8 out of 181); similar to the national rate for England and Wales between 2018 and 2019 (5%; Home Office, 2019c).

Although over three quarters (76.3%) of the participants that completed the post-participation questionnaire indicated that they '*Usually*' or '*Always*' use the National Decision Model (NDM) when making time pressured decisions, only 40.5% of the respondents felt that the NDM was '*Very*' or '*Extremely'* useful in these circumstances. This slight variance could be due to operational directive that requires officers to use the model, regardless of how useful they find it. Indeed, some of the qualitative findings suggested that whilst the use of NDM for slow-time decisions was viewed quite positively, some indicated that they found it to be less useful when decision-making was more reflexive or involved high-stakes. Nonetheless, many officers directly referenced the NDM when describing how they make use of force decisions, and many felt that this particular decision-making model had an impact on their threat assessments which were often cited as a key part in their use of force decision-making. Qualitative analysis in relation to influential factors in the decision to use force revealed that all three broad categories of factors (officer, situational, and subject) were narratively linked to the officers' perceived level of threat and, thus, indirectly on officer use of force. However, only situational and subject characteristics were thought to impact directly on the officers' use of force. Interestingly, officers did not attribute any of their use of force decision-making to their own characteristics.

In addition to descriptive statistics for each of the research questions listed above, over one hundred bivariate tests were conducted to explore potential relationships between the variables that these questions were measuring.

The results from these analyses produced a wealth of information that not only provided enlightening evidence in relation to the research questions, but also afforded opportunities to explore the relationships between the variables within a wider context and identify potentially fruitful avenues for further enquiry. Nonetheless, this chapter

will now focus on sequentially examining the evidence gathered by the diary study in relation to the study's main research questions.

7.2 RESEARCH QUESTION ONE: Do crewing levels affect the frequency and type of TASER use by police officers?

As mentioned in Chapter Five, there is a distinct operational difference between crewing levels throughout an officer's shift (shift crewing) and crewing levels at the time of an incident (incident crewing). Though they may seem similar, an officer that is single-crewed during their shift may not be alone when they respond to a critical incident; for example, they may wait for back-up to arrive before attempting to deal with the situation, or they may arrive at the incident at the same time as another officer. Similarly, an officer that is double-crewed during their shift, may not necessarily be with another officer during a use-of-force incident; for example, they may get separated from the other officer when chasing a potential suspect, or the officers may split-up for tactical reasons. As such, the analyses exploring the relationship between crewing levels and TASER use concentrated on incident crewing only. Nonetheless, it is important to note that, as one might expect, a statistically significant relationship between shift crewing and incident crewing was found; whereby officers that were single-crewed during their shifts were also more likely to be single-crewed during an incident where force was used.

Moreover, the results from the diary study indicate that crewing levels during an incident where force is required has a statistically significant impact on frequency of non-discharge uses of TASER (i.e., where the TASER is drawn but not fired; please see Chapter One for more information on types of TASER use); with bivariate analyses indicating that a larger proportion of officers carried out a non-discharge use of TASER, and carried out a non-discharge use of TASER *as the first tactical option*, when they were alone when the use of force began.

However, these findings conflict with the earlier UK research by Dymond (2016; 2018), which found no relationship between incident crewing and TASER use (regardless of type of use), and the 2020 study by Quinton et al. which found that whilst the odds of discharging TASER were increased when an officer was single-crewed, the odds of a non-discharge use of TASER were not.

One potential explanation for this observed discrepancy is the differing comparator groups used in the analyses. More specifically, the diary study conducted as part of this thesis compared the use of TASER between officers that were alone at the time where force was used, to those that were not; whilst Quinton et al. (2020), compared the use of TASER between officers that were 'single-crewed at the time' relative to those that were deployed with other officers *that did not use force during the incident.* Quinton et al.'s rationale for excluding use of force cases when more than one officer used force is due to recording practices within the police service and aims to avoid the 'double counting' of outcomes. Each police use of force record provides an account of an individual officers' use of force against a single person; this means that if two officers use force against an individual, two separate forms for the same incident would be generated (one for each officer). Though this rationale for case exclusion is well founded and follows the precedent set by others, it does not come without its own problems. By restricting the data set to only cases where one officer uses force (regardless of incident crewing), the authors may have excluded some of the more serious incidents from the data set (and thus those where a 'higher' level of force, such as TASER, might be utilised).

Then again, another possibility is that the observed discrepancy is a result of the type of statistical analysis used. Due to the large sample size used by Quinton et al.'s study (2020), the researchers were able to run multi-level regression models; thus enabling them to control for potential confounding factors, account for the nested nature

of the variables, and to determine the relative influence of each of the predictor variables. It is possible, then, that the relationship discovered between crewing and TASER use within the diary study could be little more than a methodological artefact and a different relationship between the variables, or even the absence of a relationship, might be evident if a multivariate approach had been taken and potential confounding variables were controlled for. This is particularly important given that half of the incidents that used TASER (n=4) were related to one single participant, and that their responses accounted for all TASER uses in incidents where the officer was alone when the use of force began; meaning that this particular finding is mostly the result of an individual officer's above average use of TASER.

However, it's important to note that this may not be unusual; for example, Ready & White's study in 2011 also found that 15% of officers were responsible for 60% of all TASER deployments. Though the underlying reason for this is not apparent, idiosyncratic patterns of TASER use, such as 'high-frequency' users, supports the notion that individual differences are important facets of decision-making to examine. One explanation for high-frequency users could be found in the Recognition Primed Decision Model (RPDM; Klein, 1989). As discussed in Chapter One, part of the situational assessment within the RPDM expects the decision-maker to identify a list of 'typical actions,' that are usually taken in such a situation; or failing the most typical – the most recent actions. Though this tactic does not always result in the most optimal response to the situation being selected, it does generally lead to acceptable actions with little expenditure of time or effort (Klein, 1989). Viewing this through a behavioural lens, this stage in the RPDM could be seen as being similar to operant conditioning; with the consequences of one's actions increasing or decreasing the likelihood of these actions being repeated. If, for example, an officer successfully uses TASER to bring a particular type of incident to a close quickly and efficiently – they may be more likely

to identify this as a potential course action when next dealing with a similar situation (as it is the most recent action they can recall using in a similar or 'matched' situation). Moreover, the more the action is used successfully, the more likely they are to identify and select this option, i.e. using TASER, again in the future (as the action might change from the most recent actions they can recall, to most typical actions that they can recall in response to a 'matched' situation).

This type of decision-making could result in a self-perpetuating behaviour cycle; whereby the more, or the more recently, an officer uses TASER successfully to achieve their aims, the more likely they may be to use it again. Alternatively, high-frequency users could equally be falling prey to a simple cognitive bias, such as the Ambiguity Effect (Croskerry et al., 2009, p.220), or the Law of the Instrument (Brislin, 1980, p.73). These particular findings indicate that there could be substantial gain, both operationally and academically, to explore the underlying mechanisms that drive high-frequency users; and although embryonic, it may also be useful for forces to begin monitoring the use of TASER to identify, and observe, high-frequency users.

The qualitative findings seem to dovetail with these results, as one of the narratives that emerged from the shift diary entries was that officers believe incident crewing directly impacts on the level of force they need to use; with higher levels of force being associated with single-crewing, and double crewing being associated with lower levels of force. Although the underlying reason for this association was not well explained within the participant responses, there was evidence that additional force is required when single-crewed in order to gain or maintain control of the situation. Moreover, when officers that were double-crewed during a use-of-force incident were asked whether they would have responded to the incident differently, had they been single-crewed, many explicitly mentioned that due to the nature of the incident they would have had to use a higher level of force, and more specifically TASER.

As mentioned in the analysis section in Chapter Five (Section 5.2.1), TASER is not used by officers in isolation, but as a part of a larger, interpersonal and dynamic behavioural exchange between officers and members of the public; and as such, the *placement* of TASER use may provide additional insight into *how* and *why* TASER is used. This makes it all the more surprising that, to the author's knowledge, this is the only study to examine whether or not crewing levels might influence the sequential placement of TASER within an incident; or, more specifically, whether crewing impacts on whether TASER is used as the first tactical option or not.

Given that TASER was used as the first tactical option in a significantly larger proportion of incidents where officers were alone, than when accompanied by their colleagues when the use of force began; this may indicate that single-crewed officers are not only more likely to use TASER than their double-crewed colleagues, but they have a greater propensity to select TASER as their first tactical option of choice. Perhaps aptly summarised by the following quotation from one of the shift diary entries: *"If solo crewed I would have had to use a higher level of force with pre-emptive taser tactics a major consideration."*

However, it is also important to note that not all officers indicated that they would behave in this manner; one officer actually indicated that when they are single-crewed they avoid using any force at all costs, perhaps indicating a '*Go Hard or go Home*' effect. This could indicate that single-crewed officers might be viewing potential use-of-force incidents as a zero-sum game whereby they will either 'win' the encounter (characterised by successfully achieving their policing objective with little to no harm befalling them), or 'loose' (characterised by failing to meet their policing objective and/or the incident resulting in serious injury). In this situation, it may be understandable then, that officers might consider the only two viable options to be playing with an advantage (i.e. by using TASER) or not playing at all.

Moreover, given that officers were only asked to give additional details for specific incidents where force was actually used, if a '*Go Hard or Go Home'* effect was in play – the '*Go Home'* aspect would not have been captured by the shift diaries. For example, if an officer had attended a potentially violent incident alone and decided not to use force or to engage proactively, then they would have selected '*No*,' when asked whether they had used force during their shift; as such, they would not have been asked a follow-up question about what they would have done had they been crewed differently. Consequently, there may be value in future researchers extending their scope to look at all officer-citizen encounters, to determine which factors lead to uses of force (including TASER use) rather than just examining the factors that affect the type of force used.

In summary, both the qualitative and quantitative data indicates that crewing levels at the time of an incident directly affect an officer's use of force, and more specifically their use of TASER; with the qualitative results indicating that, in at least some cases, crewing is part of an officer's conscious decision-making process and is seen as a way to manage their decreased ability to gain or maintain control of a situation when alone. This echoes the results from the qualitative study by Hine et al. (2018b), which found that new recruits often used the officer to subject ratio as an overt and pragmatic consideration in their use of force decisions. More specifically, that when there were more officers than subjects, the threat level was considered to be lower and thus less force was required to manage the situation. Perhaps, then, TASER use could be reduced by providing additional training on how to manage incidents where officers are out-numbered or out-matched without the use of TASER. This is particularly pertinent given that Personal Safety Training (PST) is not currently standardised across the length and breadth of England and Wales, and a notable proportion of officers are not currently satisfied with the PST they receive (College of Policing & National Police

Chiefs' Council, 2020). However, implementing such a change might prove challenging due to the devolution of police training to individual forces (Alys et al., 2013).

It must also be noted, however, that the data collected by the diary study included a very small number of TASER uses overall and did not include any *discharge* uses of TASER. As such, it would be worth exploring all the relationships between crewing and TASER use with a larger data set that includes both non-discharge and discharge uses, to examine whether these findings are replicated in cases where TASER is discharged.

Although judgements about the appropriateness of these uses of TASER cannot be made, it is important to examine any operational practices that create unintended and undesirable consequences. This knowledge can help police forces utilise crewing in a manner that might slow the 'mission creep' in the use of TASER that has recently been denounced by Amnesty International in the wake of Benjamin Monk being found guilty of Dalian Atkinson's manslaughter (Thompson, 2021). To speak more plainly, the results from this research has shown that incident crewing levels may directly impact the use of TASER and the Police Service of England and Wales (PSEW) could potentially use these findings to reduce the use of TASER and even help manage problematic or disproportionate uses of TASER; such as the use of TASER in mental health crises and amongst minority ethnic communities (Home Office, 2020c; Quinton et al., 2020). For example, forces could attempt to reduce the likelihood of TASER use by making sure that they double-crew officers when there is evidence to suggest that mental health may be an impact factor when responding to incidents.

7.3 RESEARCH QUESTION THREE: Do crewing levels impact on transient biological factors (i.e., stress and fatigue) that might affect the decision-making abilities of officers? [62]

Stress and fatigue were the primary factors under exploration within the biological dimension of the panoptic decision-making framework used within this thesis. Quantitative analysis was used to explore the possibility of a relationship between incident crewing, and ratings of incident-related stress; and although the analysis did not find a statistically significant relationship, the tests were under-powered, and the pattern of results indicated that average incident stress ratings were slightly higher when officers were alone than when they were with other officers. Quantitative analysis was also used to examine the data for potential relationships between shift crewing and ratings of overall shift stress, physical fatigue and mental exhaustion. Although no statistically significant relationships between these variables were found, these analyses were similarly underpowered; meaning that these results may not indicate the absence of any such relationships, but merely a lack in the requisite sensitivity required to detect them. Moreover, results from the qualitative data seemed to support a link between crewing and stress, with officers reporting that being double-crewed had a positive effect on stress levels (i.e., resulting in reduced levels of stress), whilst single-crewing had the opposite effect.

Although the quantitative results indicated that shift crewing did not have statistically significant relationship with shift stress, physical fatigue and mental exhaustion, a significant relationship was found between shift crewing and workload, with those reporting that they had been predominantly single-crewed throughout their shift also rating their workloads as significantly higher than those that were

[62] Please note, research question two was not addressed by the diary study, it was addressed in Chapter Three by Study One (the systematic literature review). As such, this particular research question is omitted from the discussion in this chapter.

predominantly double-crewed. Interestingly, ad hoc analyses driven by the results in Chapter Five, also identified a significant positive relationship between average shift workload ratings and ratings of shift-related stress, and fatigue; with those reporting higher workloads during their shift, also reporting higher ratings of stress, physical fatigue, and mental exhaustion. These additional findings are particularly important as they indicate that shift crewing may indirectly affect the biological state of officers via their workloads.

In summary, these results indicate that crewing levels, both at an incident and shift level, may have an impact on transient biological factors that might affect an officer's decision-making abilities (e.g. stress and fatigue). Though more research is clearly required to examine these relationships in more depth, and with a larger data set, these initial findings validate the use of the bio-psychological elements of the bespoke panoptic decision-making framework underpinning this thesis. These results also indicate that officers that frequently experience high workloads may be at higher risk of experiencing other psychosocial hazards, such as fatigue and stress; important findings given that recent survey data suggests that the majority of officers in England and Wales believe their workloads to be too high (Elliott-Davies, 2021).

7.4 RESEARCH QUESTION FOUR: If so, are these transient biological factors associated with, or effect an officer's decision to use TASER?

Stress was the primary factor explored in relation to TASER use as part of the biological dimension within the panoptic decision-making framework underpinning this thesis. Quantitative analysis was used to explore the possibility of a relationship between incident-related stress and TASER use. Although the analysis did not find a statistically significant relationship, the pattern of results was nevertheless insightful, as TASER was *only* used in incidents where low to moderate levels of stress were reported – regardless of crewing. Although one's initial expectation might be that an incident

serious enough to require the use of TASER may be more intrinsically stressful, the fact that the results directly oppose this supposition could potentially be explained by the very presence of the TASER itself.

One explanation could be that early and successful deployment of TASER may reduce the level of stress experienced by officers by achieving a swift and efficient end to the encounter; a notion that is perhaps supported by the auxiliary exploration of the shift diary data, which revealed that higher levels of stress were associated with incidents where more tactics were used.

However, perhaps a more likely explanation sits within the analytical approach as incidents were only included within the analyses when TASER was available to the officer(s). Although no statistically significant relationship was found between average ratings of incident stress and TASER availability, statistically significant relationships were found between overall ratings of shift stress and TASER availability, and between officer ratings of incident-related threat and stress. This could indicate that TASER has an indirect impact on incident stress via incident threat; or, more specifically, the mere presence of a TASER during an officer's shift could be enough to reassure officers of their own safety and consequently reduce incident stress due to a perceived reduction in risk. This theoretical explanation for the results is, in a small way, also supported by the quantitative analysis in Chapter Five, which also highlights a positive correlation between the perceived level of threat during an incident and how stressful officers found the encounter. Although several officers mentioned TASER specifically (please see Chapter Six), one officer described TASER as a potential mediating (or preventative) factor between incident stress and incident threat caused by a change in their perceived vulnerability.

Although the statistical analysis appears not to support stress as an underpinning mechanism for the observed relationship between crewing and TASER use, the

bivariate analyses were consistently underpowered; meaning that the failure to observe an effect cannot be assumed to indicate the absence of one. In addition to the statistical shortcomings of the bivariate analyses, the general pattern of results and the qualitative data suggests that stress *is* likely to be related to crewing and use of force in some way; however, the direction and strength of the relationship cannot be fully explored without further experimentation. Nonetheless, these results echo those from the wider literature which indicates that stress and fatigue can impact on officer decision-making and performance (Hope, 2016; Ma et al., 2013; Verhage, et al., 2018). These findings not only validate the bio psycho elements on the panoptic decision-making framework designed for this thesis, but also highlights the need for the incorporation of these elements into future work evaluating the use of force, and TASER, in particular. Given the potential impacts of stress and fatigue on officer decision-making highlighted by previous research (please see Chapter One for more information), it may also be worth considering including an element of psychoeducation in officer PST to draw officers' attention towards these potential impacts and highlighting the need for acquiring adequate rest and relaxation. The results also suggest an organisational need to create and maintain a working culture that supports officers in high stress situations, such as responding to emergencies and the deployment of force. These results may also provide additional impetus for forces to monitor and better manage the levels of stress and fatigue experience by officers within local teams/units, as well as providing evidence to suggest that crewing practices could potentially be utilised as a means to reduce work-related stress and fatigue in problematic or high-risk roles.

7.5 RESEARCH QUESTION FIVE: Are enduring officer factors associated with, or effect an officer's decision-making, including the decision to use TASER?

Although the original inferential analysis schedule had planned to test for potential relationships between enduring officer factors and the use of TASER, the data landscape generated by the diary study meant that this was not possible (please see Sections 4.2.6, and 5.2 for additional information). However, as discussed in relation to the findings for Research Question One, half of the incidents included in the diary study that used TASER were related to one single participant (n=4), which lends some support to the view that individual differences are important facets of officer decision-making and require examination.

Given the result discussed above, and the potential impacts of enduring officer factors identified by the literature review in Chapter Three, officer gender, role, length of service, and decision-making styles were explored (at an individual-level) in relation to: Average incident stress ratings, average incident threat ratings, average shift workload ratings, average shift safety ratings, average shift-related fatigue, ratings of the perceived utility of the NDM, and how frequently they reported using the NDM.

Overall, few statistically significant relationships were found between these officer factors and the variables listed above; however, as with many of the previous analyses discussed, retrospective power analysis identified that the tests were consistently underpowered, indicating that we should view the failure to detect a significant result with caution as this may be due to a lack of sensitivity rather than the absence of any relationships.

Nevertheless, there were some important findings from these analyses; the first of which being the statistically significant relationship between officer decision-making styles and average ratings of incident-related threat. More specifically, spontaneous

decision-making scores were positively and significantly associated with average incident threat ratings; with those scoring higher on the spontaneous decision-making dimension of the General Decision-Making Style (GDMS) inventory also reporting higher average ratings for incident threat. High scores on the spontaneous decision-making dimension indicates that an individual may be more likely to have a sense of immediacy and a desire to get through a decision-making process quickly; meaning that they may be more likely to align themselves with the use of System One processes than other individuals, i.e. decision-making that is fast, automatic, associative, intuitive, implicit and unconscious (Stanovich & West, 2000). Given that the findings from the diary study imply that high scores on the spontaneous decision-making dimension were associated with higher average incident threat ratings, it may be that these individuals prefer to utilise simple heuristics and are less likely to use more complex and multi-staged decision-making strategies, such as the NDM or the RPDM.

More specifically, the spontaneous decision-maker's desire for a straightforward decision-making strategy may also increase their susceptibility to a type of cognitive bias somewhat akin to the Prudence Trap (Hammond et al., 1998), causing these officers to be more circumspect in their threat assessments; a policing specific bias coined herein as the '*spontaneous but shrewd threat assessment bias.'* Interestingly, previous research by Dror et al. (1999) not only found that externally applied time pressures reduce decision thresholds (meaning that decision-makers require less information to make a decision), but that the amount of attention that decision-maker pays to less important dimensions of the decision-making task reduces. Perhaps then, it is feasible that the spontaneous but shrewd threat assessment bias could be driven by the application of an artificial internal time pressure, due to their preference for faster decision-making.

Conversely, another perspective might suggest that those scoring higher on spontaneous decision-making are merely reporting higher levels of threat *retrospectively* to ensure that the level of force they used is perceived as being reasonable. However, previous research has also revealed spontaneous decision-making styles to be negatively correlated with the M–C Social Desirability Scale (Thunholm, 2004); perhaps indicating that those with high scores for spontaneous decision-making would actually be less likely to augment their self-reporting to ensure that their behaviour is perceived more positively by others.

The link between spontaneous decision-making scores and threat assessment is particularly important to examine further as previous studies have also shown spontaneous decision-making styles to be negatively correlated with risk perception and overall decision-making competence (Bruine de Bruin et al., 2007). This means that there is a possibility that the *Spontaneous but shrewd threat assessment bias* may result in poorer risk assessment, and as such, this avenue warrants further investigation.

Not only is this, to the author's knowledge, the first exploration on the operational impacts of individual decision-making style on officer decision-making in the field within the PSEW; but given that officers are directed to evaluate threat and risk as part of their decision-making process when considering the use of force (College of Policing, 2013b), this could mean that an officer's decision-making style could indirectly impact their use of force via their assessment of threat. These findings add additional support to the inclusion of the psychological element of the panoptic decision-making framework designed for this thesis, and the potential impact of enduring officer factors on the decision to use force. As with the transient characteristics explored in Sections 7.3 and 7.4, it would be useful for future research to delve into these differences further, and perhaps an element of psychoeducation within

officer PST on decision-making styles might help officers identify and modify their own behaviour as and when necessary.

Another particularly noteworthy result to emerge from the quantitative analyses was the relationship between individual decision-making styles and an officer's propensity to use the NDM as well as their perception of the NDM's utility. More specifically, the rational dimension of the GDMS was positively correlated with NDM use, whilst the dependent decision-making dimension was negatively correlated with NDM use, and avoidant decision-making dimension was negatively correlated with the NDM use as well as the perceived utility of the NDM. Whilst it may seem fairly logical for those with a deliberate and logical approach to decision-making to report using the NDM more often than those that avoid decision-making or seek support from others; it also implies that there could be room to improve the utility and, subsequently, the operational application of the NDM by further exploring the reasons why those with particular decision-making styles do not benefit from, nor use, the tool as much as others.

The final result to be discussed here is the impact of gender on average shift safety ratings, and average incident stress ratings. To be more specific, male officers were inclined to rate their shifts as safer, and the incidents they attended as less stressful, than their female counterparts. Whilst it might be easy to assume that these differences are due to divergent physical or psychological characteristics between the sexes (i.e. strength, size, or psychological resilience); this would most likely be an extremely reductive conceptualization of the meaning, and impact, of gender in policing. Not only did gender fail to emerge as a key theme within the qualitative data, but there are likely to be a range of social, organisational, and cultural elements contributing these results. For instance, it could be that male officers are less likely to report high levels of incident related stress and/or feeling unsafe due to a social

desirability bias (Nederhof, 1985) based on gendered stereotypes, a.k.a. 'male bravado.' Moreover, higher levels of incident related stress within the sample of female participants could equally be related to the increased rates of sex discrimination, harassment and prejudice experienced by female officers (Brown & Fielding, 1993; Brown et al., 2019). Female officers are, for example, often perceived as using force differently than their male counterparts (Rabe-Hemp, 2008), and may be more concerned about social accountability after an incident and/or additional scrutiny due to their gender.

Nonetheless, it would be beneficial for additional research to explore the depths of this discrepancy to elucidate the matter further so that, if needed, targeted interventions and support can be put in place for those that are experiencing higher levels of incident-related stress and feelings of vulnerability whilst on shift.

7.6 RESEARCH QUESTION SIX: How do officers think crewing impacts them, and how they do their job?

Through the qualitative responses to the diary study, officers shared their views on how crewing levels impact them and how they do their job, with the results demonstrating a clear, consistent, and categorical belief system amongst officers where single-crewing was perceived negatively, and double crewing was viewed positively.

Overall, officers identified a number of personal impacts associated with crewing practices, such as officer safety and various psychosocial elements (including stress, confidence, morale, mental health and wellbeing, and social connectivity), that were predominantly perceived to be negatively impacted by single-crewing and/or positively impacted by double crewing. It is perhaps no wonder then, that the vast majority of officers that completed the post-participation questionnaire indicated that they preferred to be double-crewed (87.2%; please see Chapter Five, Section 5.1.3), which echoed the results from previous UK research in 1992 (Bailey, 2008).

Officer safety was a clear concern of many respondents, with the vast majority indicating that they believe they are more vulnerable to physical violence when alone – a point of view which has, historically, been challenged by empirical evidence. Whilst the most recent evidence from England and Wales suggests that officers are at greater risk of violent victimisation, assault, and injury when working alone (Houdmont et al., 2012; Quinton et al., 2020), some older studies found no greater risks to officers when single-crewed (Boydstun et al., 1977; Decker & Wagner, 1982; Wilson & Brewer, 1993, 2001). However, it is possible that the results from these older papers may actually reflect a greater level of prudence and restraint on the part of the lone officer due to their increased vulnerability (Decker & Wagner, 1982; Elliott-Davies et al., 2016) – an idea that also emerged organically through several narratives shared by the participants within the diary study. For example, some participants highlighted that they would wait for back-up to arrive before entering a volatile situation or that they would avoid using force when alone; whilst others indicated that local protocols dictated that two officers were required for some types of incidents, and that when an officer attended such an incident alone, they had to wait for a second officer to arrive before engaging.

Not only can the violent victimisation of police officers have significant and long-lasting health and wellbeing impacts for the officers involved (both physical and psychological), they can also carry a financial burden to the PSEW in the form of increased sick leave, lost productivity, equipment costs (e.g. replacing damaged body armour), recruitment and retention expenditure, and health care costs. Indeed, to put this into context, a report by Home Office in 2018 indicated that the economic and social costs for each and every case of 'violence with injury' in 2015/16 was just over 14 thousand pounds (£14,050) – placing the estimated total costs of this particular type of crime during the specified period as fifteen and a half billion pounds (£15.5bn; Heeks et

al., 2018).[63] Whilst the cost of assaulting a police officer may differ slightly to that of a member of the public, the evidence suggests that using single-crewing to maximise efficiency or minimise costs may represent a false economy if it also results in higher numbers of injuries and assaults.

Though some scholars argue that officers are no more likely to be assaulted or injured when working alone (Boydstun et al., 1977; Decker & Wagner, 1982; Wilson & Brewer, 1993, 2001), it could be argued that the *perceived* impact of crewing on officer safety is equally as important, regardless of the actual odds of violence. This is because *perceived* risks are likely to feed into an officer's threat assessment, and as such, may indirectly impact on the level of force used by officers during an incident. Interestingly, many participants within the diary study also highlighted that they would have used a different level of force during an incident had they been crewed differently; with participants identifying that being single-crewed would result in an increased use of force, whilst double crewing was perceived as requiring less force.

Any increase in the frequency or level of force used by the police against the public is problematic for several reasons; not only does this increase the human costs for those that come into contact with the police, but it could conceivably also damage the fragile relationship between the police and the public which they serve; regardless of whether or not the use of force was lawful, necessary, reasonable, and proportionate.

However, this was not the only negative operational impact of single-crewing identified by the participants; the emergent narratives from the qualitative data collected via the diary study also highlighted associations between crewing practices and workloads, operational efficiency, and efficacy, as well as officer decision-making, performance, and outcomes. More specifically, officers felt that single-crewing

[63] This was calculated as the cost of 1,104,930 incidents of the crime 'violence with injury' at £14,050 each.

increased their workloads, reduced their efficiency and efficacy when on the job, effected their decision-making, and overall, it resulted in poorer outcomes for officer performance.

Although the quantitative analysis from the diary study did not examine the impact of crewing on the wider level of force used by officers, nor their productivity, a relationship was found between crewing and self-reported workload measurements; with the average shift workload rating for those that were primarily single-crewed being significantly higher than those that were primarily double-crewed. Moreover, these average workload ratings were also found to be significantly associated with average ratings of shift related stress, physical fatigue, and mental exhaustion.

Even though there have been several previous studies aimed at examining the impact of crewing on officer performance and policing outcomes, the findings from these studies are fairly disparate, dated, and mostly relate to specific operational contexts only. For instance, a UK study completed in 2005 by Coupe and Blake indicated that switching all double-crewed units to single officer units would increase the teams on-scene captures at in-progress burglaries from 10% to 21% by reducing the number of incidents and the geographical area covered per patrol (and thus reducing response times). Whilst there are several studies that also indicate that single-crewed response units have shorter response times (Chelst, 1981; Green, & Kolesar, 1984; Kessler, 1985), the time saved may represent a false economy if this also results in stage delays when responding to an incident where protocol dictates that two officers are required before the officers can engage (e.g. domestic violence incidents; Chelst, 1981). Given the specificity of these outcomes, the results are not easily generalisable to other policing activities, and fail to provide a holistic view of the impacts of crewing on overall police efficiency. For instance, there is also pre-existing evidence that supports the findings from the diary study suggesting that single-crewed units take longer to deal

with incidents (Boydstun et al., 1977), cannot observe as much as two officers (Del Carmen & Guevara, 2003), and find using the radio or other technological solutions on route to an incident as impracticable (Lindsay et al., 2009).

Whilst the merits and demerits of single-crewing have long since been a topic of hot debate within the policing sector, it has oft been described as a way of meeting operational targets and increase visibility with fewer officers (Betts & Farmer, 2019; Boyd et al., 2011; HMIC, 2012). However, the evidence generated via the diary study and presented within this thesis, highlights that these operational needs are potentially being met at the expense of officers themselves. Although it is unlikely that the role of the police will ever be without some level of risk, it is the duty of the PSEW to ensure that any and all preventable risks to officers' health and wellbeing are monitored, managed and minimised; and the results contain herein suggest that crewing is one such risk. Operational policy and procedure should be informed by the lived experience of frontline officers and take their views into account. This is, to the author's knowledge, the first UK based study to examine the psychosocial impacts of officer crewing practices, and not only does the diary study identify that officers steadfastly believe that single-crewing has a negative impact on their health and wellbeing, but that it also has a negative impact on the service they provide to the public as well as their use of force. In order to police ethically and successfully, operational needs must be balanced with the needs of the officers themselves, and more work must be undertaken to develop and test new crewing models that take a more holistic approach by measuring and incorporating key outcomes for the service, the officers, and the public alike, within their evaluations. Moreover, these results indicate that if single-crewing were to be utilised by police forces, then those with management responsibilities should consider ways in which these potentially damaging impacts can be minimised. For example, some of the psychosocial impacts (e.g. morale, wellbeing and social connectivity) might be

mitigated, at least in part, by ensuring that officers are able to access peer support with ease, and by increasing opportunities for regular socialisation (both formal and informal in nature). This could be done by ensuring that officers take their allocated refreshment breaks on site, but away from their desks, and by providing a suitable communal space for officers to eat together and bond with their colleagues over shared activities (e.g. exercise or games). Supervisors could also ensure that they provide regular one-to-ones with those they line manage and actively promote or conduct debriefing sessions at the end of the shift or on a rolling basis; perhaps similar to those explored in acute mental health and hospital settings (Hunt, 2020; Ragoobar et al., 2020). Enhanced wellbeing support should be provided to those that are regularly single-crewed and these individuals could, perhaps, be awarded with additional 'mental health days'[64] or 'fast-track' passes to occupational health so they can access help and support more easily.

The negative impacts of single-crewing on officer safety could potentially be mitigated, to some extent, by ensuring that officers have access to other protective process or equipment; such as body worn camera equipped with live-stream technology and GPS, personal alarms, additional officer PST (that specifically addresses the needs of those that are single-crewed), increasing access to TASER, or enhanced availability of back-up via the use of proximity patrolling or similar (whereby officers are deployed alone but are in close proximity to at least one other officer to ensure that back-up is close to hand; Boyd et al., 2011).

However, operational managers should be mindful of the potential for unintended consequences, as although TASER was found to reduce both the perceived level of incident-related threat and shift-related stress, officers that were alone when a use of force began were more likely to use TASER, and use TASER as their first tactical

[64] Dedicated leave that can be used (instead of annual leave or sick leave) to maintain, protect or improve one's mental health.

option (Chapter Five, or Section 7.2 above for a summary). Moreover, some evidence has recently emerged to indicate that members of the public are also more likely to assault officers that are armed with TASER (Ariel et al., 2019). As such it may be more fruitful to ensure that single-crewed officers have rapid access to tactical support rather than to merely equip more single-crewed officers with TASER. Alternatively, as policy change and the recency of PST training have previously been shown to successfully moderate the use of TASER (Bishopp et al., 2015; Quinton et al., 2020), it may be possible to manage an increased arming of single-crewed officers with TASER without such consequences, if the changes were appropriately governed.

Finally, if single-crewing were to be utilised, operational management should consider implementing additional measures to mitigate the impact of single-crewing on performance. This could include the use of reflective practice groups so that officers can learn from the experiences of others and gain greater confidence and autonomy in their decision-making (Platzer et al., 2000); enhancing technological support to reduce workloads associated with reporting; or facilitate proactive policing by ensuring that back-up is routinely available and officer safety is prioritised. However, it is important that any reflective practice is facilitated by an appropriately trained individuals to ensure that any potential distress is minimised (Knight et al., 2010).

7.7 RESEARCH QUESTION SEVEN: How do officers go about assessing threat and making use of force decisions, and what factors are most important?

The assessment of threat is a key concept in relation to use of force, and thus the use of TASER, and is a core part of the NDM and 'spinning the wheel' (CoP, 2013a). As such, both the qualitative and quantitative analyses from the diary study were utilised to explore factors important for officers when assessing threat and making use of force decisions.

Firstly, the results from the fourth qualitative Empirical Domain found that few officers provided descriptions of their threat assessment process or in answer to the question *"Please describe how you made the decision to use force, and what type of force to use*." As discussed in Chapter Six, this may be due to habit caused by operational procedures, or attribute substitution (Kahneman & Frederick, 2002); but regardless of these deficits, it was apparent from officers' narratives that threat assessment often begins before arriving at an incident. More specifically, officers identified that information gathered before attending the incident, combined with their pre-existing experience and the information they gather once on scene, all feed into their threat assessment process. This recognition of pre-attendance information not only dovetails with the first step of the NDM (i.e. gather information and intelligence) but it also supports recent work by Taylor in 2020 which found that officers relied heavily on pre-attendance information when confronted with an ambiguously armed subject and the decision to shoot, and, moreover, that inaccurate pre-attendance information significantly contributed to shooter error.

Though some respondents discussed the use of the NDM during use-of-force incidents, it was not universally seen as being a decision-making tool. In some instances, officers felt it was merely a narrative framework that helped to conceptualise the process, or to help officers retrospectively organise and articulate their rationale for using force. The descriptive results from Chapter Five may support the supposition that it may not always be practical to use the NDM in real-time, as although almost three quarters of the respondents that completed the post-participation questionnaire indicated that they '*Usually*' or '*Always*' use the NDM (76.3%; n=29), only 40.5% (n=15) indicated that they found the tool '*Very*' or '*Extremely'* useful when making time pressured decisions in the line of duty. The slight discrepancy between reported use and perceived utility may be due to a type of social desirability bias, as officers are expected

to use the NDM in all circumstances – so are therefore perhaps more likely to say that they use it, even if they do not. However, the inferential results described in Chapter Five (and discussed previously in Section 7.5 above) showed that those with higher scores on the dependent and avoidant decision-making dimensions of the GDMS were less likely to use the NDM, and those with high scores on the avoidant decision-making dimension were less likely to perceive the tool as useful in fast-paced dynamic situations. Whilst this is the first examination of individual decision-making styles and the use and perceived utility of the NDM, the findings echoed the results from a recent qualitative study by Christie in 2020, which interviewed officers from the Metropolitan Police Service. Christie (2020) found that although officers thought the NDM was useful post-incident to provide a standardised way of assessing risks in relation to pursuit driving, it was not as helpful in the more dynamic or fast-paced pursuits. These results indicate that whilst the NDM is an extremely useful tool, the degree of utility fluctuates depending on the individual making the decision and the type of decision being made; and as such, is by no means the panacea perhaps inferred by the Association of Chief of Police Officers (ACPO) in their 2012 guidance. Whilst the ACPO concedes that it may not always be *"possible to segregate thinking or response according to each phase of the* [NDM] *model"* and in such cases the main priority for officers is to *"keep in mind their overarching mission,"* this provides very little practical guidance for officers on the ground. Given that the use of force can have far reaching consequences for both the individuals involved in an incident and the wider social landscape (please see the murder of George Floyd, the George Floyd protests, and the impact of the Black Lives Matter movement for example: "Black Lives Matter," 2021; "Murder of George Floyd," 2021) use of force decisions are far too important for their methods to be shrouded in mystery. In order to support officers in making better, more

consistent, and equitable decisions we must first understand how these decisions are made.

Perhaps then, it would be beneficial for future research to take a more descriptive approach to officer use of force decision-making; with the aim of identifying the methods currently being used by officers, and, subsequently, improving these existing approaches via the development and testing of a more prescriptive and domain-specific model. Moreover, given the demonstrable importance of threat assessment on police use of force, and the evident difficulty with which officers articulated their threat assessment processes (please see Chapter Six for more details), it may be useful for future scholars to treat threat assessment as a specific decision-making task also worthy of additional investigation.

As mentioned in Chapter Six, officers were much more forthcoming in relation to the factors that affect their threat assessments and their decision to use force, then the underlying processes. Although officers identified a range of factors, these mostly related to the situation, the subject and/or the assessed level of safety and risk. The most frequently cited factors appeared to be the subjects affect and state of mind (e.g. anger, agitation, aggression, intoxication and or their mental health), the resources available to the officer at the time of the incident (e.g. crewing, availability of back up, and access to the appropriate equipment), and the threat to themselves or other officers present.

By using the focal concerns perspective developed by Crow and Adrion (2011) to frame these results, it could be hypothesised that officers are using subject affect and state of mind as a proxy measure of subject threat (i.e. their first of two focal concerns); with individuals being judged as being potentially more dangerous when experiencing negative affect such as anger or irritability, and/or when perceived as being less predictable due to intoxication or a disturbed mental state. If so, then this may also go some way to explaining the disproportionate use of TASER on those experiencing

mental health crises (Quinton et al., 2020; IOPC, 2020) and increased likelihood of using TASER on individuals under the influence of drugs (Dymond, 2016; 2018). The second focal concern identified by Crow and Adrion (2011), i.e. practical constraints, is also supported by the findings from the diary study. For example, officer resources and access to appropriate equipment represent some of the practical constraints that officers listed as key considerations when making use of force decisions (please see Chapter Six for more information).

Interestingly, these results are somewhat incongruent with the quantitative analysis, which not only failed to reveal a significant relationship between incident crewing and the average incident-related threat ratings, but the overall pattern of results also actually indicated the opposite of what might be expected. To be more precise, the perceived level of threat appeared to be rated slightly *lower* when officers were alone when the use of force began than when more officers were present. Though the quantitative results may seem counterintuitive, they may well be an operational artefact as lone officers may well be exclusively sent to less dangerous incidents by their control rooms as a way of managing officer safety. Or, alternatively, these results could be interpreted as officers being more inclined to use force in lower-threat situations when single-crewed.

Access to equipment, however, not only emerged as a key resourcing factor in relation to an officer use of force and threat assessment via the qualitative analyses; the availability of TASER was significantly associated with average ratings of incident-related threat. More specifically, average ratings of incident-related threat were higher when officers did not have access to TASER during their shift, than when they did. It is interesting that this potentially moderating effect of TASER access on threat assessment was consistent with the narrative depicted in Empirical Domain Five (please see Chapter Six), which characterised the evolution of risk and threat as a dynamic process

that not only considered the level of threat posed by an individual, but the availability of officer resources to mitigate that threat (e.g. availability of TASER).

The risk recipient also emerged as an important factor in officer threat assessments and the decision to use force; with many identifying that these processes include consideration to whom is at risk, and some even indicating a hierarchy of importance. Interestingly, when looking at the subtheme coding, the safety of the officer themselves and their colleagues was the most frequently cited, followed by members of the public (including the suspect); perhaps the most sensible approach, given that an officer would not be capable of helping or protecting others if they became hurt or incapacitated themselves.

Nonetheless, when examining the quantitative results, no significant relationships were found between TASER use and officers' reasons for using force, nor the average incident-related threat rating. Though failure to find a significant finding may be due to the small sample sizes and the subsequent lack of power, the pattern of results in relation to threat ratings was of particular interest. More specifically, the reason with the highest average incident-related threat rating was '*To protect myself'* (mean=3.58) followed by '*To protect another officer'* (mean=3.39), and then '*To protect a member of public'* (mean=3.09). Given that the dataset only contains information on incidents where force was used, these figures could imply that officers have a higher threat threshold when they are the ones at risk compared to when their colleagues and members of the public are at jeopardy; meaning that, on average, the threat level must be higher for them to feel justified in using force when protecting themselves from harm. This may be because, according to Approved Professional Practice sanctioned by the CoP, the need to achieve or maintain the safety, security and wellbeing of the public is identified as a primary consideration (Principle 2; CoP, 2013d) whilst officer safety is not.

Overall, participants rarely mentioned officer factors, or what Dror (2007) referred to as Internal Factors, when identifying influential factors in their decision to use force and threat assessments (i.e. aspects that directly relate to the decision-maker, rather than the decision itself, such as; cognitive resources, prior learning, personality traits, experience, physiological state, and affect). However, the few officer factors that did emerge through the qualitative data were in relation to their skills and experience; with several indicating that this was what their assessments were based upon. Perhaps understandably, none of the participants overtly identified transient physiological states such as fatigue or stress as having an impact on these processes, nor did they identify more enduring attributes such as personality. Though this could be due to a genuine belief that these internal factors are unrelated to their decision-making and assessment of threat, it is more likely that these types of factors were omitted due to a type of social desirability bias (Nederhof, 1985), or perhaps because they simply did not occur to the officers as being important. However, given that officer decision-making style and average incident-related stress ratings were two of the few officer factors that were significantly associated with average incident-related threat ratings; officers may benefit from psychoeducational approaches in training that draws officers' attention to the potential impact of stress and individual differences on their decision-making.

More importantly, however, it would be beneficial for future research to determine the direction of the relationship between stress and perceived threat in use of TASER, and the wider use of force. However, given that previous research into police use of force using a shoot/no shoot paradigm has indicated that stress and the activation of the Hypothalamic–Pituitary–Adrenal (HPA) axis may well exacerbate vigilance for threat cues and threat-selective attention (Akinola & Mendes, 2012; Putman, Hermans, et al., 2010), it may not be over-presumptuous to propose that an individual's level of stress may well be influencing the perceived level of threat and thus, consequentially,

their use of force. This is of particular importance given that the results from the quantitative analysis (please see Chapter Five, or Figure 5.5 for a summary) indicated a possible pathway between shift crewing and stress. Nevertheless, this pathway has only been identified conceptually, and future research would need to test whether such a mechanism applied in practice.

7.8 LIMITATIONS OF THE DIARY STUDY

Whilst the diary study used an innovative and unique method for capturing real-time (or close to real time) information direct from individual officers, the complex and uncontrollable nature of quasi-experimental field observations meant the resulting samples were underpowered and were not large enough to conduct any robust multivariate tests. This is one of the core limitations of the study, and was the result of an unavoidable post-design amendment to the sampling strategy necessitated by unforeseen circumstances (for more information please see Chapters Two and Four). As such, it would be useful to validate the quantitative findings, particularly in relation to research question one, with a larger dataset that includes both discharge and non-discharge uses of TASER. Notwithstanding the limitations above, the statistical analysis still detected a number of significant effects, and the general pattern of results were triangulated with the qualitative data to reveal a number of valuable insights.

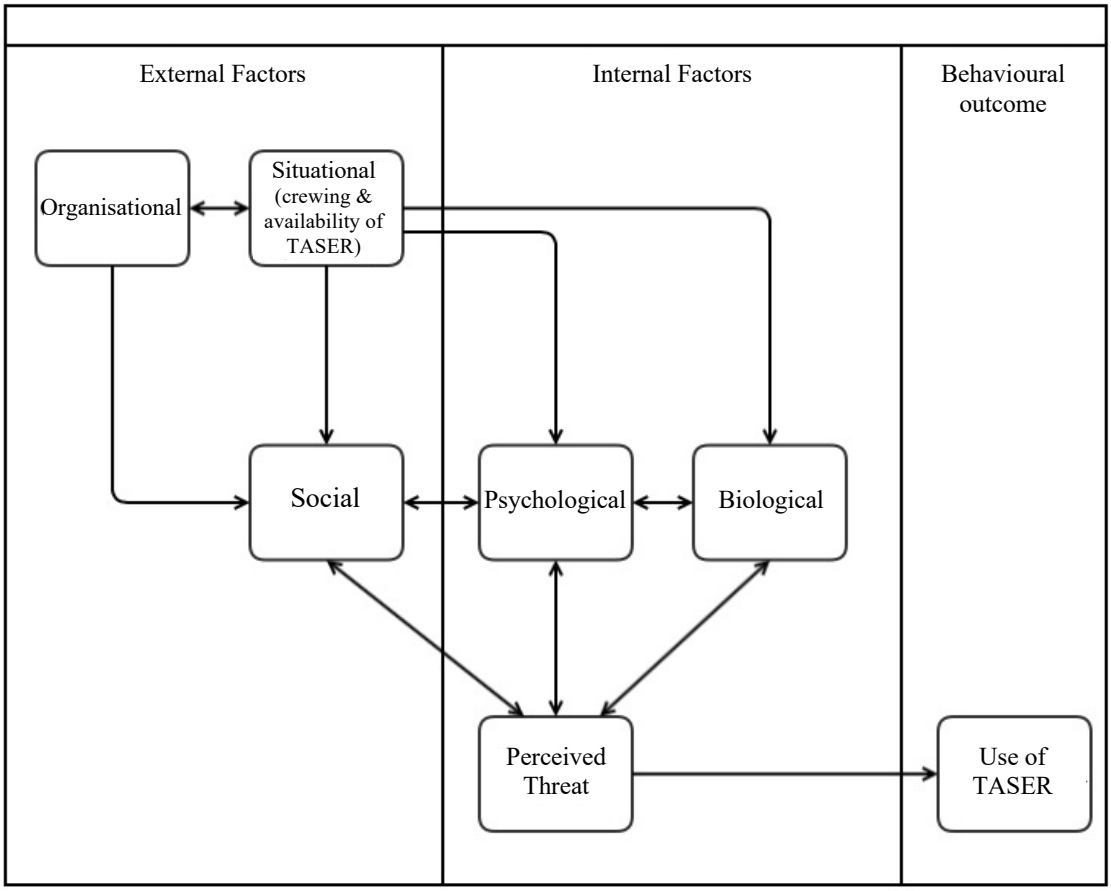
7.9 DIARY STUDY CONCLUSIONS

Whilst the diary study aimed to address the six individual research questions discussed above, the overall aims of this study were to explore how crewing levels affect the way officers think and feel, and how this might relate to the internal and external factors in the decision to use TASER. The findings have been examined using the panoptic biopsychosocial decision-making framework designed for this thesis (described in Chapter One) and are described as a conceptual model in Figure 7.1.

Overall, the results indicated that single-crewing was linked to a number of detrimental psychological outcomes for officers, including increased stress, decreased confidence, poorer overall mental health and wellbeing, and an increase in perceived vulnerability. This perceived increase in vulnerability was also identified as feeding into officers' threat assessments, with officers explicitly considering crewing levels as an external situational decision-factor when deciding whether or not to engage in proactive policing, and the level of force needed during an incident; a narrative that was, overall, supported by the quantitative findings, which identified that officers were more likely to use TASER, and were more likely to use TASER as their first tactical option when they were alone when the use of force began.

The impact of crewing on the perceived level of threat can also be interpreted via focal concerns perspective; the sociological theory indicating that officers' use of TASER is driven by two focal concerns – the danger posed by a subject and the officers' need to protect themselves and the community (with TASER use being more likely the higher the perceived threat), and the the practical constraints and consequences of using TASER (Crow & Adrion, 2011). If officers feel more vulnerable when single-crewed, it stands to reason that the danger posed by a subject may also be perceived as greater when alone, than when accompanied by a colleague. Furthermore, the qualitative analyses indicated that officers may use the NDM as a practical tool, or control, when making use of force decisions and threat assessments; representing an organisational factor that could be considered as a 'practical constraint' and fulfilling the second focal concern. Officers also mentioned other types of practical constraints imposed by the organisation, such as the legal powers being used to justify the use of force, and how the use of force will be perceived after the event.

Figure 7.1 *The Decision to use TASER: A Conceptual Panoptic Biopsychosocial Model of Police Officer Decision-Making*



Interestingly, however, the original focal concerns literature posited by Steffensmeier et al. in 1998 included a third focal concern; namely the perceived blameworthiness and culpability of the offender. Whilst Crow and Adrion (2011) did not find a significant relationship between their measure of blameworthiness and TASER use, i.e. type of call, it may well be that this may not be the only, nor best, measure of culpability within the context of police use of force. For example, the qualitative data from Study Two found that many of the officers had highlighted the subject's behaviour and actions as important factors in both the perception of threat and use of force decision-making. Whilst a number of the comments were general, many mentioned violent behaviour, non-compliance, or resisting arrest. This, in some ways, echoes the findings from Study One where one of the four factors that were found to be

potential predictors of TASER use (based on the strength and consistency of the evidence from the extant literature) could conceptually be linked to subject behaviour and actions, i.e. level of resistance. It is plausible then, that officers feel as though subjects are, for the most part, accountable for their actions, and as such, should shoulder some of the blame for the force used against them. Whilst a subject's physical behaviour is not only a logical correlate for use of force and would directly influence the level of threat involved in a situation, it is also unlikely to be the sole determinant when assessing threat. For example, the same behaviour by the same subject may be perceived as less threatening if there are more officers present to help manage the situation. Whilst the data collected via the diary study would not allow for additional analysis into subject resistance as a potential measure of culpability, this is something that could be examined by future research.

However, the qualitative results indicated that crewing may not only impact TASER use by augmenting the level of threat perceived by officers when managing an incident; they also indicated that crewing levels may trigger an acute psychobiological stress response. Officers indicated that being single-crewed caused higher levels of stress, and whilst no statistically significant relationships were found between incident crewing and ratings of incident-related stress, the test was underpowered, and the pattern of results indicated that officers that were alone when the use of force began had a slightly higher average incident-related stress rating. Moreover, a statistically significant association was found between incident-related stress ratings and incident threat ratings, and although the qualitative results supports a one way relationship (i.e. where the incident threat levels impact on incident related stress), this does not necessarily mean that the relationship is a mono-directional; especially given that previous work has found that stress can influence threat-related attention and decision-making (Akinola & Mendes, 2012; Putman, Hermans, et al., 2010).

These results have both theoretical and practical import. Firstly, they validate and demonstrate the potential benefits of using the biopsychosocial panoptic model when exploring the decision to use TASER by the police, and secondly, they highlight the importance of threat perception in this particular realm of officer decision-making. Finally, they indicate that though some authors may argue that single-crewing can help individual units manage operational demands, or increase officer visibility and approachability (Betts & Farmer, 2019; Boyd et al., 2011; Boydstun et al., 1977; Chelst, 1981; Green & Kolesar, 1984; Kessler, 1985; McKenzie & Whitehouse, 1995; Timothy Coupe & Blake, 2005) the application of this practice could, without appropriate measures to mitigate the risks, result in a cornucopia of unintended negative outcomes – including the increased use of TASER and decreased officer wellbeing.

CHAPTER EIGHT: GENERAL DISCUSSION AND CONCLUSION

This chapter considers the key findings and unique contributions to knowledge provided by this thesis. Firstly, a short summary to reintroduce the overarching objectives of the thesis and the comprising studies will be presented. Thereafter, the Chapter will highlight how each of these studies have helped to address the thesis objectives by drawing the reader's attention to related findings and the resulting theoretical and practical implications, including the identification of recommendations for future research and policy makers. The Chapter will then identify key points of originality within the thesis, before ending with a concise conclusion.

8.1 BRIEF THESIS SUMMARY

TASER use in England and Wales has dramatically increased since they were introduced to policing in 2003 (Home Office, 2016, 2020b). Whilst this particular device is considered to be a '*less-lethal weapon*,' there are some well-documented and wide-ranging physical side-effects associated with their use (DOMILL, 2012; Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons, 2016; TASER International, 2013). Moreover, these devices have been linked to several tragic life-altering, and in some cases, life-ending incidents (please see Chapter One for more information).

Regardless of the gravity of these potential consequences and the increasing prevalence of TASER use by the Police Service of England and Wales (PSEW; Home Office, 2020b), there has been relatively little academic research into how, when, and why these devices are used against members of the public. This is surprising given that police use of TASER has recently suffered a great deal of exposure in the British press due to a number of high-profile injuries and deaths (such as Marc Cole, Darren Cumberbatch, Adrian McDonald, Jordan Begley and Dalian Atkinson: British Broadcasting Corporation, 2015, 2017; Busby, 2021; Independent Office for Police

Conduct, 2020) and the increasing evidence of disprportionate use against vulnerable or minority populations such as children, people with disabilities, and/or those from Black and ethnic minority communities (Home Office, 2020c; Independent Office for Police Conduct, 2020, 2021; National Police Chiefs' Council, 2020a; Quinton et al., 2020).

Officer crewing is another police practice that has recently come to the fore due to the much-publicised and horrific murder of Sarah Everard (Siddique, 2021). Whilst single-crewing has, anecdotally, been used to stretch the diminished resources of the 'thin blue line' that little bit further, there have been a number of recent studies that have suggested that patrolling alone may also have unintended consequences in terms of decision-making (Highways Agency, 2011a, 2011b) and, more specifically, in relation to the use of TASER (Quinton et al., 2020).

Given the potentially severe impacts of TASER use, gaining a greater understanding of how, when, and why police officers choose to employ this device against the public is imperative; only then can we gain any meaningful insight into how this particular type of discretionary decision-making can be moderated and improved. Consequently, the examination of any and all factors that might influence the use of TASER by the PSEW should be examined in great detail; particularly those that may fall within the operational purview of the police, such as crewing practices.

In light of the above, the overarching objectives of this thesis were to examine the potential impacts of crewing on the decision to use TASER by the PSEW, and to explore the potential underpinning mechanisms of any such impacts. Although this was achieved by addressing a stepwise series of self-generating research questions (please see Chapter One and Two for more detail), these individual research questions have already been addressed directly by the discussions in the main body of the thesis (please see Chapter Three, Section 3.4 and Chapter Seven). Consequently, this chapter will

focus solely on discussing the emergent findings that directly relate to the overarching objectives of this thesis.

This thesis itself is comprised of two individual studies; Study One being a systematic literature review (please see Chapters One, Two and Three for more details), and Study Two being a tripartite mixed-methods quasi-experimental self-report diary study that collected primary field data direct from serving police officers. The diary study encompassed a baseline survey, a shift diary logging phase (where officers completed a short form at the end of each shift for a self-selected period of time), and a post-participation questionnaire (please see Chapters One, and Two, and Four through Seven for more detail).

Whilst the diary study was the weightier of the two studies (both in measures of exertion and the written word), the systematic literature review was nonetheless a crucial first step in the progression of this thesis. By amassing and evaluating the existing evidence regarding the relationship between crewing and TASER use in an organised, efficient, replicable and robust manner, Study One enabled the landscape of knowledge to be mapped and gaps in the extant literature to be identified and capitalised on. Study One directly informed the development of Study Two, a vehicle by which the unfamiliar territories discovered by the systematic review could be explored, recorded and understood.

8.2 EXAMINING THE MAIN THESIS OBJECTIVES

The core objectives of this thesis were to examine the potential impacts of crewing on the decision to use TASER by the PSEW, and to explore the potential underpinning mechanisms of any such impacts. These objectives will now be fully realised by integrating and considering the diverse compilation of findings that were generated across the two studies.

With reference to the first objective - to examine the potential impacts of crewing on the decision to use TASER by the PSEW - the results indicated that both shift and incident crewing levels were likely to impact on how and when TASER is used. Specifically, that officers may be more likely to use TASER, and to use TASER as their first tactical option, if they are alone when a use of force begins. These findings not only contribute to the corpus of knowledge concerning crewing practices and their subsequent effects on police use of TASER within the PSEW by identifying and examining the impacts of both shift and incident crewing separately, something which previous studies have neglected, but also by considering *when* TASER is used during an incident. As discussed in Chapter Seven the placement of TASER use within a use-of-force incident is important as it may provide additional insight into *how* and *why* TASER is used. This is because encounters between the police and the general public are not static incidents but are, instead, part of a larger interpersonal and dynamic exchange. By examining the TASER placement within this exchange and identifying the propensity for lone officers to select TASER as their first tactical option, the research in this thesis identified the potential presence of a novel behavioural pattern dubbed herein as the '*Go Hard or go Home*' effect (please see Chapter Seven). In other words, single-crewed officers may view potentially violent incidents as a zero-sum game where the only way to 'win' (i.e., achieving their policing objective without injury) is to either abstain from entering the situation until reinforcements arrive, or to respond to the incident in the most robust way possible. Whilst there is no direct evidence supporting the presence of such an effect, this embryonic finding provides a novel avenue for future research to explore and may encourage scholars to conceptualise TASER use as part of an interpersonal exchange or causal sequence, as opposed to a single decision-making event.

The findings of Studies One and Two not only supported the supposition that crewing practices are linked to police use of TASER, but they also helped to identify a potential pathway that may be underpinning this relationship, thus meeting the second objective of this thesis. Specifically, threat perception emerged as the central theme when examining the relationship between crewing practices and TASER use among diary study participants. Not only were incident crewing and incident threat ratings the only statistically significant determinants of TASER use discovered within the quantitative component of the diary study (please see Chapter Five), but officer narratives from the diary study (please see Chapter Six) highlighted the influence that incident crewing had on perceived risk. More specifically, single-crewing was perceived to be associated with higher levels of risk and lower risk was associated with double crewing (Section 6.2.2.1). In addition, '*Safety and risk,'* emerged as a global theme when officers were asked to identify the most influential factors when assessing threat and making use of force decisions (Chapter Six, Section 6.2.3.2).

These findings also echo those from previous research identified in the systematic review, which found that participants identified subject-to-officer ratios as having an indirect influence over their use of force due to an associated change in the perceived risk (Hine et al., 2018b). Moreover, the two subject factors that were consistently found to be linked with TASER use within the systematic review could arguably also be linked to an officer's perception of threat. Hine et al., (2018b) also found that female subjects were considered to be less threatening, and that intoxicated subjects were considered by participants to be higher risk as they were more unpredictable, less rational, and potentially had a higher threshold for pain. Whilst real or perceived mental health difficulties on the part of the subject did not emerge from Hine et al.'s study (2018b), it is a common misconception that those experiencing mental health crises are likely to be violent (TNS-BMRB, 2015b), and as such, it is

possible that officers are more likely to use TASER against these individuals because they too harbour similar assumptions.

Perhaps, given that threat perception is included as a core element within the prescriptive decision-making model promoted by the College of Policing (i.e. the National Decision Model; NDM), it is unsurprising that threat perception emerged as a potential pathway between crewing and TASER use. Nonetheless, the findings of this thesis provide a novel contribution to the current evidence base as there have not yet been any UK studies to specifically focus on examining the relationship between police crewing practices and use of TASER, let alone the rationale for any such association.

As discussed in Chapter Seven, perceived threat as a contributing factor to TASER decision-making could be explained, at least partially, using the focal concerns perspective (Crow & Adrion, 2011; Steffensmeier et al., 1998). However, this approach does not offer a full explanation of officer decision-making as it cannot, by itself, explain why two officers might respond differently to the same situation, nor why the same officer might respond differently to the same situation at a later point in time. The reason for this is that whilst the focal concerns perspective identifies the key concepts that individuals use to make their decisions, it does not tell us how these concepts are constructed, how they are appraised, nor what factors are most important. Interestingly, when officers were asked directly about the *process* of making use of force decisions or assessing threat during the diary study, they struggled either to identify or articulate this in a meaningful way, and instead chose to discuss the external factors that they considered as part of this process.

Nonetheless, when discussing factors that officers considered to be influential in their threat assessments and use of force decisions, participants often recounted situational or subject characteristics that were identified in Study One (please see Figure 3.2, Chapter Three for a summary). One explanation for the coherence of these findings

might be operational habit, as most of the studies in the systematic review were based on the examination of secondary data collected via institutionalised use of force reporting. Therefore, officers might have responded to the diary study question about influential factors by merely listing circumstances that they are used to recording via their organisational processes.

Although no officers mentioned internal factors as being influential when discussing how they make use of force decisions or appraise threat, several participants identified volatility and violence as being associated with incident-related stress, as well as the level of perceived threat. These findings were also supported by the quantitative data from Study Two, which found that officers might be more likely to experience an acute stress response during incidents where they perceive a higher level of threat, and thus, may also be more likely to experience the accompanying biological impacts – such as the activation of the sympathetic nervous system (McCorry, Laurie, 2007), the Hypothalamic–Pituitary–Adrenal (HPA) axis (Besedovsky et al., 2008; Thau & Sharma, 2020) and, consequently, the release of cortisol. A key finding since previous studies have found the activation of these physiological responses and subsequent cortisol release to impact a range of cognitive and affective processes linked to decision-making, including; working memory, threat-selective attention, anxiety, and fear (Het & Wolf, 2007; Putman et al., 2007; Putman, Hermans, et al., 2010; Soravia et al., 2006; Wolf, 2003).

Another, less transient, officer factor that was found to be related to threat perception was individual officer decision-making styles. Officers who scored higher on the spontaneous dimension of the General Decision-Making Style inventory (GDMS) reported higher average incident threat ratings. This potential cognitive bias has been dubbed herein as the '*Spontaneous but shrewd threat assessment bias*,' (please see Chapter Seven for more details) and may be of particular import for two reasons.

Firstly, no research hitherto has examined the link between individual decision-making styles and officer decision-making in the field, let alone the decision to use TASER. Secondly, previous research has found spontaneous decision-making styles to be negatively correlated with measures of risk perception and overall decision-making competence (Bruine de Bruin et al., 2007).

The emergence of threat perception as a core theme within this thesis, and as a potential mediator in the relationship between police crewing practices and TASER use, was particularly important given that these findings may also help to contextualise disproportionate use of TASER against Black and ethnic minority communities (Home Office, 2020c; Independent Office for Police Conduct, 2020, 2021; National Police Chiefs' Council, 2020a; Quinton et al., 2020). Previous firearms research has not only found racial bias within the identification of weapons and the decision to shoot, but that these biases may be driven by cultural stereotypes about the relative threat posed by different ethnicities, with people from Black communities being perceived as more dangerous (Correll et al., 2002; Payne & Correll, 2020; Scott et al., 2017). This may suggest that individuals from Black communities may be disproportionately represented in incidents of TASER use by the PSEW due to cultural stereotypes about race and relative threat. However, a recent review highlighted that some studies have found race to impact the *timing* of an officer's decision to shoot, but not the *error rate* in officer shootings (Payne & Correll, 2020). Or, to put it plainly, whilst officers were found to take longer to identify non-stereotype conforming stimuli, ultimately, they were no more likely to accidentally shoot an unarmed Black subject than an unarmed White subject (or, conversely, fail to shoot an armed subject of either colour). Viewing these results through the lens of Stanovich and West's dual process theory of reasoning (2000), this could be an example of System Two processing (decision-making that is slow and conscious) successfully overriding the stereotyping error that has crept in via

the more vulnerable System One process (decision-making that is fast and unconscious) and consequently reducing the perceived level of threat before the officer decides whether or not to pull the trigger. Since those that score highly on the spontaneous decision-making dimension of the GDMS are characterised by a preference for making swift decisions and, were more likely to report higher incident threat ratings within Study Two; perhaps it is not unreasonable to suggest that they might also be more susceptible to the risk of stereotyping errors, and thus perceive increased levels of incident-related threat as they may be more likely to conclude their decision-making before their System Two processes are able to overrule System One.

The evidence gathered by this thesis contributed to the body of knowledge by suggesting that crewing practices may indirectly impact the frequency and placement of police use of TASER in England and Wales via augmented perceptions of threat. However, perhaps the foremost finding to emerge is that the decision to use TASER is much more complex and dynamic than this, and includes a range of additional situational, organisational, sociological, psychological, and biological factors.

8.3 THEORETICAL IMPLICATIONS & RECOMMENDATIONS FOR FUTURE RESEARCH

Whilst the police use of TASER and public concerns over disproportionate use of TASER against vulnerable groups have both increased since these devices were introduced into the PSEW in 2003 (e.g. children, the elderly, those experiencing mental distress, and minority communities; Hallett et al., 2021; Home Office, 2020c; Independent Office for Police Conduct, 2020a, 2021; Mercer, 2021; National Police Chiefs' Council, 2020a; Quinton et al., 2020), the evidence base regarding the decision to use TASER has been comparatively gradual in its growth. Given the potential human costs associated with TASER use (please see Chapter One), the lack of scrutiny from the academic community is not only surprising, but imperative to redress.

The findings from the systematic literature review and the diary study highlighted various research recommendations that are ancillary to the overarching objectives of this thesis, and these have been discussed throughout previous chapters and, as such, will not be duplicated here. The remainder of this section will concentrate on the theoretical implications and recommendations for future research associated with overarching thesis objectives only.

Not only did the findings from Study One confirm the absence of a robust UK-centric evidence base, but the systematic literature review highlighted that, to date, the extant research had failed to examine the impacts of crewing on police use of TASER in any greater detail than whether a relationship between the two existed. Therefore, Study Two attempted to remedy some of these shortcomings by focussing on gathering primary data from individual officers about their experiences, and by exploring the potential mechanisms that might underpin any relationship between crewing and police use of TASER. Moreover, in doing so, the results from Study Two supported the notion that several officer factors are likely involved within the decision to use TASER and, as such, focussing solely on subject characteristics and/or situational factors in an effort to understand police use of TASER is likely to be insufficient if one wishes to gain a meaningful grasp of the phenomenon.

The results from Study Two also provide an emerging proof of principle in relation to the panoptic biopsychosocial decision-making framework developed as part of this thesis, demonstrating that a broader, more holistic view of the decision to use TASER can be both viable and functional. Utilising this new framework afforded a comprehensive approach to structuring, organising, and understanding the concept of officer decision-making. Consequently, other scholars may also benefit from using a similar approach when considering and investigating police decision-making in future research. Utilising this innovative and inclusive decision-making framework may help

researchers to account for a wider range of factors when planning future studies, and thus better represent the dynamic and multifaceted process that is officer decision-making. For example, the application of this framework may encourage academics to include some element of primary data collection in future work, rather than merely relying on the analysis of secondary data collected via official reporting processes, as these often neglect focal officer factors.

Another key theoretical implication of findings from this research, is the emergence of perceived threat as a core concept within the decision to use TASER. Given that the assessment of threat is a fundamental part of the NDM and 'spinning the wheel' (CoP, 2013a), it is perhaps unsurprising that perceived threat emerged as such a strong conceptual driver. However, the finding does imply that perceived threat should be a key area for future research to explore in more depth, particularly when examining the relationship between crewing and TASER use.

This may be of particular value given that the quantitative results from the diary study found that TASER availability appeared to directly impact both the perceived level of incident-related threat, and how stressful officers found their shift overall. More specifically, average incident threat ratings were higher when officers did not have access to TASER during their shift, than when they did; and average ratings for shift stress were lower when officers had access to TASER during their shift, than when they did not. These findings perhaps support previous work by other scholars that have utilised Science and Technology Studies and allied approaches, such as Actor Network Theory, to explore TASER use (Dymond, 2016; 2020); indicating that the very presence of TASER is influencing the use of police force by impacting on officers and their threat assessments.

As set out above, there is inherent value in examining the use of TASER as a single and unique type of force. The results from the diary study suggest that future

research should also consider examining TASER as part of the wider interpersonal exchange within which it is situated, as well as the broader continuum of police use of force. More specifically, analysis of the incident-level data showed that officers that were alone when their use of force began, had a greater propensity to use TASER as their first tactical option, indicating that they may be using TASER earlier on in the police-citizen exchange than they might do if they were double-crewed. This infers that whilst there is innate value in examining the use of TASER as a single use of force, there is also merit in future research further investigating how and why TASER is used within the wider and more dynamic police-citizen exchange.

Whilst only crewing level and perceived threat were quantitatively linked to TASER use via the findings from Study Two, there were a number of factors, both internal and external to the decision-maker, that were linked to their assessment of threat. For example, as mentioned above, quantitative evidence suggested that TASER availability directly influenced the perceived threat during an incident, whilst the qualitative findings highlighted that officer resources – including crewing levels and availability of backup – were also factors that officers considered when assessing threat. The quantitative data also found a relationship between officer decision-making styles and perceived threat, as well as a positive correlation between the level of threat associated with an incident and self-rated reports of incident-related stress. These results indicate that there are likely to be a wide range of situational, organisational, sociological, psychological, and biological factors that influence TASER use via their impact on perceived threat.

Finally, due to the methodological difficulties with collecting data that evaluates and classifies the appropriateness of TASER use (for more information please see Chapter Three Section 3.4, and Chapter Seven for more information), there has not yet been any research conducted to address this principal issue. Though understandably

sensitive, appropriateness of TASER use is also an extremely important outcome to examine. Thus, it would be beneficial if future research were to meet this challenge head-on and examine the impact of crewing on the *appropriateness* of police use of TASER. Given the aforementioned difficulties in data collection, it is likely that outcome measures relating to the quality of a use of force decision may need to be gathered anonymously and/or through incident simulations (such as role-play scenarios) to reduce the likelihood of any unintended professional consequences for participants.

8.4 PRACTICAL IMPLICATIONS & RECOMMENDATIONS FOR POLICY MAKERS

While TASER use is, undoubtedly, accompanied by a potentially heavy human cost, the use of this device may also carry a steep price for the PSEW. TASERs, and their accompanying cartridges, are not just expensive pieces of equipment to purchase, maintain, and replenish, but high-frequency, disproportionate and inappropriate TASER use may cause irreversible reputational damage by bringing the PSEW into disrepute and eroding the trust between the PSEW and the public whom they serve.

As such, any and all police use of force, including TASER, should be used sparingly in order to protect the public, the PSEW, and the delicate relational balance between the two. Moreover, it is important for the PSEW to ensure that TASER use continues to be monitored, reviewed and well-regulated by contemporary evidence-based policies.

Though the systematic literature review and the diary study have generated various policy recommendations that are extraneous to the overarching objectives of this thesis, these have been discussed throughout earlier chapters and thus will not be duplicated here. The remainder of this section will concentrate on the practical implications and recommendations for policymakers associated with overarching objectives of the thesis.

Overall, the findings across the two studies not only suggest that crewing levels do indeed affect the decision to use TASER by officers within the PSEW but that this relationship may also be driven, indirectly, by the impact of crewing on the level of threat perceived by the officer. Whilst it would be both unreasonable and erroneous to posit that policing activities should never be conducted by lone officers, the findings from Study Two highlighted a wealth of negative impacts associated with single-crewing over and above the effects on TASER use.

Although operational needs should be considered paramount, the PSEW also has a duty of care towards their officers and, as such, the needs of the service should never be met at the expense of the officers themselves. Therefore, perhaps one of the primary policy implications to emerge from this thesis relates to crewing models themselves (please see Chapter Seven, Section 7.6). Given both the breadth and depth of the potential impacts of crewing practices highlighted herein, including the use of TASER, it would be beneficial for the PSEW to review and test crewing models using a more comprehensive approach to identify potential areas for improvement.

However, as such a review would most likely be a lengthy process, perhaps another primary policy implication should be to move away from the use of single-crewing wherever possible, and to give officers greater access to double crewing for those in high-risk roles, in localities covering a large geographical area, or who experience longer waits for the arrival of back-up. Not only might this reduce the need for TASER use, but it may also provide a number of health and wellbeing benefits for the officers themselves.

Although the suggestion to move away from single-crewing may seem unrealistic due to the 15% drop in serving police officers between 2010 and 2018 (Home Office, 2020d), the more recent pledge by the Conservative Government to fund the recruitment of 20,000 new police officers by March 2023 (Home Office, 2019b)

may indicate that this could be more practical than previously envisioned – especially as the number of warranted police officers has increased by over 12,000 between 31 of March 2019 and 2021(Home Office, 2020d). Nonetheless, given that new recruits will need time to gather the requisite skills and knowledge to pass their probationary period and no longer be considered as supernumerary, any anticipated benefits from this long-awaited injection of police joiners may take time to be properly realised; and as such, perhaps the most pertinent question for police practitioners, is what can be implemented presently and within the current resourcing context?

In answer to the question above, the overall findings from this thesis identify the following four areas of action that policy makers may wish to consider should they aspire to reduce incident rates and disproportionate use of TASER: Prioritisation, Mitigation, Observation and Evaluation.

Firstly, forces should consider identifying circumstances where the benefits associated with double crewing, such as reduced likelihood of TASER use and officer wellbeing, can be maximised or used to target specific challenges. For example, policy makers could consider using crewing practices to help reduce TASER use within disproportionately affected communities by prioritising double crewing in areas where violent crime is frequent, where there is a high density of minority ethnic populations, or when an emergency call indicates that mental health problems are a relevant subject consideration. In addition, forces could also consider prioritising double crewing in specific areas or times, such as in city centres on a Friday and Saturday night, to reduce the use of TASER against subjects that might be at higher risk of adverse health outcomes, such as those that are under the influence of drugs and/or alcohol (Defence Scientific Advisory Council Sub-Committee on the Medical Implications of Less-Lethal Weapons, 2012).

However, where single-crewing cannot be avoided, operational managers should consider mitigating the increased level of perceived risk by modifying one of the other key factors identified by officers (during Study Two) as being an important part of their threat assessment process, such as; officer resources, knowledge and experience, and/or pre-attendance information. For example, whilst patrolling in areas where violent crime is frequent, Operational Managers could reduce perceived threat, and thus potentially the use of TASER, by boosting officer resources via increased access to rapid tactical support and/or proximity patrolling (whereby officers are deployed in close proximity to at least one other officer to ensure that back-up is close to hand; Boyd et al., 2011).

Alternatively, Operational Managers could reduce perceived threat by ensuring that only experienced Authorised TASER Officers (ATOs) are crewed alone, or by increasing officers' knowledge and experience by providing enhanced or more frequent Personal Safety Training (PST)[65] that specifically addresses the needs of those that are single-crewed, and thus potentially outmatched, by the subjects or situation (discussed in Chapter Three and Seven). This could be considered as a particularly pertinent policy implication given that PST is not currently standardised across the PSEW, a notable proportion of officers are not currently satisfied with the PST they receive (College of Policing & National Police Chiefs' Council, 2020), and officers are more likely to discharge their TASERs when it has been a year or more since they attended this particular type of training (Dymond 2016; 2018).

These evidence based recommendations perhaps also support the use of Naturalistic Decision-Making approaches which, essentially, attribute intuitive knowledge to the development of pattern recognition gained via personal experiences (Heaton et al., 2019; Klein, 1989; Ross, et al., 2004). By providing officers with regular opportunities to practice de-escalation and less invasive types of force in response to

[65] Sometimes referred to as Officer Safety Training.

violence, officers may be better able to build a mental repository of patterns between specific events, decisions, and their associated consequences; facilitating the development of expertise and their ability to rapidly assess and respond to such situations. Understandably, shortages in staffing caused by shift abstractions can often be a barrier to regular training attendance. However, the current influx of new joiners cause by the recent Officer Uplift Program (Home Office, 2019b) presents the perfect opportunity to cultivate a culture of learning and development within the service, and enable those that are young in service to develop their skills and experience within a protected space.

Given that the College of Policing (CoP) and the National Police Chiefs' Council (NPCC) have pledged to overhaul PST in a bid to improve officer safety following the release of the Officer and Staff Safety Review in 2020 (College of Policing & National Police Chiefs' Council, 2020; National Police Chiefs' Council, 2020b), there may well be an opportunity for police leaders to apply the findings herein to improve not only officer safety, but to perhaps also reduce the use of TASER by re-focusing officer training on less-invasive techniques. Moreover, reviewing the current PST curriculum also offers the opportunity to target unwanted disproportionality for vulnerable groups, such as those suffering a mental health crisis. The results from Study One and Study Two not only show that officers are more likely to use TASER when the subject appears to present with poor mental health, they indicate that this may be because officers associate higher levels of risks with these individuals due an increase in perceived volatility. As such, by updating PST to provide a greater focus on how to help those experiencing mental health difficulties with less intrusive methods, especially when single-crewed, TASER use may be reduced within this particular population.

Operational Managers could also attempt to reduce perceived threat by increasing the quality and quantity of pre-attendance information provided to officers,

by ensuring that call handlers request and relay the right information, at the right time. Not only did pre-attendance information emerge as a key factor in threat assessment within Study Two, but research by Taylor in 2020 found that officers relied heavily on pre-attendance information when deciding whether or not to shoot an ambiguously armed subject, and that inaccurate pre-attendance information significantly contributed to shooter error.

The last two crucial areas of action mentioned above - Observation and Evaluation - are inextricably entwined, and thus will be considered together. Given the gravity of the potential consequences of TASER, any and all TASER use by the PSEW should be monitored and analysed regularly, both at a local and national level, alongside any potentially influential factors, including incident crewing levels.

Whilst official use of force reporting within England and Wales collects data on police use of TASER at a national level, publicly available information is only reported at an aggregate level. Information regarding incident crewing is currently omitted, and these statistics are currently classed as 'experimental' by the Office for National Statistics (ONS) due to variable data quality and associated limitations (Home Office, 2020f). Without good quality data at a national level, it is impossible for the PSEW to adequately monitor, review and regulate TASER use appropriately and, as such, another key recommendation for policy leads would be to continue working with the ONS on improving and standardising these data and complying with the Annual Data Requirement.[66]

[66] As mentioned in Chapter One, the Annual Data Requirement (ADR) is a list of data that police forces are compelled to provide the government as per the Home Secretary's statutory powers. For more information on the ADR, please see: https://www.gov.uk/government/publications/home-office-crime-and-policing-research-and-annual-data-requirement-adr-data-privacy-information-notices/home-office-annual-data-requirement-adr-data-privacy-information-notice.

Nonetheless, given that individual forces should have access to record-level data regarding local uses of force, they ought to be better equipped to observe and evaluate TASER use within their own geographical boundaries. Given that the results herein suggest that incident crewing is linked to TASER use, it would be beneficial for forces to explore and monitor this relationship within their own data sets; identifying patterns, challenges and potential opportunities. Moreover, forces should consider providing opportunities for officers to review and evaluate their own uses of TASER, particularly whilst single-crewed, through reflective group practices. Not only could this provide additional professional contexts within which good practice can be shared, it may also enable those that are younger in service to learn from more established colleagues. However, as mentioned previously (please see Chapter Seven), it is important that reflective practice is facilitated by individuals with training in group processes to ensure that the process remains positive (Knight et al., 2010).

The final policy recommendation to be raised within this chapter also relates to observation and evaluation and is perhaps the most important proposal listed herein. One of the main findings from this thesis overall, is that the decision to use TASER is both complex and multifaceted; and although this particular decision is likely to be primarily driven by the level of incident-related threat perceived by the attending officer – their assessment of threat is, in turn, likely to be driven by a number of additional factors that are both internal, and external, to the officer themselves. As such, any changes to crewing practices, or any other potentially moderating element (as discussed above), should be monitored closely to ensure that there are no unintended negative consequences for the service, the officers, or the general public alike.

8.5 POINTS OF ORIGINALITY AND KEY FINDINGS IN RELATION TO THE OVERALL THESIS OBJECTIVES:

8.5.1 Study One: Points of originality and findings

Arguably, Study One is a point of originality in and of itself, as prior to this thesis scholars had yet to conduct a systematic review into the relationship between police crewing practices and the use of TASER. Whilst the use of a systematic review is in no way original, the subject matter is focussed and unique; revealing that the extant literature was sparse, often non-UK centric, and mostly descriptive. Moreover, the review found that the few studies that used inferential statistics to examine the relationship between crewing practices and TASER resulted in conflicting findings. For example, whilst Hine et al. (2018b) found the number of officers present was an overt and pragmatic influence amongst newly recruited officers' use of force decisions, the multivariate analysis on a rural English force by Dymond (2016; 2018) found that the number of officers present failed to have any statistically significant effects on whether or not TASER was used.

Nonetheless, a similar multivariate study included from the second screening period (Quinton et al., 2020), found that the odds of an officer effecting a discharge use of TASER (but not a non-discharge use of TASER) were significantly increased when the officer was single-crewed at the time force was used.

The contrasting results found by Study One in relation to crewing and the use of TASER indicated that, overall, the evidence regarding this relationship is far from conclusive. This is a key finding not only in relation to one of the main objectives of this thesis (i.e. exploring the potential impact of crewing on the decision to use TASER by the PSEW), but also regarding the impetus for the continued examination of this relationship as the core focus within this thesis.

Another key finding to emerge from Study One, relating to the second overarching thesis objective (i.e., exploring the potential underpinning mechanisms of the relationship between TASER use and crewing practices), was that most other variables examined by the extant literature offered similarly inconsistent or inadequate evidence to support their standing as a predictor of TASER use. Only nine factors were consistently found to be associated with TASER use, four of which were related to the situation, context or interactional elements of the incident (i.e. location, local TASER and use of force policies, the number of bystanders, and the level of subject resistance/compliance), two of which were related to the characteristics of the TASER subject (mental illness and mental or emotional 'disturbance,' and gender) and the remaining three were related to officer factors (officer ethnicity, role, and length of service). Moreover, as mentioned in Chapter Three (Section 3.4.2), it could be argued that many of the subject characteristics and interactive elements examined (including crewing levels) are linked to the same underlying conceptual driver of perceived threat.

A further key finding from this analysis was that none of the studies within the identified sample had utilised any biological or psychological approaches when exploring officer decision-making. The implication of this is that officers are reduced to nothing but a passive instrument of the law and circumstance, rather than an active agent in a dynamic interpersonal exchange. By stripping officers of their agency in this manner it limits our understanding of their decision-making, rendering it nigh-on impossible to understand why two different officers would make different choices when given similar scenarios; or why the same officer would make a different choice when faced with the same scenario at a different point in time.

Two final findings from Study One that relate to the overarching objectives of this thesis were that none of these papers had studied the relationship between crewing

and TASER use as their primary research focus, nor had any British scholars examined the underlying drivers for why this potential relationship exists.

8.5.2 Study Two: Points of originality and findings

Study Two was a bespoke tripartite diary study that aimed to address several gaps in the extant literature identified by Study One, including the paucity of UK-centric research, and a distinct lack of psychological and biological approaches to the exploration of TASER use and crewing. More specifically, Study Two aimed to explore whether crewing practices affect the way police officers think and feel, and how this might impact on an officer's decision to use TASER. The diary study was designed to gather primary data direct from officers themselves via a bespoke app called the 'RH Cops and Crewing App.' This interactive app collected data from officers via their smart phones and included a baseline survey and a diary logging phase. At the end of the study, participants were asked to fill in a post-participation questionnaire via email. This unique approach to data collection was chosen for several methodological reasons (please see Chapters One and Two) and is, undoubtedly, another point of originality within this thesis in securing primary data. Not only is most of the extant literature based on secondary data, but there are currently no other studies that utilise this type of methodology to explore the relationship between TASER and crewing. Furthermore, none of the existing studies have explicitly examined the relationship between crewing and *when* TASER is used during an incident where force is required.

Overall, the results from both the qualitative and quantitative analyses from Study Two indicated that not only had incident crewing impacted on whether TASER was used, but also whether or not TASER was the *first tactical option utilised* by the officer. More specifically, the findings from the quantitative analyses (please see Chapter Five) identified that incident crewing levels during an incident where force is used had a statistically significant impact on the frequency and placement of non-

discharge TASER use. Inferential analyses revealed that a larger proportion of officers carried out a non-discharge use of TASER, and carried out a non-discharge use of TASER *as their first tactical option*, when they were alone at the beginning of a use-of-force incident. The qualitative accounts from the diary study also echoed these findings, as officer narratives keenly emphasised the overt impact of incident crewing on the level of force they used within an incident; with higher levels of force being associated with single-crewing and lower levels of force with double crewing (please see Chapter Six).

Interestingly, additional quantitative analyses from Study Two also identified that incidents involving TASER use were, on average, rated as has having a higher threat level than those that did not (please see Chapter Five). These results, coupled with the previous research identified by Study One and discussed throughout Chapter Seven and herein Chapter Eight (please see Sections 7.7, 7.9, and 8.2 in particular), indicate that perceived threat is likely to be an important mediator in the relationship between crewing and TASER use.

Another important, albeit unsurprising, result to emerged from Study Two was the discovery of a statistically significant relationship between shift crewing and incident crewing. Officers who were mostly single-crewed during their shift were more likely to also report being alone when they used force (and vice versa). Whilst this may seem like nothing more than common sense, it is nonetheless an essential premise to establish. Not only does this indicate that officers who are primarily single-crewed during their shift are more likely to be alone when using force against a member of the public (and thus perhaps the associated consequences), but also, that this is not *always* the case. Therefore, although shift and incident crewing may seem similar, they should perhaps be measured and considered separately when analysing situational factors in officer decision-making.

A further key finding from Study Two was that single-crewing was, overall, seen negatively by the majority of officers due to a veritable smorgasbord of unintended but adverse officer outcomes over and above threat, risk and their use of force. More specifically, officers felt that crewing practices had a number of psychosocial and operational impacts which were positively associated with double crewing and/or negative associated with single-crewing, including: morale, officer mental health and wellbeing, stress, confidence, officer efficiency and efficacy, as well as proactivity and productivity (please see Chapter Six and Seven). Moreover, additional quantitative analyses revealed evidence to suggest that crewing practices might affect levels of shift-related stress and fatigue via officer workloads (please see Chapter Five and Seven).

The last point of originality to be presented in relation to Study Two is the examination of transient officer factors (i.e., stress and fatigue) and how these, along with more enduring officer factors (such as personal decision-making styles), might affect police use of TASER. Whilst none of these internal officer factors were found to be directly associated with TASER use, there was evidence to suggest that decision-making style and incident-related stress were linked to the perceived level of threat associated with an incident. This is an important point to consider given the potential mediatory properties of perceived threat in relation to use of force identified and discussed above.

8.5.3 Other points of originality

One final, but substantial point of originality that should be mentioned is the theoretical framework for decision-making that underpins the thesis as whole. Existing approaches to police decision-making in relation to the use of TASER were found to be lacking in breadth and scope and, as such, a bespoke decision-making framework was developed for use within this thesis. This new approach, the ‘panoptic biopsychosocial decision-making framework,’ deliberately drew on several descriptive decision-making

models and integrated their common factors into a more holistic structure to help visualise and interpret officer decision-making within the well-defined and limited scope of TASER use by the PSEW (please see Chapter One, Figure 1.4 for detail).

Whilst using this framework helped to identify the gaps in the extant literature by providing a gentle reminder as to the breadth and depth of the subject matter, the true utility of the framework became apparent when evaluating the findings from Study Two. Firstly, the five individual factor groups described in the panoptic biopsychosocial decision-making framework provided a useful prompt when attempting to identify relevant approaches and models that might help explain the individual findings from Study Two. Secondly, it provided an effective structure when trying to conceptualise and integrate the findings from such a sizable collection of analyses. It is possible, given the advantages listed above, that the panoptic biopsychosocial decision-making framework may also be a useful tool when considering other fast-paced, high-impact, dynamic police decision-making tasks.

8.6 THESIS CONCLUSION

Both police use of TASER and crewing practices can have serious side effects for the police and public alike and, as such, both these operational activities should be monitored, review and well-regulated by evidence-based policies. Whilst scholarly interest in these two operational practices has, historically, been lacking; this thesis aimed to simultaneously explore both practices by explicitly examining the relationship between the two. More specifically, this thesis focussed on the potential impacts of crewing on TASER use within the PSEW, and the potential underpinning mechanisms of any such effects.

Overall, the results described and discussed hitherto, indicate that incident crewing levels do indeed impact on an officer's decision to use TASER, with single-crewing increasing the odds of TASER use during incidents where force is used. In

addition, the results also indicated that officers were more likely to use TASER as their first tactical option when alone, and that crewing practices may have been driving these outcomes indirectly, by augmenting the level of perceived threat posed by an incident. Moreover, threat assessment was found to be linked to a number of internal and external factors that may, like police crewing practices, indirectly impact on an officer's decision to use TASER.

The findings herein hold both practical and theoretical weight. Not only have the findings identified a situational factor within the PSEW's sphere of operational control that may help to temper police use of TASER, but they have also demonstrated the value, and perhaps necessity, of considering officer factors when examining the decision to use TASER by police officers in England and Wales.

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APPENDICES

Appendix 1 - Tactics Glossary

Please note – the below list has been copied from the Home Office's 2020 User guide to the Police use of force statistics for England and Wales (Home Office, 2020f, p.14-16) and are listed in alphabetical order.

Attenuating energy projectile (AEP): An AEP is a soft nosed impact projectile fired from a single shot launcher. AEP is a form of less lethal weapon only available for use by specially trained officers, to give them (including those armed with conventional firearms) an additional means of dealing with threats of serious violence. It delivers an impact that is not intended to cause serious or life-threatening injury, but is of sufficient force to dissuade or prevent a violent or potentially violent person from their intended course of action, thereby reducing the threat. Police officers must record both when an AEP is aimed (even if not subsequently fired), and when fired.

Baton: A baton is a static or expandable stick. Batons can be used by appropriately trained officers to protect themselves or others, to demonstrate that force is about to be used (or may be used), and to facilitate dispersal and/or arrest. Frontline officers routinely carry a baton, and must record both when a baton is drawn (even if not subsequently used), and when used.

Conducted energy device (CED): A CED (i.e. a TASER® X26 or TASER® X2) is a less lethal weapon system authorised for use by specially trained officers only. This is one of a number of tactical options available when dealing with an incident with the potential for conflict. When fired, it is designed to temporarily incapacitate a person through the delivery of an electrical current which temporarily interferes with the body's neuromuscular system. The different possible uses of CEDs are as follows:

Non-discharge

- Drawn - Drawing of the device in circumstances where any person could reasonably perceive the action to be a use of force.
- Aimed - Deliberate aiming of the device at a targeted person.
- Red-dot - The device is deliberately aimed and then partially activated so that a red laser dot is placed onto the person. The device is not discharged.
- Arced - Sparking of the device without aiming or firing it.

Discharge

- Drive-stun - The device is held against the person's body and the trigger is pulled with no probes being fired. Contact with the person completes the electrical circuit which causes pain but does not deliver an incapacitating effect.
- Fired - The device is fired with a live cartridge installed. When the trigger is pulled, the probes are fired towards the person with the intention of completing an electrical circuit and delivering an incapacitating effect.
- Angled drive-stun - The officer fires the device with a live cartridge installed. One or both probes may attach to the person. The officer then holds the device against the person's body in a different area to the probe(s), in order to complete the electrical circuit and deliver an incapacitating effect.

Dog deployment: Police officers may use specially trained dogs in certain situations, for example to pursue a suspect who is attempting to evade officers. Police officers must record when a dog is deployed, as well as if the dog comes in to physical contact with (i.e. bites) an individual.

Firearms: The use of firearms by specially trained armed officers can sometimes be the most appropriate way of dealing with a violent situation. An officer carrying a firearm,

or the presence of an armed officer, does not in itself constitute a use of force. The 'use' of a firearm does not necessarily mean the firearm was discharged (fired); the act of an officer drawing or deliberately pointing the firearm at another person may de-escalate a situation, meaning it is not necessary for the officer to fire the weapon.

Ground restraint: This refers to when a police officer restrains someone on the ground. This does not include other tactics used to restrain individuals (not on the ground), which should be recorded in these statistics under 'Unarmed skills' if no specific restraint equipment was used. If an officer restrained an individual on the ground and then used specific limb/body restraint equipment, then 'Limb/body restraints' would also be reported as a tactic for that incident.

Handcuffing (compliant and non-compliant): Frontline officers routinely carry handcuffs. Officers must record whether the handcuffing of an individual was compliant (i.e. the individual does not resist and follows requests) or non- compliant.

Irritant spray (CS and PAVA): [67] There are two different types of sensory irritant spray currently in use by police forces in England and Wales: CS and PAVA. Both types can be drawn and/or used (sprayed) during an incident. Frontline police officers routinely carry an irritant spray and must record both when an irritant spray is drawn (even if not subsequently used), and when used. For more information there is a Home Office report comparing CS and PAVA sprays.

[67] CS referrers to 2-chlorobenzylidene malononitrole and PAVA spray refers to Pelargonic Acid Vanillylamide. For more information, visit: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/342817/comparison-sprays-2414.pdf

Limb/Body restraints: This refers to the use of specialist equipment to reduce the movement of arms and legs. This tactic does not cover when a police officer restrains someone without using equipment (which may be recorded in these statistics as 'Unarmed skills' or 'Ground restraint', depending on how the individual was restrained).

Other/improvised: When an officer used tactics which are not otherwise listed, they record the tactic as 'Other/improvised'. These tactics may include the use of horses or vehicles, for example.

Shield: A shield may be used by an officer to protect themselves and others, and potentially to strike an individual.

Spit and bite guard: A spit and bite guard may be used by an officer to provide protection from spitting and reduce the worst effects of biting, as well as reducing the need for the officer to resort to other, potentially more injurious, forms of physical restraint.

Tactical communication: Tactical communication refers to an officer speaking to an individual, which includes the officer issuing orders such as asking them to move or stop/change their actions. A situation in which an officer used only tactical communication would not be recorded as a use-of-force incident. Tactical communication is only recorded when a use of force tactic has also been used by the officer as part of the same incident; for example, tactical communication followed by the use of a baton. Tactical communication is not a use of force per se, this data is being

collected to develop a better understanding of how it is used alongside other tactics in conflict management and resolution.

Unarmed skills: This tactic refers to physical contact, which can include: pushing; pulling; the use of pressure points; and knee, foot or hand strikes. This does not include police officers restraining someone (which is recorded as ‘Ground restraint’ or ‘Limb/Body restraints’).

Appendix 2 - Police Service of England and Wales: Statement of Mission and Values

Please note, this statement was copied from the College of Policing's Code of Ethics Reading list (College of Policing, 2014, p.4) and was approved by the Association of Chief Police Officers (ACPO)[68] in January 2011 to help shape the professional judgement and decision-making processes of officers in the application of the law and the exercise of discretion.

- The mission of the police is to make communities safer by upholding the law fairly and firmly; preventing crime and antisocial behaviour; keeping the peace; protecting and reassuring communities; investigating crime and bringing offenders to justice.
- We will act with integrity, compassion, courtesy and patience, showing neither fear nor favour in what we do. We will be sensitive to the needs and dignity of victims and demonstrate respect for the human rights of all.
- We will use discretion, professional judgement and common sense to guide us and will be accountable for our decisions and actions. We will respond to well-founded criticism with a willingness to learn and change.
- We will work with communities and partners, listening to their views, building their trust and confidence, making every effort to understand and meet their needs.

[68] Please note, ACPO was replaced by the National Police Chiefs' Council (NPCC) in 2015.

- We will not be distracted from our mission through fear of being criticised. In identifying and managing risk, we will seek to achieve successful outcomes and to reduce the risk of harm to individuals and communities.
- In the face of violence, we will be professional, calm and restrained and will apply only that force which is necessary to accomplish our lawful duty.
- Our commitment is to deliver a service that we and those we serve can be proud of and which keeps our communities safe.

Appendix 3 - Systematic Literature Review: Search Protocol

Review title: The impact of crewing on officer's decision-making when deploying TASER.

Reviewers: Mary Elliott-Davies

Review question/objective: The primary question that this systematic review will answer is:

What impact could crewing levels have on the decision to use TASER within English and Welsh policing?

Specifically, the review will additionally address the following sub-questions:

1. Do crewing levels affect the frequency and type of TASER use by police officers?
2. What factors are known to be associated with, or affect the decision to use, TASER?

Background: Single-crewing has been reported as on the increase (The Police Federation of England and Wales, 2018), and anecdotal evidence suggests that it is often seen as a way of stretching ever thinning resources and concerns have been raised over the potential consequences of this practice to both officer welfare and performance (Elliott-Davies et al, 2016). In light of this, it is important to explore the potential impacts of crewing levels on key aspects of operational policing.

Existing evidence has previously shown that officers who are frequently single-crewed were more likely to report violent victimisation from members of the public (Houdmont, Elliott-Davies and Donnelly, 2017). In addition, research from the social care arena has also indicated that as exposure to violence increases, so does the reporting of stress symptoms; a relationship that also appears to be mediated by feelings of fear or vulnerability (Harris and Leather, 2011). This is particularly important given that stress has previously been shown to affect brain regions involved in decision-

making processes, as well as disrupting functions associated with memory and behavioural flexibility (Sousa et al., 1998; Sousa and Almeida, 2012; Mizoguchi et al., 2000; Cerqueira et al., 2007a; Cerqueira et al., 2007b).

Interestingly, Highways England produced a report in 2011, which found that single-crewed traffic officers were more likely to score lower on judgement and compliance to operational guidelines when driving than their double-crewed counterparts (Highways Agency, 2011).

One of the critical decisions that officer have to make quickly and competently, is in regard to the use of force. The decision to use TASER, has not been the object of much scrutiny within the UK academic field thus far. In light of this, it is important to explore whether single-crewing may affect officer's decisions to use less-lethal force, and if so, what the underlying drivers of this might be.

As such, this literature review aims to provide a synthesis of the published research on the effects of crewing level on the decision to use less lethal force by police officers from England and Wales to; help inform public policy, police procedure and, identify future research areas.

Eligibility criteria:

- *Participants*

  This review will consider studies that include participants from:

  - The policing population from England and Wales
  - Policing populations with similar policing principles (e.g. Western policing populations).

- *Phenomena of interest*

  This review will consider studies that evaluate the following within the context of the research questions listed above:

  a) Single-crewing (lone working) of police officers

b) The decision to use force, TASER in particular, by police officers

- *Types of outcome*

  This review will consider studies that include the following outcome measures:

  - The frequency and type of TASER use
  - Position of TASER use within sequential use-of-force situations
  - Reasons for TASER use

- *Types of studies*

  Original empirical published or unpublished research presenting data in relation to the research questions. This includes, but is not limited to:

  - Quantitative data from experimental, observational and field study designs, and
  - Qualitative data from interviews, focus groups and diary studies.

- *Languages*

  Only articles written in English will be considered.

- *Dates*

  There are no date restrictions.

Search strategy: The search strategy aims to find both published and unpublished studies. A staged matrix design will be used to combine search terms in Table A.3.1 to ensure a robust search.

Table A.3.1 *Systematic Literature Review: Key Search Terms*

1	Crewing level	Single-crew*, "Lone working", "Working alone", "Single crew", "Single-crewing", “Single patrol”, “Single-patrol”, “Crewing level”, “Crewing”, “Crewing-level”, “Crew*”.
2	Decision	Decision, Choice, Choos*, Decid*, Elect, Opt, "Decision-making”
3	TASER	TASER, "Less-lethal-force", "Less-lethal force", "Less lethal force", "Non-lethal-force", "Non-lethal force", "Non lethal force", "Non-lethal-alternatives", "Non-lethal alternatives", "Non lethal alternatives", "Conducted electrical weapon", "Conducted energy device".
4	Police	Polic*, Officer*, Constable*.

Stage one of the matrix will search for all four key concepts together, stage two will search for all possible combinations of three concepts, stage three searched for all possible combinations of two concepts, and finally, stage four will search the reference list of all identified reports and articles for additional studies that fit the eligibility criteria. Please see Appendix 4 for full matrix tables.

- Stage 1: Search for all key concepts together.
- Stage 2: Search for all relevant combinations of three concepts.
- Stage 3: Search for all relevant combinations of two concepts.
- Stage 4: The reference list of all identified reports and articles will be searched for additional studies that fit the eligibility criteria.

The databases to be searched include:

- The Cochrane Library
- The Campbell Collaboration online library

- ProQuest Dissertations & Theses Global
- PROSPERO
- Scopus
- PsycArticles
- PsycEXTRA
- PsycINFO
- College of Policing's National Policing Library Search Summary

Data management: Extraction from full text reviews was conducted using a bespoke extraction template based on the Cochrane collaboration extraction form (please see Appendix 8).

Data synthesis: Thematic analysis based on the six-step process outline by Braun and Clark in 2006, will be conducted to inductively explore common themes across the studies in relation to the research questions and the review aims.

Conflicts of interest: The PhD Student also works full time as a Researcher at the Police Federation of England and Wales (PFEW). Although the PFEW are funding the research, there are currently no restrictions on publication rights.

Appendix 4 - Systematic Literature Review: Search Matrix Table

The Table A.4.2 on the next page depicts the staged matrix search design used to ensure that the four key concepts are searched for in a rigorous and systematic way by ensuring that all possible combinations of the four key concepts in Table A.4.1 below.

Table A.4.1 *Systematic Literature Review: Key Concepts and Related Search Terms*

Key Concepts		Search Terms
1	Crewing level	Single-crew*, "Lone working", "Working alone", "Single crew", "Single-crewing", "Single patrol", "Single-patrol", "Crewing level", "Crewing", "Crewing-level", "Crew*"
2	Decision	Decision, Choice, Choos*, Decid*, Elect, Opt, "Decision-making"
3	TASER	TASER, "Less-lethal-force", "Less-lethal force", "Less lethal force", "Non-lethal-force", "Non-lethal force", "Non lethal force", "Non-lethal-alternatives", "Non-lethal alternatives", "Non lethal alternatives", "Conducted electrical weapon", "Conducted energy device", "Conductive electrical weapon," "Conductive energy device" [69]
4	Police	Polic*, Officer*, Constable*

[69] Please note, the last two search terms listed under key concept three (i.e., TASER) were identified and included after the search protocol was developed and submitted to PROSPERO.

There are four distinct stages to the search design:

- Stage 1: Search for all key concepts together.
- Stage 2: Search for all relevant combinations of three concepts.
- Stage 3: Search for all relevant combinations of two concepts.
- Stage 4: Search the reference list of all identified reports and articles for additional studies that fit the eligibility criteria.

The first column of the table represents the search stage and the second column represents the number of searches within the stage. The remaining columns represent a search matrix. For example, search stage one consists of a single search (the full concept search) where all four key concepts will be searched for together. Search stage 2, however, consists of three separate tri-concept searches (searches 2.1, 2.2 and 2.3), where all relevant combinations of the three key concepts will be searched for together.

Table A.4.2 *Systematic Literature Review: Search Matrix*

Search Stage	**No. of searches**	**Concepts to be searched**				
1	1	**Search 1.0** Concepts 1 & 2 & 3 & 4 (Single-crewing & Decision & TASER & Police)				
2	3	**Tri-concept Matrix**	Key Concept 1 (Single-crewing)	Key Concept 2 (Decision)	Key Concept 3 (TASER)	Key Concept 4 (Police)
		Key Concepts 1 & 2 (Single-crewing & Decision)	NA	NA	**Search 2.1** Concepts 1 & 2 & 3	**Search 2.2** Concepts 1 & 2 & 4
		Key Concepts 1 & 3 (Single-crewing & TASER)	NA	NA	NA	**Search 2.3** Concepts 1 & 3 & 4
		Key Concepts 1 & 4 (Single-crewing & Police)	NA	NA	NA	NA

Table A.4.2 *Systematic Literature Review: Search Matrix*

Search Stage	**No. of searches**	**Concepts to be searched**				
		Duel-concept Matrix	Key Concept 1 (Single-crewing)	Key Concept 2 (Decision)	Key Concept 3 (TASER)	Key Concept 4 (Police)
3	6	**Key Concept 1** (Single-crewing)	NA	**Search 3.1** Concepts 1&2	**Search 3.2** Concepts 1&3	**Search 3.3** Concepts 1&4
		Key Concept 2 (Decision)	NA	NA	**Search 3.4** Concepts 2&3	**Search 3.5** Concepts 2&4
		Key Concept 3 (TASER)	NA	NA	NA	**Search 3.6** Concepts 3&4
		Key Concept 4 (Police)	NA	NA	NA	NA
4	Unknown	The reference list of all identified reports and articles for additional studies that fit the eligibility criteria				

Appendix 5 - Systematic Literature Review: Search Strings & Total Returned Records

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	1

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	1

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	5

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	1

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ")	37
3.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	1

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	8
3.4	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	2

Table A.5.1 *Systematic Literature Review: Search Strings & Total Returned Records - PROSPERO*

Search fields	None specified	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.5	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	141
3.6	(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	3
	Total	**200**

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
2.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”)	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	0
3.4	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")	0

Table A.5.2 *Systematic Literature Review: Search Strings & Total Returned Records - The Campbell Collaboration*

Search fields	Full text keyword search	
Limiters applied	None specified	
Search Stage	Search String	Records Returned
3.5	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	4
3.6	(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)	0
	Total	**4**

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword- (Word variations have been searched)	0

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
2.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") in Title Abstract Keyword - (Word variations have been searched)	0

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
2.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword - (Word variations have been searched)	0

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
2.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword - (Word variations have been searched)	0

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
3.1	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") in Title Abstract Keyword - (Word variations have been searched)	23

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
3.2	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") in Title Abstract Keyword - (Word variations have been searched)	0

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
3.3	(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR “Crewing-level” OR “Crew*”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword - (Word variations have been searched)	2

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
3.4	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") in Title Abstract Keyword - (Word variations have been searched)	2
3.5	(Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword - (Word variations have been searched)	86

Table A.5.3 *Systematic Literature Review: Search Strings and Total Returned Records - The Cochrane Library*

Search fields	Title, Abstract and Keyword	
Limiters applied	Trials or reviews	
Search Stage	Search String	Records Returned
3.6	(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*) in Title Abstract Keyword - (Word variations have been searched)	2
	Total	**115**

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
1	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR	4

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	Constable*)) OR AB ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	Constable*)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	weapon" OR "Conductive energy device") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
2.1	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")) OR AB ((Single-crew* OR "Lone working" OR "Working alone"	3

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	“Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
2.2	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR AB ((Single-crew* OR "Lone working" OR "Working alone"	0

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	“Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
2.3	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR AB ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew"	159

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	“Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.1	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”)) OR AB ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR	11

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	“Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.2	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR AB ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing	0

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.3	TI ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR AB ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR KW ((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR	28

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	“Crewing” OR “Crewing-level” OR “Crew*”) AND (Police OR "Police Officer" OR "Police Officers" OR Constable*))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.4	TI ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")) OR AB ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR	6

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	"Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device")) OR KW ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR "Conducted energy device" OR "Conductive electrical weapon" OR "Conductive energy device"))	

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.5	TI ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR AB ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*)) OR KW ((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND (Police OR "Police Officer" OR "Police Officers" OR Constable*))	2370

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
3.6	TI ((Police OR "Police Officer" OR "Police Officers" OR Constable*) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR AB ((Police OR "Police Officer" OR "Police Officers" OR Constable*) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR	58

Table A.5.4 *Systematic Literature Review: Search Strings & Total Returned Records: PsycARTICLE, PsycINFO and PsycEXTRA*

Search fields	Title, Abstract and Keyword	
Search modes	Boolean/Phrase	
Limiters applied	Exclude Book Reviews; Exclude Non-Article Content	
Search Stage	Search String	Records Returned
	"Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) OR KW ((Police OR "Police Officer" OR "Police Officers" OR Constable*) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	
	Total	**2639**

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
1	(TITLE-ABS-KEY (single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND TITLE-ABS-KEY (decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ") AND TITLE-ABS-KEY (taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND TITLE-ABS-KEY (police OR "Police Officer" OR "Police Officers" OR constable*))	0

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
2.1	(TITLE-ABS-KEY(Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND TITLE-ABS-KEY (Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ") AND TITLE-ABS-KEY (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR 0“Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	0

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
2.2	(TITLE-ABS-KEY (single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND TITLE-ABS-KEY (decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ") AND TITLE-ABS-KEY (police OR "Police Officer" OR "Police Officers" OR constable*))	5

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
2.3	(TITLE-ABS-KEY (single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*") AND TITLE-ABS-KEY (decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ") AND TITLE-ABS-KEY (taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	0

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
3.1	(TITLE-ABS-KEY ((single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND TITLE-ABS-KEY ((decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ")))	1821

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
3.2	(TITLE-ABS-KEY ((single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND TITLE-ABS-KEY ((taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)))	0

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
3.3	(TITLE-ABS-KEY ((single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND TITLE-ABS-KEY ((police OR "Police Officer" OR "Police Officers" OR constable*)))	90

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
3.4	(TITLE-ABS-KEY ((decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ")) AND TITLE-ABS-KEY ((taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)))	33

Table A.5.5 *Systematic Literature Review: Search Strings & Total Returned Records - SCOPUS*

Search fields	Title, Abstract and Keyword	
Limiters applied	English only, source type journal only, document type article, article in press and review only.	
Search Stage	Search String	Records Returned
3.5	(TITLE-ABS-KEY ((decision OR choice OR choos* OR decid* OR elect OR opt OR "Decision-making ")) AND TITLE-ABS-KEY ((police OR "Police Officer" OR "Police Officers" OR constable*)))	5472
3.6	(TITLE-ABS-KEY ((police OR "Police Officer" OR "Police Officers" OR constable*)) AND TITLE-ABS-KEY ((taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)))	165
	Total	**7,586**

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
1	(single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ") AND (police OR "police officer" OR "police officers" OR constable*) AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	0

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
2.1	(single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	0

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
2.2	(Single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (Decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ") AND (Police OR "police officer" OR "police officers" OR constable*)	1

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
2.3	(Single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND (Police OR "police officer" OR "police officers" OR constable*)	0

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
3.1	(Single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (Decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ")	0

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
3.2	(Single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	0

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
3.3	(Single-crew* OR "lone working" OR "working alone" OR "single crew" OR "single-crewing" OR "single patrol" OR "single-patrol" OR "crewing level" OR "crewing" OR "crewing-level" OR "crew*") AND (Police OR "police officer" OR "police officers" OR constable*)	37
3.4	(Decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ") AND (Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	7

Table A.5.6 *Systematic Literature Review: Search Strings & Total Returned Records - The National Policing Library*

Search fields	Title and Abstract	
Search mode	Boolean/Phrase	
Limiters applied	Available in Library catalogue collection, Catalogue only, English Only, Journal articles and dissertations only	
Search Stage	Search String	Records Returned
3.5	(Decision OR choice or choos* OR decid* OR elect OR opt OR "decision-making ") AND (Police OR "police officer" OR "police officers" OR constable*)	781
3.6	(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND (Police OR "police officer" OR "police officers" OR constable*)	119
	Total	**945**

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
1	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR “Single patrol” OR “Single-patrol” OR “Crewing level” OR “Crewing” OR “Crewing-level” OR “Crew*”)) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ”)) AND ab(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”) AND ab(Police OR "Police Officer" OR "Police Officers" OR Constable*)	0

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
2.1	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ")) AND ab(Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)	0
2.2	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making ")) AND ab((Police OR "Police Officer" OR "Police Officers" OR Constable*))	2

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
2.3	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND ab((Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) AND ab((Police OR "Police Officer" OR "Police Officers" OR Constable*))	0
3.1	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" , "Crewing-level" OR "Crew*")) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making "))	476

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
3.2	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" OR "Crewing-level" OR "Crew*")) AND ab((Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	0
3.3	ab((Single-crew* OR "Lone working" OR "Working alone" OR "Single crew" OR "Single-crewing" OR "Single patrol" OR "Single-patrol" OR "Crewing level" OR "Crewing" , "Crewing-level" OR "Crew*")) AND ab((Police OR "Police Officer" OR "Police Officers" OR Constable*))	19

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
3.4	ab((Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”)) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making "))	5
3.5	ab((Police OR "Police Officer" OR "Police Officers" OR Constable*)) AND ab((Decision OR Choice OR Choos* OR Decid* OR Elect OR Opt OR "Decision-making "))	2430
3.6	ab((Police OR "Police Officer" OR "Police Officers" OR Constable*)) AND ab((Taser OR "Less-lethal-force" OR "Less-lethal force" OR "Less lethal force" OR "Non-lethal-force" OR "Non-lethal force" OR "Non lethal force" OR "Non-lethal-alternatives" OR "Non-lethal alternatives" OR "Non lethal alternatives" OR "Conducted electrical weapon" OR “Conducted energy device” OR “Conductive electrical weapon” OR “Conductive energy device”))	25

Table A.5.7 *Systematic Literature Review: Search Strings & Total Returned Records: ProQuest*

Search fields	Abstract	
Limiters applied	Dissertations and articles (practitioner and academic) only	
Search Stage	Search String	Records Returned
	Total	**2,957**

Appendix 6 - Systematic Literature Review: Copy of Quality Appraisal Checklist Questions

Quality appraisal checklist – quantitative intervention studies

https://www.nice.org.uk/process/pmg4/chapter/appendix-f-quality-appraisal-checklist-quantitative-intervention-studies

Checklist items are worded so that 1 of 5 responses is possible:

++	Indicates that for that particular aspect of study design, the study has been designed or conducted in such a way as to minimise the risk of bias.
+	Indicates that either the answer to the checklist question is not clear from the way the study is reported, or that the study may not have addressed all potential sources of bias for that particular aspect of study design.
−	Should be reserved for those aspects of the study design in which significant sources of bias may persist.
Not reported (NR)	Should be reserved for those aspects in which the study under review fails to report how they have (or might have) been considered.
Not applicable (NA)	Should be reserved for those study design aspects that are not applicable given the study design under review (for example, allocation concealment would not be applicable for case control studies).

In addition, the reviewer is requested to complete in detail the comments section of the quality appraisal form so that the grade awarded for each study aspect is as transparent as possible.

Each study is then awarded an overall study quality grading for internal validity (IV) and a separate one for external validity (EV):

- ++ All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.
- + Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.
- – Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter

Question	**Score** (please circle)	**Comments**
Section 1: Population		
1.1 Is the source population or source area well described? Was the country (e.g. developed or non-developed, type of healthcare system), setting (primary schools, community centres etc.), location (urban, rural), population demographics etc. adequately described?	++ + − NR NA	

Question	Score (please circle)	Comments
1.2 Is the eligible population or area representative of the source population or area? Was the recruitment of individuals, clusters or areas well defined (e.g. advertisement, birth register)? Was the eligible population representative of the source? Were important groups under-represented?	++ + − NR NA	
1.3 Do the selected participants or areas represent the eligible population or area? Was the method of selection of participants from the eligible population well described? What % of selected individuals or clusters agreed to participate? Were there any sources of bias? Were the inclusion or exclusion criteria explicit and appropriate?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 2: Method of allocation to intervention (or comparison)		
2.1 Allocation to intervention (or comparison). How was selection bias minimised? Was allocation to exposure and comparison randomised? Was it truly random ++ or pseudo-randomised + (e.g. consecutive admissions)? If not randomised, was significant confounding likely (−) or not (+)? If a cross-over, was order of intervention randomised?	++ + − NR NA	
2.2 Were interventions (and comparisons) well described and appropriate? Were interventions and comparisons described in sufficient detail (i.e. enough for study to be replicated)? Was comparisons appropriate (e.g. usual practice rather than no intervention)?	++ + − NR NA	

Question	Score (please circle)	Comments
2.3 Was the allocation concealed? Could the person(s) determining allocation of participants or clusters to intervention or comparison groups have influenced the allocation? Adequate allocation concealment (++) would include centralised allocation or computerised allocation systems.	++ + − NR NA	
2.4 Were participants or investigators blind to exposure and comparison? Were participants and investigators – those delivering or assessing the intervention kept blind to intervention allocation? (Triple or double blinding score ++) If lack of blinding is likely to cause important bias, score −.	++ + − NR NA	
2.5 Was the exposure to the intervention and comparison adequate? Is reduced exposure to intervention or control related to the intervention (e.g. adverse effects leading to reduced compliance) or fidelity of	++ + − NR NA	

Question	Score (please circle)	Comments
implementation (e.g. reduced adherence to protocol)? Was lack of exposure sufficient to cause important bias?		
2.6 Was contamination acceptably low? Did any in the comparison group receive the intervention or vice versa? If so, was it sufficient to cause important bias? If a cross-over trial, was there a sufficient wash-out period between interventions?	++ + − NR NA	
2.7 Were other interventions similar in both groups? Did either group receive additional interventions or have services provided in a different manner? Were the groups treated equally by researchers or other professionals? Was this sufficient to cause important bias?	++ + − NR NA	

Question	Score (please circle)	Comments
2.8 Were all participants accounted for at study conclusion? Were those lost-to-follow-up (i.e. dropped or lost pre-,during or post-intervention) acceptably low (i.e. typically <20%)? Did the proportion dropped differ by group? For example, were drop-outs related to the adverse effects of the intervention?	++ + − NR NA	
2.9 Did the setting reflect usual UK practice? Did the setting in which the intervention or comparison was delivered differ significantly from usual practice in the UK? For example, did participants receive intervention (or comparison) condition in a hospital rather than a community-based setting?	++ + − NR NA	

Question	Score (please circle)	Comments
2.10 Did the intervention or control comparison reflect usual UK practice? Did the intervention or comparison differ significantly from usual practice in the UK? For example, did participants receive intervention (or comparison) delivered by specialists rather than GPs? Were participants monitored more closely?	++ + − NR NA	
Section 3: Outcomes		
3.1 Were outcome measures reliable? Were outcome measures subjective or objective (e.g. biochemically validated nicotine levels ++ vs self-reported smoking −)? How reliable were outcome measures (e.g. inter- or intra-rater reliability scores)? Was there any indication that measures had been validated (e.g. validated against a gold standard measure or assessed for content validity)?	++ + − NR NA	

Question	Score (please circle)	Comments
3.2 Were all outcome measurements complete? Were all or most study participants who met the defined study outcome definitions likely to have been identified?	++ + − NR NA	
3.3 Were all important outcomes assessed? Were all important benefits and harms assessed? Was it possible to determine the overall balance of benefits and harms of the intervention versus comparison?	++ + − NR NA	
3.4 Were outcomes relevant? Where surrogate outcome measures were used, did they measure what they set out to measure? (e.g. a study to assess impact on physical activity assesses gym membership – a potentially objective outcome measure – but is it a reliable predictor of physical activity?)	++ + NR NA	

Question	Score (please circle)	Comments
3.5 Were there similar follow-up times in exposure and comparison groups? If groups are followed for different lengths of time, then more events are likely to occur in the group followed-up for longer distorting the comparison. Analyses can be adjusted to allow for differences in length of follow-up (e.g. using person-years).	++ + NR NA	
3.6 Was follow-up time meaningful? Was follow-up long enough to assess long-term benefits or harms? Was it too long, e.g. participants lost to follow-up?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 4: Analyses		
4.1 Were exposure and comparison groups similar at baseline? If not, were these adjusted? Were there any differences between groups in important confounders at baseline? If so, were these adjusted for in the analyses (e.g. multivariate analyses or stratification). Were there likely to be any residual differences of relevance?	++ + − NR NA	
4.2 Was intention to treat (ITT) analysis conducted? Were all participants (including those that dropped out or did not fully complete the intervention course) analysed in the groups (i.e. intervention or comparison) to which they were originally allocated?	++ + − NR NA	

Question	Score (please circle)	Comments
4.3 Was the study sufficiently powered to detect an intervention effect (if one exists)? A power of 0.8 (that is, it is likely to see an effect of a given size if one exists, 80% of the time) is the conventionally accepted standard. Is a power calculation presented? If not, what is the expected effect size? Is the sample size adequate?	++ + − NR NA	
4.4 Were the estimates of effect size given or calculable? Were effect estimates (e.g. relative risks, absolute risks) given or possible to calculate?	++ + − NR NA	
4.5 Were the analytical methods appropriate? Were important differences in follow-up time and likely confounders adjusted for? If a cluster design, were analyses of sample size (and power), and effect size performed on clusters (and not individuals)? Were subgroup analyses pre-specified?	++ + − NR NA	

Question	Score (please circle)	Comments
4.6 Was the precision of intervention effects given or calculable? Were they meaningful? Were confidence intervals or p values for effect estimates given or possible to calculate? Were CI's wide or were they sufficiently precise to aid decision-making? If precision is lacking, is this because the study is under-powered?	++ + − NR NA	
Section 5: Summary		
5.1 Are the study results internally valid (i.e. unbiased)? How well did the study minimise sources of bias (i.e. adjusting for potential confounders)? Were there significant flaws in the study design?	++ + −	
5.2 Are the findings generalisable to the source population (i.e. externally valid)? Are there sufficient details given about the study to determine if the findings are generalisable to the source population? Consider: participants, interventions and comparisons, outcomes, resource and policy implications.	++ + −	

Quality appraisal checklist – quantitative studies reporting correlations and associations

https://www.nice.org.uk/process/pmg4/chapter/appendix-g-quality-appraisal-checklist-quantitative-studies-reporting-correlations-and

Checklist items are worded so that 1 of 5 responses is possible:

++	Indicates that for that particular aspect of study design, the study has been designed or conducted in such a way as to minimise the risk of bias.
+	Indicates that either the answer to the checklist question is not clear from the way the study is reported, or that the study may not have addressed all potential sources of bias for that particular aspect of study design.
−	Should be reserved for those aspects of the study design in which significant sources of bias may persist.
Not reported (NR)	Should be reserved for those aspects in which the study under review fails to report how they have (or might have) been considered.
Not applicable (NA)	Should be reserved for those study design aspects that are not applicable given the study design under review (for example, allocation concealment would not be applicable for case–control studies).

In addition, the reviewer is requested to complete in detail the comments section of the quality appraisal form so that the grade awarded for each study aspect is as transparent as possible.

Each study is then awarded an overall study quality grading for internal validity (IV) and a separate one for external validity (EV):

- ++ All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.
- + Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.
- – Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

Question	**Score** (please circle)	**Comments**
Section 1: Population		
1.1 Is the source population or source area well described? • Was the country (e.g. developed or non-developed, type of health care system), setting (primary schools, community centres etc), location (urban, rural), population demographics etc adequately described?	++ + − NR NA	

Question	Score (please circle)	Comments
1.2 Is the eligible population or area representative of the source population or area? • Was the recruitment of individuals, clusters or areas well defined (e.g. advertisement, birth register)? • Was the eligible population representative of the source? Were important groups underrepresented?	++ + − NR NA	
1.3 Do the selected participants or areas represent the eligible population or area? • Was the method of selection of participants from the eligible population well described? • What % of selected individuals or clusters agreed to participate? Were there any sources of bias? • Were the inclusion or exclusion criteria explicit and appropriate?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 2: Method of selection of exposure (or comparison) group		
2.1 Selection of exposure (and comparison) group. How was selection bias minimised? • How was selection bias minimised?	++ + − NR NA	
2.2 Was the selection of explanatory variables based on a sound theoretical basis? • How sound was the theoretical basis for selecting the explanatory variables?	++ + − NR NA	
2.3 Was the contamination acceptably low? • Did any in the comparison group receive the exposure? • If so, was it sufficient to cause important bias?	++ + − NR NA	

Question	Score (please circle)	Comments
2.4 How well were likely confounding factors identified and controlled? • Were there likely to be other confounding factors not considered or appropriately adjusted for? • Was this sufficient to cause important bias?	++ + − NR NA	
2.5 Is the setting applicable to the UK? • Did the setting differ significantly from the UK?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 3: Outcomes		
3.1 Were the outcome measures and procedures reliable? • Were outcome measures subjective or objective (e.g. biochemically validated nicotine levels ++ vs self-reported smoking −)? • How reliable were outcome measures (e.g. inter- or intra-rater reliability scores)? • Was there any indication that measures had been validated (e.g. validated against a gold standard measure or assessed for content validity)?	++ + − NR NA	
3.2 Were the outcome measurements complete? • Were all or most of the study participants who met the defined study outcome definitions likely to have been identified?	++ + − NR NA	

Question	Score (please circle)	Comments
3.3 Were all the important outcomes assessed? • Were all the important benefits and harms assessed? • Was it possible to determine the overall balance of benefits and harms of the intervention versus comparison?	++ + − NR NA	
3.4 Was there a similar follow-up time in exposure and comparison groups? • If groups are followed for different lengths of time, then more events are likely to occur in the group followed-up for longer distorting the comparison. • Analyses can be adjusted to allow for differences in length of follow-up (e.g. using person-years).	++ + − NR NA	
3.5 Was follow-up time meaningful? • Was follow-up long enough to assess long-term benefits and harms? • Was it too long, e.g. participants lost to follow-up?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 4: Analyses		
4.1 Was the study sufficiently powered to detect an intervention effect (if one exists)? • A power of 0.8 (i.e. it is likely to see an effect of a given size if one exists, 80% of the time) is the conventionally accepted standard. • Is a power calculation presented? If not, what is the expected effect size? Is the sample size adequate?	++ + − NR NA	
4.2 Were multiple explanatory variables considered in the analyses? • Were there sufficient explanatory variables considered in the analysis?	++ + − NR NA	
4.3 Were the analytical methods appropriate? • Were important differences in follow-up time and likely confounders adjusted for?	++ + − NR NA	

Question	Score (please circle)	Comments
4.4 Was the precision of association given or calculable? Is association meaningful? • Were confidence intervals or p values for effect estimates given or possible to calculate? • Were CIs wide or were they sufficiently precise to aid decision-making? If precision is lacking, is this because the study is under-powered?	++ + − NR NA	

Question	Score (please circle)	Comments
Section 5: Summary		
5.1 Are the study results internally valid (i.e. unbiased)? • How well did the study minimise sources of bias (i.e. adjusting for potential confounders)? • Were there significant flaws in the study design?	++ + −	
5.2 Are the findings generalisable to the source population (i.e. externally valid)? • Are there sufficient details given about the study to determine if the findings are generalisable to the source population? • Consider: participants, interventions and comparisons, outcomes, resource and policy implications.	++ + −	

Quality appraisal checklist – qualitative studies

https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-qualitative-studies

Question	Score (please circle)	Comments
Theoretical approach		
1. Is a qualitative approach appropriate? For example: • Does the research question seek to understand processes or structures, or illuminate subjective experiences or meanings? • Could a quantitative approach better have addressed the research question?	Appropriate Inappropriate Not sure	
2. Is the study clear in what it seeks to do? For example: • Is the purpose of the study discussed – aims/objectives/research question/s? • Is there adequate/appropriate reference to the literature? • Are underpinning values/assumptions/theory discussed?	Clear Unclear Mixed	

Question	Score (please circle)	Comments
Study design		
3. How defensible/rigorous is the research design/methodology? For example: • Is the design appropriate to the research question? • Is a rationale given for using a qualitative approach? • Are there clear accounts of the rationale/justification for the sampling, data collection and data analysis techniques used? • Is the selection of cases/sampling strategy theoretically justified?	Defensible Indefensible Not sure	

Question	Score (please circle)	Comments
Data collection		
4. How well was the data collection carried out? For example: • Are the data collection methods clearly described? • Were the appropriate data collected to address the research question? • Was the data collection and record keeping systematic?	Appropriately Inappropriately Not sure/inadequately reported	

Question	Score (please circle)	Comments
Trustworthiness		
5. Is the role of the researcher clearly described? For example: • Has the relationship between the researcher and the participants been adequately considered? • Does the paper describe how the research was explained and presented to the participants?	Clearly described Unclear Not described	
6. Is the context clearly described? For example: • Are the characteristics of the participants and settings clearly defined? • Were observations made in a sufficient variety of circumstances • Was context bias considered	Clear Unclear Not sure	

Question	Score (please circle)	Comments
7. Were the methods reliable? For example: • Was data collected by more than one method? • Is there justification for triangulation, or for not triangulating? • Do the methods investigate what they claim to?	Reliable Unreliable Not sure	

Question	Score (please circle)	Comments
Analysis		
8. Is the data analysis sufficiently rigorous? For example: • Is the procedure explicit – i.e. is it clear how the data was analysed to arrive at the results? • How systematic is the analysis, is the procedure reliable/dependable? • Is it clear how the themes and concepts were derived from the data?	Rigorous Not rigorous Not sure/not reported	
9. Is the data 'rich'? For example: • How well are the contexts of the data described? • Has the diversity of perspective and content been explored? • How well has the detail and depth been demonstrated? • Are responses compared and contrasted across groups/sites?	Rich Poor Not sure/not reported	

Question	Score (please circle)	Comments
10. Is the analysis reliable? For example: • Did more than one researcher theme and code transcripts/data? • If so, how were differences resolved? • Did participants feed back on the transcripts/data if possible and relevant? • Were negative/discrepant results addressed or ignored?	Reliable Unreliable Not sure/not reported	
11. Are the findings convincing? For example: • Are the findings clearly presented? • Are the findings internally coherent? • Are extracts from the original data included? • Are the data appropriately referenced? • Is the reporting clear and coherent?	Convincing Not convincing Not sure	
12. Are the findings relevant to the aims of the study?	Relevant Irrelevant Partially relevant	

Question	Score (please circle)	Comments
13. Conclusions For example: • How clear are the links between data, interpretation and conclusions? • Are the conclusions plausible and coherent? • Have alternative explanations been explored and discounted? • Does this enhance understanding of the research topic? • Are the implications of the research clearly defined? • Is there adequate discussion of any limitations encountered?	Adequate Inadequate Not sure	

Question	Score (please circle)	Comments
Ethics		
14. How clear and coherent is the reporting of ethics? For example: • Have ethical issues been taken into consideration? • Are they adequately discussed e.g. do they address consent and anonymity? • Have the consequences of the research been considered i.e. raising expectations, changing behaviour? • Was the study approved by an ethics committee?	Appropriate Inappropriate Not sure/not reported	
Overall assessment		
As far as can be ascertained from the paper, how well was the study conducted?	++ + –	

Appendix 7 - Systematic Literature Review: Interrater Reliability Calculation Tables

Table A.7.1 *Systematic Literature Review: Interrater Reliability Calculation for Dymond (2018)*

		Researcher 2				
	Score	-	+	++	NA	NR
Researcher 1	-	1	0	0	0	0
	+	0	0	0	0	0
	++	0	3	8	0	1
	NA	0	1	0	5	0
	NR	0	0	0	0	0

Interrater reliability analysis using the Kappa statistic was performed to determine consistency among raters. The interrater reliability for the raters was found to be Kappa 0.59 ($p<.000$), 95% CI (0.331, 0.857); a moderate agreement (Landis & Koch, 1977).

Table A.7.2 *Systematic Literature Review: Interrater Reliability Calculation for White & Ready (2007)*

		Researcher 2				
	Score	-	+	++	NA	NR
Researcher 1	-	1	0	0	0	0
	+	0	2	0	0	0
	++	0	1	7	1	0
	NA	1	0	0	14	0
	NR	0	0	0	0	0

Interrater reliability analysis using the Kappa statistic was performed to determine consistency among raters. The interrater reliability for the raters was found to be Kappa 0.56 ($p<.000$), 95% CI (0.619, 1.000); a moderate agreement (Landis & Koch, 1977).

Table A.7.3 *Systematic Literature Review: Interrater Reliability Calculation for Hine, Porter, Westera, Alpert & Allen (2018)*

		Researcher 2					
	Score	-	+	++	NS	ND	MISSING
Researcher 1	-	0	0	0	0	0	0
	+	0	10	0	0	0	0
	++	0	0	1	0	0	0
	NS	0	1	0	1	0	0
	ND	1	0	0	0	0	0
	MISSING	0	1	0	0	0	0

Interrater reliability analysis using the Kappa statistic was performed to determine consistency among raters. The interrater reliability for the raters was found to be Kappa 0.62 ($p<.000$), 95% CI (0.190, 0.928); a moderate agreement (Landis & Koch, 1977).

Appendix 8 - Systematic Literature Review: Completed Data Extraction Sheet

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Bishopp, S. A., Klinger, D. A., & Morris, R. G. (2015). An examination of the effect of a policy change on police use of TASERs. *Criminal Justice Policy Review, 26* (7), 727-746. https://doi.org/10.1177/0887403414543558	+/+	USA	**Design:** Complex correlational design **Methodology:** Compared frequency of TASER use (fired only) before and after policy change	Sample of 275 Police Officers from Dallas, Texas. The unit of analysis was the frequency of TASER use over each month for each	Multivariate (logistic regression)	1. TASER policy 2. Location 3. Officer gender 4. Officer ethnicity 5. Season 6. Previous use of TASER	Frequency of TASER use	**New (more restrictive) policy** New policy = reduced frequency of TASER use **Officer ethnicity** Black officers = less likely to use TASER than White officers (but not Latin

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): Does department policy effect the use of TASER?			(with the new policy being more restrictive) whilst controlling for potential confounding factors.	officer, over 16 months. 4,400 units of analysis were derived from official use-of-force forms.				**Season** Summer = reduced frequency of TASER use **Previous use of TASER** Previous use = reduced frequency of TASER use

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Boehme, H. M., Martin, A., & Kaminski, R. J. (2021). Evaluating the 4th Circuit's decision to limit officer use of Tasers: a descriptive and time-series approach. *Police Practice and Research, 1-16*. https://doi.org/10.1080/15614263.2021.1982713	+/+	USA	**Mixed methods with two designs.** **Design 1:** Descriptive **Methodology 1:** A survey of agencies within the Fourth Circuit Court of Appeals in America. Surveys were	**Design 1:** 74 out of 169 eligible agencies responded, equating to a 44% response rate. **Design 2:** The unit of analysis was the average TASER	**Design 1:** Frequencies and proportions **Design 2:** Binomial regression models	A single intervention – i.e., the decision of the Fourth Circuit to restrict police use of TASER due to a court ruling (referred to as 'The Armstrong decision.')	**Design 1:** 1. Changes to the placement of TASER on use of force Continua. 2. Changes to the TASER training. 3. Perceived changes in the use of	**Design 1:** The majority of survey respondents indicated that after the decision of the Fourth Circuit to restrict police use of TASER: 1. There were departmental adjustments in how they trained officers in TASER 2. There were no changes to the

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): Whether the decision of the Fourth Circuit to restrict police use of TASER (the intervention) had an impact on the incidence of police use of various types of force including TASER.			sent to all full-service agencies within the Fourth Circuit (Maryland, North Carolina, South Carolina, Virginia, and West Virginia) who employed 75 or more full-time sworn officers.	frequency per month. Most outcome measures include 62 observations (i.e., months): 49 pre and 13 post intervention observations. Officer injury			other types of force **Design 2:** 1. Types of force used. 2. Injuries. 3. Suspect resistance.	placement of TASERs on use of force continua post-intervention. **Design 2:** Following the Courts ruling, there was: 1. A statistically significant increase in non-discharge uses of firearms. 2. A statistically significant decline

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
			Design 2: Complex correlational **Methodology 2:** Incident-level use of force data were obtained from one agency within the Fourth Circuit between 01.01.12 – 31.12.18.	includes 60 observations: 24 pre and 36 post intervention.				in the monthly average number of TASER discharges and non-discharge uses of TASER

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Brandl, S. G., & Stroshine, M. S. (2017). Oleoresin Capsicum Spray and TASERs: A Comparison of Factors Predicting Use and Effectiveness. *Criminal Justice Policy Review*, *28*(3), 279–306. https://doi.org/10.1177/0887403415578732	+/+	USA	**Design:** Complex correlational design. **Methodology:** Compared use of TASER (discharge) with use of OCS whilst controlling for potential	Use of force forms from a large municipal police department. All use of force forms between 2010 and 2011 where OCS, TASER. or	Bivariate (X^2 and t-tests) and multivariate analyses used (logistic regression)	**Subject** 1. Ethnicity 2. Age 3. Gender 4. Height (not included in multivariate analysis) 5. Weight (not included in multivariate analysis)	1. Type of force used (TASER vs OCS) 2. The effectiveness of force used (characterised by it being the only, or last form of force used)	**<u>Bivariate analysis</u>** **Subject 'mentally disturbed'** Yes = more likely to use TASER than OCS. **Subject believed to be armed** Yes = more likely to use TASER than OCS.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): In what circumstances are Oleoresin Capsicum Spray (OCS) and/or TASER used (and do they differ). How effective are OCS and TASERs? And in what circumstances are OCS and TASER effective?			confounding factors.	both, were used. 528 forms in total.		6. Mentally 'disturbed' 7. Intoxicated (drugs) 8. Intoxicated (alcohol) 9. Believed to be armed 10. Armed 11. Fled police 12. Resistance level		**Subject fled police** Yes = more likely to use TASER than OCS. **Number of officers that used force** More officers = more likely to use TASER than OCS.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
						13. Assaulted police **Other** 14. Number of subjects 15. Number of officers used force 16. Number of officers present		**Number of officers present** More officers = more likely to use TASER than OCS. **<u>Multivariate analysis</u>** **Subject 'mentally disturbed'** Yes = more likely to use TASER than OCS.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject believed to be armed Yes = more likely to use TASER than OCS. **Subject fled police** Yes = more likely to use TASER than OCS.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Number of subjects More subjects = TASER less likely to be used than OCS. **Number of officers present** More officers = more likely to use TASER than OCS.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Crow, M. S., & Adrion, B. (2011). Focal concerns and police use of force: Examining the factors associated with taser use. *Police Quarterly*, *14*(4), 366–387. https://doi.org/10.1177/1098611111423740	+/+	USA	**Design:** Complex correlational design. **Methodology:** Compared use of TASER (discharge) with other uses of force whilst controlling for potential	Use of force forms from a medium sized municipal police department. All use of force forms between 2004 and 2010. 610 cases were selected.	Multivariate (logistic regression)	**Subject** **1.** Ethnicity **2.** Age **3.** Gender **4.** Resistance level **Officer** **5.** Ethnicity **6.** Age **7.** Gender **8.** Rank	**1.** Type of force used (TASER vs other force) **2.** Type of force used (TASER vs other force) by resistance (flight vs. non flight)	**Subject ethnicity** Non-white = more likely for TASER to be used than other types of force. **Subject gender** Male = more likely for TASER to be used than other types of force. **Subject resistance** Physical resistance or weapons = less likely

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): What factors (related to focal concerns theory) affect the use of TASER?			confounding factors.	Reduced to 461 after excluding animal cases and cases where key variables were missing.		**Other** **9.** Type of Call **10.** Time of day **11.** Policy and practical constraints		for TASER to be used than other types of force. **Officer age** Older = more likely for TASER to be used than other types of force. **Policy** A more restrictive policy = less likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer age, subject ethnicity gender effects are greater when subjects resist by attempting to flee.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: DeLone, G. J., & Thompson, L. M. (2009). The Application and Use of TASERs by a Midwestern Police Agency. *International Journal of Police Science & Management*, *11*(4), 414–428. https://doi.org/10.1350/ijps.2009.11.4.139	+/+	USA	**Design:** Descriptive **Methodology:** Profiled TASER use (discharge) by associated factors.	Use of force forms from a medium sized mid-western police agency. All use of force forms for TASER related incidents between Jan 2004 and Aug 2007.	Frequencies and proportions	**Larger proportions of the following were found amongst the 26 cases of TASER use:** 1. Subjects with previous police contact 2. White subjects 3. Male subjects 4. Verbally abusive subjects 5. Subjects that physical resisted 6. Intoxicated subjects (alcohol) 7. Not intoxicated subjects (Drugs) 8. Lone subjects 9. Subjects that had been given verbal commands 10. Subjects that had not been given a TASER warning 11. Encounters that did not result in officer injury 12. Encounters where the subject was hospitalised

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One	
			Design and Methodology	Sample & Unit of Analysis	Main Analysis		
Summary of research question(s): What is the profile of TASER use? How effective is TASER? How safe is TASER?				26 cases were included.		13. 14. 15. 16. 17. 18. 19. 20. 21. 22.	Encounters took place in a private residence Subjects were tased once only Body contact points located on the upper/lower torso Encounters where 1 to 3 officers were present Encounters that did not take place whilst the subject was in custody Encounters where the subject was not in handcuffs Encounters where the initial call was in regard to an 'Emotionally Disturbed Person' Encounters that resulted in no injury to other officers Encounters that resulted in no injury to subjects Encounters that resulted in no injury to bystanders

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and research questions	QA score	Country	Overview of study design and method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: den Heyer, G. (2020). An analysis of the effectiveness and use by the New Zealand Police of the TASER from 2009 to 2017. *International Journal of police science & management, 22*(4), 356-365. https://doi.org/10.1177/1461355720947779	++/-	New Zealand	**Design:** Descriptive **Methodology:** Secondary data from bi-annual and annual Tactical Options database reports - a comprehensive set of secondary data of TASER	All uses of TASER between 2010 to 2017 by the New Zealand Police.	Frequencies and proportions	• In 2010 approximately two-thirds of subjects involved in an event in which a TASER was discharged were armed with a weapon. • In 2010 TASER was not deployed in any incidents that involved persons with mental health issues or who had attempted suicide • In 2011 19% of TASER uses were against subjects who had a mental illness and 12% of TASER uses were against those displaying suicidal behaviours. • In 2011 the most common location for an event involving a TASER was a residential property

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and research questions	QA score	Country	Overview of study design and method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Summary of research question(s): How has TASER been used (discharge and non-discharge) between 2010 and 2017 by New Zealand police, and how effective has it been?			use by the New Zealand Police.			(65%), followed by street/highway/motorway (16%) and outdoor public places (11%) • The average number of TASER events per month increased from 56 in 2010, to 99 in 2017, and the percentage of TASER events to total events increases from 14 in 2010, to 25 in 2017. • The majority of 'early events' involved subjects who were impaired by alcohol (56%) or drugs (14%). • TASER was deployed mostly against males aged 30 years or younger. • Across all years, the majority of TASER subjects were from the Maori community, and this

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and research questions	QA score	Country	Overview of study design and method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
						ethnicity is disproportionately represented in TASER uses.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Dymond, A. (2016). *Police use of taser in England and Wales, 2004-2014* [Doctoral thesis, University of Exeter, United Kingdom]. In University of Exeter Repository. https://ore.exeter.ac.uk/repository/bitstream/handle/10871/28097/Dymond%2CA.pdf?sequence=1&isAllowed=y	++/++	England	**Design:** Complex correlational design. **Methodology:** Compared use of TASER, and type of TASER use (discharge and non-discharge uses) with other uses of	Use of force forms from a semi-rural UK force. All use of force forms between Jan 2007 and Jan 2015. 23,556 cases were included in analysis	Multivariate (binary logistic regression)	**Subject** 1. Ethnicity 2. Gender 3. Mental health/ disability 4. Intoxication (alcohol) 5. Intoxication (drugs) 6. Mental health issues	1. Type of force used (discharge use vs other force) 2. Type of force used (non-discharge use vs other force)	**<u>DV1 = Discharge use</u>** **Subject gender** Female = less likely for TASER to be used than other types of force. **Subject mental health/ disability** Yes = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): In what circumstances is TASER used? Who is TASER used on? Which incident characteristics can predict when TASER is used?			force whilst controlling for potential confounding factors.	after data cleansing and aggregation (to remove potential cases of double-counting)		**Officer** 7. Response officer present 8. Traffic officer present 9. Firearms officer present 10. Length of Service 11. Rank		**Subject Intoxicated (drugs)** Yes = more likely for TASER to be used than other types of force **Subject mental health issues** Yes = more likely for TASER to be used than other types of force

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
						12. Personal Safety Training (PST) Recency **Other** 13. Resistance level 14. Weapon present 15. Reason for force		**Subject resistance/weapon** Fleeing, general struggle and using a weapon= more likely for TASER to be used than other types of force. **Type of officer present** Traffic and firearms officer= more likely for TASER to be used than other types of force; Response officer = less

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
						16. Type of incident 17. Year 18. Number of officers present 19. Number of officers using force 20. Number of subjects present (ratio) 21. Lighting		likely for TASER to be used than other types of force. **Officer length of service** Most experience officer having 6-10 years' experience = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer PST recency Over a year since training = more likely for TASER to be used than other types of force. **Weapon present** Yes = more likely for TASER to be used than other types of force.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Reason for force To protect self or others = more likely for TASER to be used than other types of force. **Year** 2009 and 2010 = more likely for TASER to be used than other types of force.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Type of incident Traffic = more likely for TASER to be used than other types of force; Custody = less likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								DV2= Non-discharge use **Subject gender** Female = less likely for TASER to be used than other types of force. **Subject intoxicated (alcohol)** Yes = less likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject resistance/weapon Fleeing and using a weapon = more likely for TASER to be used than other types of force; general struggle = less likely for TASER to be used than other types of force. **Type of officer present** Traffic and firearms officer = more likely for

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								TASER to be used than other types of force; Response officer = less likely for TASER to be used than other types of force. **Officer length of service** Most experience officer having 6-10 years' experience = more likely for TASER to be

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								used than other types of force. **Weapon present** Yes = more likely for TASER to be used than other types of force. **Reason for force** To protect self or others = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Type of incident Violent crime and other = more likely for TASER to be used than other types of force; Custody = less likely for TASER to be used than other types of force. **Year** 2009, 2010, 2012, 2013, 2014 = more likely for TASER to be used than other types of force.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Number of subjects present Two subjects = more likely for TASER to be used than other types of force.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Dymond, A. (2018). 'Taser, Taser'! Exploring factors associated with police use of Taser in England and Wales. *Policing and Society*, *30*(4), 396–411. https://doi.org/10.1080/10439463.2018.1551392	++/++	England	**Design:** Complex correlational design. **Methodology:** Compared use of TASER (discharge) with other uses of force whilst controlling for potential	Use of force forms from a semi-rural UK force. All use of force forms for between Jan 2007 and Jan 2015. 23,556 cases were included in analysis	Multivariate (binary logistic regression)	**Subject** 1. Ethnicity 2. Gender 3. Mental health issue /disability 4. Intoxication (alcohol) 5. Intoxication (drugs) **Officer** 6. Length of Service	Type of force used (TASER discharge vs other force)	**Subject gender** Female = less likely for TASER to be used than other types of force. **Subject mental health issue or disability** Yes = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): The extent to which multivariate findings from the USA apply internationally. Is TASER more strongly related to who the citizen is, or what the citizen does?			confounding factors.	after data cleansing and aggregation (to remove potential cases of double counting)		7. Personal Safety Training (PST) Recency 8. Response officer present 9. Traffic officer present 10. Firearms officer present		**Subject intoxication (drugs)** Yes = more likely for TASER to be used than other types of force. **Resistance level** Weapon present = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
						Other 11. Resistance level 12. Reason for force 13. Number of officers present 14. Year		**Officer length of service** Most experience officer having 6-10 years' experience = more likely for TASER to be used than other types of force. **Officer PST** Over a year since training = more likely for TASER to be used

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								than other types of force. **Type of officer present** Traffic and firearms officer = more likely for TASER to be used than other types of force; Response officer = less likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Reason for use of force To protect self or others = more likely for TASER to be used than other types of force. **Year** 2009 and 2010 = more likely for TASER to be used than other types of force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: Escalante, G. A. (2020). A Phenomenological Study: Police Officers' Lived Experiences with the Use of CEDs [Doctoral thesis, Walden University, Central Florida, United States of America]. In Walden Dissertations and Doctoral Studies Collection.	+/+	USA	Semi-structured interviews.	Sample of five police officers from a municipal police department in Florida who use TASERs. Participants were all men between the ages of 26 and 55.	Phenomenological approach.	1. Findings were presented in the form of five themes: Initial encounter, Modus Operandi, Compliance, Feelings, and Effectiveness of TASER. • Key results from 'Initial encounter' – all subjects were noncompliant. • Key results from 'Modus operandi'- justification of TASER use includes legal basis, subject resistance and weapons. • Key results from 'Compliance' - All the participants shared the common objective of gaining compliance from a non-compliant individuals and avoid aggression.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
https://scholarworks.walden u.edu/dissertations/8883 **Summary of research question(s):** What are police officers' lived experiences involving displaying and threatening the use of CEDs on noncompliant individuals? What are officers' perceptions of the devices' effectiveness when used as a threat?				Length of service ranged from one to 25 years.		2. Findings also showed police officers perceived the TASER to be an effective tool in achieving compliance when used as a threat. 3. All participants had backup assistance while the TASER was utilised. The author wondered if there was a relationship between having a backup officer and the decision to utilise a. non-discharge use of TASER as a threat.

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Reference and research questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Gau, J. M., Mosher, C., & Pratt, T. C. (2010). An inquiry into the impact of suspect race on police use of tasers. *Police Quarterly*, *13*(1), 27–48. https://doi.org/10.1177/1098611109357332	+/+	USA	**Design:** Complex correlational design. **Methodology:** Compared use of TASER (discharge) with other uses of force whilst controlling for potential	Use of force forms from a state patrol agency. All use of force forms from between Jan 2005 and Jan 2007. 1,209 cases were included in analysis.	Multivariate (binary logistic regression)	**Subject** 1. Ethnicity 2. Age 3. Gender **Officer** 4. Ethnicity 5. Age 6. Gender 7. Rank	1. Type of force used (TASER vs other) 2. TASER used as first type of force to be applied (TASER vs other)	**<u>DV= TASER used</u>** **Subject gender** Female = less likely to use TASER than other types of force. **Resistance level** Active, assaulting or other non-compliant = less likely to use TASER than other types of force.

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Reference and research questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): Are police more likely to use TASER against black and/or Hispanic subjects than white subjects?			confounding factors.			**Other** 8. Subject Resistance 9. Officer vs subject height 10. Officer vs subject weight 11. Type of incident 12. Lighting		**Officer ethnicity** White = less likely to use TASER than other types of force. **<u>DV= TASER used as first type of force to be applied</u>** **Subject ethnicity** Hispanic = more likely to use TASER as the first type of force to be applied; Black and other minority = less likely to

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Reference and research questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								use TASER as the first type of force to be applied. **Subject resistance** Active or assaulting = less likely to use TASER as the first type of force to be applied. **Officer ethnicity** White = less likely to use TASER as the first

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Reference and research questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								type of force to be applied.

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Reference and research questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: Hine, K. A., Porter, L. E., Westera, N. J., Alpert, G. P., & Allen, A. (2018). What were they thinking? Factors influencing police recruits' decisions about force. *Policing and Society*, *29*(6), 673–691. https://doi.org/10.1080/10439463.2018.1432612	++	Australia	**Design:** Quasi-experimental qualitative design. **Methodology:** Interviews with Police Service recruits to explore their use of force decision-making during role-play	91 out of 96 new recruits from one training cohort (or 'intake') for the Queensland Police Service between December 2012 and Feb 2013.	Systemic Content Analysis Approach to post-scenario interviews.	• Despite being presented with similar suspect resistance, recruits decided to use various force options and types. • The majority of officers reported using hand tactics (90%) as the first type of force applied in their role play scenarios, but a small proportion (1%) opted to use the presentation of TASER as the first type of force to be applied and 4% fired TASER as the first type of force to be applied. • 52% of the participants used TASER as the second type of force to be applied.

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Reference and research questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Summary of research question(s): What range of factors do officers consider when making use of force decisions? How do officers use these factors to evaluate situations to determine when force should be used, how much force should be used, and what force should be used?			scenarios in two separate incident types with similar resistance levels.	Sample was 23% Female, 6% BAME, with an average age of 28 years.		**Factors affecting their choice and use of force:** 1. **Subject build:** Participants confirmed that the build of a subject affected their decision with subjects of a bigger build being considered higher risk. 2. **Subject gender:** Participants perceived female subjects to be lower risk and so decided to not use as much force. 3. **Subject intoxication:** Participants perceived subjects that appeared intoxicated to be more unpredictable, less rational, and to potentially have a higher threshold for pain. 4. **Incident type:** The domestic violence scenario was considered higher risk by participants than

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Reference and research questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
						the disturbance scenario as the violent nature of the offence was seen as an indication of the subjects' capability for violent behaviour. 5. **Location:** Participants reported that location played a part in their decision; for example, entering a subject's house was considered to be higher risk as the officers were unsure who else (or what else) may be in the building. 6. **Visibility/Accountability:** Participants mentioned that the visible nature of public spaces impacted on their decisions as they wanted to bear public perception in mind and the possibility of by-standers becoming active in the incident.

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Reference and research questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
						7. **Proximity:** Participants highlighted that when a subject was very close, they did not/would not have had time to unholster their TASER or irritant spray. 8. **Number of officer's vs subjects:** Participants considered that if the ratio was in officers' favour it was lower risk and would use lower force.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Kuzik, J. (2019). *Police Use of Force and Officer Injury: A Closer Examination of the Impact of Taser Deployment and Contextual Factors* [Master's thesis, The University of Nevada, Las Vegas]. ProQuest Dissertations and	+/+	USA	**Design:** Complex correlational design. **Methodology:** Examined combinations of contextual factors that are associated with different types of police use of force	Secondary data from the Henderson Police Department's official use of force recording system (Nevada, USA). 3,820 use-of-force incidents were recorded between 2006-	Univariate, Bivariate and Conjunctive Analysis of Case Configurations (CACC).	**Subject** 1. Gender 2. Ethnicity 3. Age 4. Subject impairment (drugs/ alcohol/ mental health) **Officer** 5. Gender 6. Ethnicity 7. Age	1. TASER 'deployed' 2. Officer injury 3. Subject injury	**<u>Univariate analysis</u>** • Officer were injured in 9% incidents examined • Subjects were injured in 28% incidents examined • TASER was deployed in 19% of incidents examined. **<u>Bivariate analysis</u>** 1. TASER deployment decreases officer

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Theses Global (Publication No. 13812854). **Summary of research question(s):** How often do police officers sustain injuries during use of force encounters?			(e.g. TASER 'deployed' and non-TASER 'deployed'), officer injuries and subject injuries.	2016 and were included in the analysis.		8. Length of Service 9. Role **Other** 10. Call type 11. Time of day 12. Day of week 13. Subject resistance 14. Type of force used		injury rates during use-of-force incidents 2. TASER deployment increases subject injury rates **<u>Multivariate CACC analysis</u>** **Officer gender** Male officers = more likely to be in the 'high risk' category for TASER use; female officers = more likely included in

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
How often do subjects sustain injuries during use of force encounters? What characteristics are associated with use-of-force incidents that result in officer injury?								the 'low risk' category for TASER use. **Officer ethnicity** White officers = more likely to be in the 'high risk' category for TASER use; non-white officers = more likely included in the 'low risk' category for TASER use.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
What characteristics, are associated with use-of-force incidents that result in subject injury? What percent of use-of-force incidents involve TASERs?								**Officer age** Younger officers = more likely included in the 'low risk' category for TASER use. **Officer tenure** More experienced officers = more likely to be in the 'high risk' category for TASER use; less experienced officers = more likely included in

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Are officer and subject injury rates higher or lower when TASERs are deployed than when other types of force are used? What characteristics are associated with the deployment of TASERs during use-of-force incidents?								the 'low risk' category for TASER use. **Subject gender** Male subjects = more likely to be in the 'high risk' category for TASER use; female subjects = more likely included in the 'low risk' category for TASER use.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer role Patrol response = more likely to be in the 'high risk' category for TASER use; non-patrol = more likely included in the 'low risk' category for TASER use. **Call type** Non-violent call types = more likely to be in the 'high risk' category for TASER use; violent call

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								types = more likely included in the 'low risk' category for TASER use. **Time of day** Night-time incidents = more likely to be in the 'high risk' category for TASER use; day-time incidents = more likely included in the 'low risk' category for TASER use.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Day of week Weekday = more likely to be in the 'high risk' category for TASER use; Weekend incidents = more likely included in the 'low risk' category for TASER use. **Subject resistance** Non-resisting subjects = more likely to be in the 'high risk' category for TASER use; more likely

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			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								included in the 'low risk' category for TASER use. **Subject impairment** Impaired subjects = more likely to be in the 'high risk' category for TASER use; non-impaired subjects = more likely included in the 'low risk' category for TASER use.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Lin, Y. S., & Jones, T. R. (2010). Electronic control devices and use of force outcomes: Incidence and severity of use of force, and frequency of injuries to arrestees and police officers. *Policing: An International Journal of*	+/+	USA	**Design:** Complex correlational design. **Methodology:** Compared use of TASER (discharge and non-discharge)	Use-of-force forms from the Office of Professional Standards in the Washington State Patrol between 2005-2007	Frequencies and proportions. Multivariate (binary logistic regression)	**Subject** 1. Ethnicity 2. Gender **Officer** 3. Ethnicity 4. Gender 5. Length of service	1. Last type of force applied during incident 2. Total number of difference types of force applied during incident	**<u>Multivariate analysis DV= TASER vs other types of force</u>**[70] **Subject ethnicity** Non-white=over 20% more likely to have a TASER involved incident than male officers; however, the

[70] Lin & Jones (2010) took a novel approach when interpreting their multivariate results and considered an increase of 20% or more to be meaningful enough to consider as having practical significant, regardless of statistical significance. However, for the purposes of this thesis, only associations that were also statistically significant have been considered and thus treated as a confirmed relationship.

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Policing Strategies & Management, *33*(1), 152–178. https://doi.org/10.1108/13639511011020647 **Summary of research question(s):** Which types of force were displaced once TASER was officially adopted as a use of force option?			with other uses of force whilst controlling for potential confounding factors.	All use of force forms from between Jan 2005 and Jan 2007. 2005 being pre-TASER, 2006 being partial roll out of TASER and 2007 being		**Other** 6. Year 7. Subject Resistance	3. TASER involved vs not involved 4. Discharge vs non-discharge TASER use 5. Effectiveness of force used 6. Officer injury 7. Subject injury	relationship was not significant. **Subject gender** Female = over 20% more likely to have a TASER involved incident than male officers; this relationship was also significant.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Did adoption of TASER result in the reduction of the use of higher levels of force? How effective is TASER?				full TASER roll out. 1,188 cases were included in analysis.				**Subject Resistance** Compared to passive resistance, all three of the other levels of resistance = over 20% less likely to become an involved in a TASER incident; these relationships were also significant (incl. use of weapons).

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer ethnicity Non-white officers = more likely to have a TASER involved incident than white officers. **Officer gender** Female officers = 20% more likely to have a TASER involved incident than male officers; however, this

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								relationship was not significant. **<u>DV=Discharge vs non-discharge TASER use</u>** [71] **Subject ethnicity** Non-white = over 20% more likely to be tased

[71] Lin & Jones (2010) took a novel approach when interpreting their multivariate results and considered an increase of 20% or more to be meaningful enough to consider as having practical significant, regardless of statistical significance. However, for the purposes of this thesis, only associations that were also statistically significant have been considered and thus treated as a confirmed relationship.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								than white subjects; however, this relationship was not significant. **Subject gender** (Males = over 20% more likely to be tased than white subjects; however, this relationship was not significant.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject resistance Compared to passive resistance, all three of the other levels of resistance = over 20% less likely to be tased; these relationships were also significant (incl. use of weapons).

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer gender Male officers = over 20% higher TASER discharge rates; however, this relationship was not significant. **Year** 2007 = officers over 20% more likely to discharge their TASER than in 2006;

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								however, this relationship was not significant.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: Mesloh, C., Henych, M., Hougland, S., & Thompson, F. (2005). TASER and Less Lethal Weapons: An Exploratory Analysis of Deployments and Effectiveness. *Law Enforcement Executive Forum, 5*(5)*,* 67–80.	-/+	USA	**Design:** Descriptive. **Methodology:** Profiled TASER use (discharge) by associated factors.	Use of force forms from Orange County Sheriff's Office. 400 cases were randomly selected from the 1,200	Frequencies and proportions.	• TASER was the most frequently used non-lethal weapon (but not disproportionately so). • TASER was used to stop fleeing suspects (across all offenses) most of the time. • In all cases where deadly force would have been sanctioned and a less lethal weapon was used, TASER was the only weapon selected by officers. • Half less-lethal weapon deployments were utilised against offenders who had not

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Summary of research question(s): What is the profile of TASER use?				available for inclusion between Jan 2001 and Aug 2003.		demonstrated aggressive action against the officers.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Quinton, P., Dymond, A., Boyd, K., & Teers, R. (2020). *Police use of force: Tactics, assaults and safety Exploratory analysis of police recorded data 2017 / 18*. College of Policing. https://assets.college.police.uk/s3fs-public/2020-09/200818-use-of-force-final-report-1.0.pdf	++/++	England	**Design:** Complex correlational design. **Methodology:** Examined combinations of contextual factors that are associated with different types of police use of force (e.g.	Analysis of 45,661 use of force records made during 2017/18 across 16 police forces within England, including British Transport Police.	Multi-level regression models.	**Subject** 1. Gender 2. Ethnicity 3. Age 4. Mental disability 5. Alcohol 6. Drugs 7. Mental health **Officer** 8. Gender 9. Length of Service	1. Drawing Equipment 2. Using equipment 3. Using unarmed force 4. Non-discharge TASER use 5. Discharge TASER use 6. Officer assault	**<u>Univariate analysis</u>** • When TASER was available, TASER was used in 26% of incidents (drawn but not discharged in 22% of incidents and discharged in 3%). • Officers reported that they had been assaulted in 5% of all incidents.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): What factors are factors are associated with officers being more or less likely to report the following as part of an incident of police force: • Being assaulted • Being injured • Using particular tactics (e.g. • Officers drawing or discharging Taser			discharge TASER use, non-discharge TASER use, PAVA spray, Handcuffs etc), officer assault and injuries, and subject injuries and hospitalisations.	This includes uses of force by police officers and police staff (e.g. Police Community Support Officers) but excludes 'linked records' (i.e., where two or more officers		10. Role **Other** 11. Location 12. Prior knowledge of subject 13. Crowds 14. Officer crewing 15. Level of resistance	7. Officer injury 8. Subject injury Subject hospitalisation following injury	• 6% of cases reported indicated that the subjects were injured as a result of force used against them. **<u>Multivariate Regression analysis – Discharge TASER use</u>** **Officer role** Armed response officers = more likely than

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
• The people subjected to police force being injured or hospitalised				used force on the same person) When examining factors related to TASER use, analysis focussed on a subsample of 11,176 use of force forms where officers		16. Reason for use of force		response officers to discharge TASER. **Subject age** <18's = less likely to have TASER used against them than subjects 18+. **Subject gender** Male = more likely to have TASER used against them than

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
				indicated they had been carrying TASER				subjects of other genders. **Subject ethnicity** Asian or Asian British subjects = less likely than White or White British to have TASER used against them. **Location** Police or medical settings = less likely for TASER to be used.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Dwellings = more likely for TASER to be used. **Alcohol** Alcohol perceived as an impact factor = less likely for TASER to be used than if not perceived as such. **Mental Health** Mental health perceived as an impact factor = more likely for TASER

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								to be used than when not perceived as such. **Crowds** Crowds perceived as an impact factor = less likely to use TASER when not perceived as such. **Crewing** Officers that are single-crewed at the time force is used = more likely to

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								discharge TASER than officers that were crewed with another officer who did not use force). **Subject resistance** Active resistance = more likely to result in officers using TASER than if non-active resistance is present.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Reason for use of force Officers reportedly using force to protect themselves or others= more likely to result in officers using TASER when this is not the main reason that officers used force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								<u>Multivariate Regression analysis – Non-discharge TASER use</u> **Officer gender** Male officers = more likely than other genders to draw (but not discharge) TASER.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Officer length of service Officers with >15 years' service = less likely to draw (but not discharge) TASER than those with fewer than 6 years. **Officer role** 'Other' roles = less likely than response officers to draw (but not discharge) TASER.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject age <18's = less likely to have TASER drawn (but not discharged) against them than subjects 18+ **Subject gender** Male = more likely than subjects of other genders to have TASER drawn (but not discharged) against them.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject ethnicity Asian or Asian British subjects = less likely than White or White British to have TASER drawn (but not discharged) against them. Black or Black British = more likely than White or White British to have TASER drawn (but not

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								discharged) against them. **Subject 'mental disability'** Subjects perceived as 'mentally disabled' = more likely to have TASER drawn (but not discharged) against them, than those that are not.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Location Police or medical settings = less likely for TASER to be drawn (but not discharged). Dwellings = more likely for TASER to be drawn (but not discharged). **Alcohol** Alcohol perceived as an impact factor = less likely for TASER to be

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								drawn (but not discharged) than when not perceived as such. **Drugs** Drugs perceived as an impact factor = less likely for TASER to be drawn (but not discharged) than when not perceived as such.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Mental Health Mental health perceived as an impact factor = more likely for TASER to be drawn (but not discharged) than when not perceived as such. **Prior knowledge of subject** Prior knowledge perceived as an impact factor = more likely for TASER to be drawn

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Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								(but not discharged) than when not perceived as such. **Crowds** Crowds perceived as an impact factor = less likely for TASER to be drawn (but not discharged) than when not perceived as such.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Subject resistance Active resistance = more likely for TASER to be drawn (but not discharged) if non-active resistance is present. **Reason for use of force** Officers reportedly using force to protect themselves or others = more likely to result in officers drawing (but not

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								discharging) TASER when this is not the main reason that officers used force.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Ready, J. T., & White, M. D. (2011). Exploring patterns of taser use by the police: An officer-level analysis. *Journal of Crime and Justice*, *34*(3), 190–204. https://doi.org/10.1080/0735648X.2011.609741	+/+	USA	**Design:** Complex correlational design. **Methodology:** Cross-sectional survey of police officers and their experience and use of TASER.	The survey was completed by 580 officers who had regular access to TASERs, across 10 police departments in northeast USA (small medium and large in size).	Bivariate comparisons (X^2 & ANOVA)	**Officer** 1. Ethnicity 2. Gender 3. Age 4. Length of Service 5. Rank 6. Education 7. Special unit 8. Previous military service	**TASER user type.** Non-user, i.e. no taser uses in the past year vs users i.e. 1-2 uses in past year, vs 'high-frequency' users i.e. 3+ uses in the past year.	**Proportionality** 15% of officers were responsible for 60% of all TASER deployments and there are distinct differences between non-users and 'high-frequency' users. **Officer ethnicity** Non-white = more likely to be 'high-frequency' users.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): What is the prevalence and frequency of TASER use in a sample of officers across multiple police agencies? What are the characteristics that distinguish non-users, users and 'high-frequency' users of TASER?				Response rate was 66%. Mean age was 39; 31% of respondents were from BAME community; 10% were female; 23% were Sergeant ranks or higher;		9. Training sessions 10. Years carrying TASER **Other** 11. Crime rate (per 100k) 12. Policy 13. Used on passive resistance 14. Used on potentially		**Officer age** Younger = more likely to be 'high-frequency' users. **Length of service** Less experience = more likely to be 'high-frequency' users. **Crime rate (per 100k)** Higher crime rate = more likely to be 'high-frequency' users.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
				average length of service was 2 years, and; average number of years carrying TASER was 2.		lethal resistance		**Policy** Restrictive (use permitted for active physical resistance or higher) = more likely to be 'high-frequency' users. **Used on passive resistance** Yes = more likely to be 'high-frequency' users

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
								Used on potentially lethal resistance Yes= more likely to be 'high-frequency' users.

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: Sierra-Arévalo, M. (2019). Technological Innovation and Police Officers' Understanding and Use of Force. *Law and Society Review*, *53*(2), 420–451. https://doi.org/10.1111/lasr.12383	-	USA	**Design:** Mixed methods field design. **Methodology:** Ethnographic field observations and with a nested qualitative element via short interviews with officers to	Data was collected across three police departments (Elmont, West River, and Sunshine) between August 2014 and July 2018. **Observations** 1,020 hours of observation across three sites during primarily ride-	Abductive analysis	• TASER was used to make encounters safer and often in a pre-emptive capacity to avoid resistance and subject injuries. • The visual nature of 'red dotting' subjects was indicated as being a useful deterrent – especially when there was not enough justification to draw a firearm. • Is seen as a good resolution to situations where lethal force could have been justified. • 'Rookie cops' use TASER more (and possibly not in line with policy) because a) they lack the experience and communication skills of their colleagues with a longer length of service, b) because they have been given training on TASER

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Summary of research question(s): How do police officers make sense of TASER and incorporate this new technology into their understanding and practice of use of force?			triangulate results.	along with patrol officers. **Interviews** Unstructured ethnographic interviews with 108 officers.		more recently, and c) possibly view risks as higher (and do not want to engage physically with subjects).

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Sousa, W., Ready, J., & Ault, M. (2010). The impact of TASERs on police use-of-force decisions: Findings from a randomized field-training experiment. *Journal of Experimental Criminology*, *6*(1), 35–55. https://doi.org/10.1007/s11292-010-9089-1	-/+	USA	**Design:** Randomised control field-training trials. **Methodology:** Field observations of officer behaviour during a series of training trials.	64 officers attending the Las Vegas metropolitan police department Training bureaus advanced officer skills training unit.	Bivariate comparisons (Yates adjusted X2)	1. Subject resistance 2. Experimental vs control group (TASER vs. no TASER).	Type of force used.	• Being armed with TASER did not significantly impact situation involving non-aggressive subject resistance • In aggressive resistance scenario, being armed with TASER was associated with fewer uses of pepper spray and baton

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): How often do officers use the TASER as a response to different levels of suspect resistance? To what extent do officers use TASER as an alternative to other options?								• In lethal resistance scenario, being armed with TASER was associated with fewer uses of firearms • The higher the level of subject resistance, the more TASER is used (although this is not tested for significance).

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Reference: Thomas, K. J., Collins, P. A., & Lovrich, N. P. (2010). Conducted Energy Device Use in Municipal Policing: Results of a National Survey on Policy and Effectiveness Assessments. *Police Quarterly*, *13*(3), 290–315. https://doi.org/10.1177/1098611110373995	+/+	USA	**Design:** Complex correlational design. **Methodology:** Cross-sectional organisational survey at a municipal departmental level.	Surveys mailed out to 484 municipal police departments. 54% response rate. 210 cases included in analysis after excluding those that returned	Poisson-based negative binominal regression analysis.	1. Department's placement of TASER on the continuum of force 2. Departmental TASER policy 3. Hours of Taser training required by department.	Frequency of TASER deployment in department	• Higher the placement of TASER on the continuum of force the lower the number of reported TASER uses • More permissive policies resulted in higher reported frequencies of TASER use • More training resulted in higher

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method					Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	IVs (incl. controls)	DV	
Summary of research question(s): Where do forces place TASER in their continuum of force? Does TASER reduce use of lethal force? What is the relationship between TASER policy and TASER use?				incomplete surveys, rejections and departments that do not use TASER.				reported frequencies of TASER uses

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Reference: White, M. D., & Ready, J. (2007). The TASER as a less lethal force alternative: Findings on use and effectiveness in a large metropolitan police agency. *Police Quarterly*, *10*(2), 170–191. https://doi.org/10.1177/1098611106288915	++/+	USA (presumed)	**Design:** Descriptive **Methodology:** Profiled TASER use (discharge) by associated factors.	Use of force forms a large metropolitan urban centre. All reported TASER uses by department personnel between 2002-2004. 243 cases included in analysis.	Frequencies, proportions and cross-tabulations.	**Subjects in TASER incidents were mostly:** • Male • From BAME communities • Older • 'Emotionally disturbed' • Not intoxicated • Not armed • Violent • Shot accurately • Incapacitated successfully, and • Did not continue to resist **Officers in TASER incidents were mostly:** • Detectives • From the Emergency Service Unit

Table A.8.1 *Systematic Literature Review: Completed Data Extraction Sheet*

Reference and Research Questions	QA score	Country	Overview of Study Design and Method			Key Results Pertinent to the Research Questions of Study One
			Design and Methodology	Sample & Unit of Analysis	Main Analysis	
Summary of research question(s): What is the profile of TASER use?						• Had back-up present • Had Supervisors present • Were satisfied with TASER **TASER incidents were mostly:** • Indoors • Within departmental policy

Appendix 9 - Systematic Literature Review: Theme Table and Factor Evaluation

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Type of call/offence/ incident	**5 Studies in total** **1 x Descriptive Study** (DeLone & Thompson, 2009) **1 x Qualitative Study** (Hine et al., 2018b)	Factor of uncertain influence due to conflicting evidence	Although five studies assessed this factor, only three are multivariate studies and they result in conflicting findings.

[72] Where studies have utilised a number of relevant analyses, they are listed under the most robust type of analysis included in their reporting. For example, where a study has reported relevant descriptive statistics as well as the results from a pertinent bivariate analyses, they will be listed under 'Bivariate Study' only.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		3 x Multivariate Studies *1 x study found no association(s)* (Crow & Adrion, 2011) *2 x studies found association(s)* (Dymond, 2016; Kuzik, 2019)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Number of officers present	**7 Studies in total** **2 x Descriptive Studies** (DeLone & Thompson, 2009; White & Ready, 2007) **1 x Qualitative Study** (Hine et al., 2018b) **4 x Multivariate Studies** *2 x studies found no association(s)* (Dymond, 2016, 2018)	Factor of uncertain influence due to conflicting evidence	Although seven studies assessed this factor, only four were multivariate; two of which used the same data set. In addition, the results of these 4 studies were conflicting.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		2 x studies found association(s) (Brandl & Stroshine, 2017; Quinton et al., 2020)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Number of officers that apply force	**2 Studies in total** **2 x Multivariate Studies** *2 x studies found no association(s)* (Brandl & Stroshine, 2017; Dymond, 2016)	Factor of indeterminate influence due to lack of evidence	Only two studies assessed this factor in total.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Number of subjects and/or bystanders	**5 Studies in total** **1 x Descriptive Study** (DeLone & Thompson, 2009) **1 x Qualitative Study** (Hine et al., 2018b) **3 x Multivariate Studies** 3 x *studies found association(s)* (Brandl & Stroshine, 2017; Dymond, 2016; Quinton et al., 2020)	Potentially influencing factor	Five studies assessed this factor, three of which were multivariate studies that resulted in convergent findings. These findings were also supported by the qualitative study.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Local TASER and use of force policies	**8 Studies in total** **1 x Descriptive Study** (White & Ready, 2007) **1 x Bivariate study** 1 x *study found no association(s)* (Ready & White, 2011) **6 x Multivariate Studies** 6 x *studies found association(s)*	Potentially influencing factor	Eight studies assessed this factor, seven of which were inferential studies; the majority of which had convergent findings (86%).

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Bishopp et al., 2015; Boehme et al., 2021; Crow & Adrion, 2011; Dymond, 2016, 2018; Thomas et al., 2010)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Time of day and/or lighting	**4 Studies in total** **4 x Multivariate Studies** 3 x *studies found no association(s)* (Crow & Adrion, 2011; Dymond, 2016; Gau et al., 2010) *1 x study found association(s)* (Kuzik, 2019)	Factor of uncertain influence due to conflicting evidence	Four studies assessed this factor, four of which were multivariate studies, however there was only 75% convergence in the findings.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Location	**5 Studies in total** **3x Descriptive Study** (DeLone & Thompson, 2009; den Heyer, 2020; White & Ready, 2007) **1 x Qualitative Study** (Hine et al., 2018b) **1 x Multivariate Study** *1 x study found association(s)* (Quinton et al., 2020)	Potentially influencing factor	Five studies assessed this factor, including one multivariate study.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Season	**1 Study in total** **1 x Multivariate Study** 1 x *study found no association(s)* (Bishopp et al., 2015)	Factor of indeterminate influence due to lack of evidence	Only one study examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Crime rate	**1 Study in total** **1 x Bivariate Study** *1 x study found association(s)* (Ready & White, 2011)	Factor of indeterminate influence due to lack of evidence	Only one study examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Day of the week	**<u>1 Study in total</u>** **1 x Multivariate Study** *1 x study found association(s)* (Kuzik, 2019)	Factor of indeterminate influence due to lack of evidence	Only one study examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and Interactional Elements	Level of subject resistance / compliance	**<u>15 Studies in total</u>** **2 x Descriptive Studies** (DeLone & Thompson, 2009; Mesloh et al., 2005) **3 x Qualitative Studies** (Escalante, 2020; Hine et al., 2018b; Sierra-Arévalo, 2019) **2 x Bivariate Studies** 2 x *studies found association(s)*	Potentially influencing factor	Fifteen studies assessed this factor, ten of which used inferential statistics to explore the data. All bar one of these studies found an association, and the one divergent study is likely to have conflicting

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Ready & White, 2011; Sousa et al., 2010) **8 x Multivariate Studies** *1 x study found no association(s)* (Brandl & Stroshine, 2017) *7 x studies found association(s)* (Crow & Adrion, 2011; Dymond, 2016, 2018; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020)		results due to using a different dependent variable.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 1: Situational, Contextual and	Reason for use of force	**<u>3 Study in total</u>** **3 x Multivariate Studies** 3 x *studies found association(s)* (Dymond, 2016, 2018; Quinton et al., 2020)	Factor of indeterminate influence due to lack of evidence	Only three studies examined this factor; two of which used the same data set.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Ethnicity	**<u>10 Studies in total</u>** **2 x Descriptive Study** (DeLone & Thompson, 2009; den Heyer, 2020) **8 x Multivariate Studies** *4 x studies found no association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019) *4 x studies found association(s)*	Factor of uncertain influence due to conflicting evidence	Ten studies examined this factor; eight of which were multivariate in nature. However, two of these studies used the same data set and the results were conflicting across the board.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Crow & Adrion, 2011; Gau et al., 2010; Lin & Jones, 2010; Quinton et al., 2020)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Gender	**<u>10 Studies in total</u>** **2 x Descriptive Studies** (DeLone & Thompson, 2009; den Heyer, 2020) **1 x Qualitative Study** (Hine et al., 2018b) **7 x Multivariate Studies** *1 x study found no association(s)* (Brandl & Stroshine, 2017) *6 x studies found association(s)*	Potentially influencing factor	Ten studies examined this factor. Seven of these studies were multivariate in nature; the majority of which had convergent findings (86%). Moreover, the one divergent study is likely to have

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Crow & Adrion, 2011; Dymond, 2016, 2018; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020)		conflicting results due to using a different dependent variable.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Age	**<u>6 Studies in total</u>** **2 x Descriptive Studies** (den Heyer, 2020; White & Ready, 2007) **4 x Multivariate Studies** 3 x *studies found no association(s)* (Brandl & Stroshine, 2017; Crow & Adrion, 2011; Kuzik, 2019) *1 x study found association(s)* (Quinton et al., 2020)	Factor of uncertain influence due to conflicting evidence	Six studies assessed this factor, four of which were multivariate studies; however, there was only 75% convergence across the findings from these four studies.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Height and weight	**3 Studies in total** **1 x Qualitative Study** (Hine et al., 2018b) **2 x Multivariate Studies** *2 x studies found no association(s)* (Brandl & Stroshine, 2017; Crow & Adrion, 2011)	Factor of indeterminate influence due to lack of evidence	Only three study examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Mental illness and mental disturbance	**7 Studies in total** **2 x Descriptive Studies** (den Heyer, 2020; White & Ready, 2007) **5 x Multivariate Studies** *5 x study found association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)	Potentially influencing factor	Seven studies assessed this factor, five of which were multivariate studies with convergent findings.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Intoxication	**8 Studies in total** **3 x Descriptive Studies** (DeLone & Thompson, 2009; den Heyer, 2020; White & Ready, 2007) **5 x Multivariate Studies**[73] *4 x study found no association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019)	Factor of uncertain influence due to conflicting evidence	Eight studies assessed this factor, five of which were multivariate studies. The majority of these multivariate studies had divergent findings, within and between types of

[73] Please note: the number of associations listed below will not equate the to the number of multivariate studies as several studies included more than one analysis relating to intoxication.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		3 x studies found association(s) (Dymond, 2016, 2018; Quinton et al., 2020)		intoxication (i.e. drugs / alcohol)

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Subject armed, or believed to be armed with a weapon	**7 Studies in total** **2 x Descriptive Studies** (den Heyer, 2020; White & Ready, 2007) **1 x Qualitative Study** (Escalante, 2020) **4 x Multivariate Studies**[74] *1 x study found no association(s)* (Brandl & Stroshine, 2017)	Factor of uncertain influence due to conflicting evidence	Six studies assessed this factor, five of which were multivariate studies. Only one study examined the belief that a subject was armed, and four examined the subject actually being

[74] Please note: the number of associations listed below will not equate the to the number of multivariate studies as several studies had more than one analysis relating to intoxication.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		4 x studies found association(s) (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Lin & Jones, 2010)		armed; however there was only 75% convergence across the findings from these four studies and two of these studies utilised the same dataset.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 2: Subject Characteristics	Previous police contact / Prior knowledge	**2 Study total** **1 x Descriptive Study** (DeLone & Thompson, 2009) **1 x Multivariate Study** *1 x study found association(s)* (Quinton et al., 2020)	Factor of indeterminate influence due to lack of evidence	Only two studies examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Ethnicity	**6 Studies in total** **1 x Bivariate Study** 1 x *study found association(s)* (Ready & White, 2011) **5 x Multivariate Studies** *1 x study found no association(s)* (Crow & Adrion, 2011) *4 x studies found association(s)*	Potentially influencing factor	Six studies assessed this factor, five of which were multivariate studies. The majority of these multivariate studies had convergent findings (80%).

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Bishopp et al., 2015; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Gender	**7 Studies in total** **1 x Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011) **6 x Multivariate Studies** *4 x studies found no association(s)* (Bishopp et al., 2015; Crow & Adrion, 2011; Gau et al., 2010; Lin & Jones, 2010)	Factor of uncertain influence due to conflicting evidence	Seven studies assessed this factor, six of which were multivariate studies. However, the findings across these multivariate studies were divergent.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		2 x studies found association(s) (Kuzik, 2019; Quinton et al., 2020)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Age	**4 Studies in total** **1 x Bivariate Studies** 1 x *association found* (Ready & White, 2011) **3 x Multivariate Studies** *1 x study found no association(s)* (Gau et al., 2010) *2 x studies found association(s)* (Crow & Adrion, 2011; Kuzik, 2019)	Factor of uncertain influence due to conflicting evidence	Four studies assessed this factor, three of which were multivariate studies. However, the findings across these multivariate studies were mostly divergent.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Rank	**4 studies in total** **1 x Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011) **3 x Multivariate Studies** *3 x studies found no association(s)* (Crow & Adrion, 2011; Dymond, 2016; Gau et al., 2010)	Factor of unlikely influence	Four studies examined this factor, with three being multivariate in nature. Moreover, the majority of these multivariate studies had convergent findings (80%).

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Role	**<u>6 studies in total</u>** **1 x Descriptive Study** (White & Ready, 2007) **1 x Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011) **4 x Multivariate Studies** *4 x studies found association(s)*	Potentially influencing factor	Six studies examined this factor; five of which used inferential statistics to examine the data. Moreover, the majority results from these multivariate studies were convergent.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Length of Service	**<u>7 studies in total</u>** **1 x Qualitative Study** (Sierra-Arévalo, 2019) **1 x Bivariate Study** *1 x study found association(s)* (Ready & White, 2011) **5 x Multivariate Studies** *1 x study found no association(s)*	Potentially influencing factor	Seven studies examined this factor; six of which used inferential statistics to examine the data. Moreover, the majority of these multivariate studies had convergent findings (83%).

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	Factor Subtheme	Summary of Factor Evidence[72]	Overall Factor Evaluation	Comments
		(Lin & Jones, 2010) *4 x studies found association(s)* (Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)		

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence[72]**	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Education	**1 Study in total** **1 Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011)	Factor of indeterminate influence due to lack of evidence	Only one study examined this factor.
Global theme 3: Officer Factors	Previous military service	**1 Study total** **1 Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011)	Factor of indeterminate influence due to lack of evidence	Only one study examined this factor.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Recency of Personal Safety Training	**2 Studies in total** **2 x Multivariate Studies** *2 x studies found association(s)* (Dymond, 2016, 2018)	Factor of indeterminate influence due to lack of evidence	Only two studies examined this factor; both of which used the same data set.

Table A.9.1 *Systematic Literature Review: Theme Table and Factor Evaluation*

Global Factor Theme	**Factor Subtheme**	**Summary of Factor Evidence**[72]	**Overall Factor Evaluation**	**Comments**
Global theme 3: Officer Factors	Experience of using and carrying Taser	**2 Studies in total** **1 x Bivariate Study** *1 x study found no association(s)* (Ready & White, 2011) **1 x Multivariate Study** *1 x study found association(s)* (Bishopp et al., 2015)	Factor of indeterminate influence due to lack of evidence	Only two studies examined this factor.

Appendix 10 - Systematic Literature Review: Quality Assessment Tables

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
1.1 Is the source population or source area well described?	++	++	++	+	NR	++
1.2 Is the eligible population or area representative of the source population or area?	NR	++	++	++	NR	++
1.3 Do the selected participants or areas represent the eligible population or area?	+	++	++	NR	NR	++
2.1 Allocation to intervention (or comparison). How was selection bias minimised?	NA	NA	NA	NA	+	NA

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
2.2 Were interventions (and comparisons) well described and appropriate?	++	NA	NA	NA	++	NA
2.3 Was the allocation concealed?	NA	NA	NA	NA	NA	NA
2.4 Were participants or investigators blind to exposure and comparison?	NA	NA	NA	NA	NA	NA
2.5 Was the exposure to the intervention and comparison adequate?	++	NA	NA	NA	++	NA
2.6 Was contamination acceptably low?	NA	NA	NA	NA	++	NA

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
2.7 Were other interventions similar in both groups?	NA	NA	NA	NA	NA	NA
2.8 Were all participants accounted for at study conclusion?	+	++	++	NA	NA	NA
2.9 Did the setting reflect usual UK practice?	-	-	-	-	-	-
2.10 Did the intervention or control comparison reflect usual UK practice?	-	NA	NA	NA	NA	-
3.1 Were outcome measures reliable?	+	+	++	+	+	+
.3 Were all outcome measurements complete?	+	++	-	NR	NR	+
3.3 Were all important outcomes assessed?	++	++	-	++	+	++

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
3.4 Were outcomes relevant?	++	++	++	++	++	++
3.5 Was there a similar follow-up time in exposure and comparison groups?	NA	NA	NA	NA	NA	NA
3.6 Was follow-up time meaningful?	++	NA	NA	NA	NA	NA
4.1 Were exposure and comparison groups similar at baseline? If not, were these adjusted?	NA	NA	NA	NA	NA	NA
4.2 Was intention to treat (ITT) analysis conducted?	NA	NA	NA	NA	NA	NA

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
1.3 Was the study sufficiently powered to detect an intervention effect (if one exists)?	NR	NA	NA	NA	+	NA
4.4 Were the estimates of effect size given or calculable?	NR	NA	NA	NA	-	NA
4.5 Were the analytical methods appropriate?	++	++	++	++	++	++
4.6 Was the precision of intervention effects given or calculable? Were they meaningful?	NR	NA	NA	NA	+	NA
5.1 Overall score for external validity (EV)	+	+	++	-	-	++

Table A.10.1 *Systematic Literature Review: Quality Assessment Scores for Quantitative Studies*

Question	Boehme et al. (2021) *	DeLone and Thompson (2009) †	den Heyer (2020)	Mesloh et al. (2005) *	Sousa et al. (2010)*	White and Ready (2007)¥
5.2 Overall score for internal validity (IV)	+	+	-	+	+	+

*= Scored by lead reviewer only †=Scored by both reviewers ¥=scored by bother reviewers and used for interrater reliability scores

Table A.10.2 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 1*

Question	Bishopp et al. (2015)*	Brandl and Stroshine (2017) †	Crow and Adrion (2011)*	Dymond (2016)*	Dymond (2018) ¥	Gau et al. (2010)*
1.1 Is the source population or source area well described?	+	++	+	-	-	+
1.2 Is the eligible population or area representative of the source population or area?	+	+	+	++	++	+
1.3 Do the selected participants or areas represent the eligible population or area?	+	+	+	++	++	+
2.1 Selection of exposure (and comparison) group. How was selection bias minimised?	NA	NA	NA	NA	NA	NA

Table A.10.2 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 1*

Question	Bishopp et al. (2015)*	Brandl and Stroshine (2017) †	Crow and Adrion (2011)*	Dymond (2016)*	Dymond (2018) ¥	Gau et al. (2010)*
2.2 Was the selection of explanatory variables (predictor variable) based on a sound theoretical basis?	++	++	++	++	++	++
2.3 Was the contamination acceptably low?	NA	NA	NA	NA	NA	NA
2.4 How well were likely confounding factors identified and controlled?	+	NA	+	+	+	+
2.5 Is the setting applicable to the UK?	+	+	+	++	++	+
3.1 Were outcome measures and procedures reliable?	+	+	+	+	+	+

Table A.10.2 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 1*

Question	Bishopp et al. (2015)*	Brandl and Stroshine (2017) †	Crow and Adrion (2011)*	Dymond (2016)*	Dymond (2018) ¥	Gau et al. (2010)*
3.2 Were all outcome measurements complete?	++	NA	+	NA	NA	NA
3.3 Were all important outcomes assessed?	+	++	+	++	++	++
3.4 Was there a similar follow-up time in exposure and comparison groups?	NA	NA	NA	NA	NA	NA
3.5 Was follow-up time meaningful?	NA	NA	NA	NA	NA	NA
4.1 Was the study sufficiently powered to detect an intervention effect (if one exists)?	NR	NR	NR	NR	NR	NR
4.2 Were multiple explanatory variables considered in the analyses?	++	+	++	++	++	++
4.3 Were the analytical methods appropriate?	+	+	+	+	+	+

Table A.10.2 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 1*

Question	Bishopp et al. (2015)*	Brandl and Stroshine (2017) †	Crow and Adrion (2011)*	Dymond (2016)*	Dymond (2018) ¥	Gau et al. (2010)*
4.4 Was the precision of association given or calculable? Is association meaningful?	+	+	+	+	+	+
5.1 Overall score for external validity (EV)	+	+	+	++	++	+
5.2 Overall score for internal validity (IV)	+	+	+	++	++	+

Table A.10.3 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 2*

Question	Kuzik (2019)*	Lin and Jones (2010)*	Quinton et al. (2020)*	Ready and White (2011)*	Thomas et al. (2010) †
1.1 Is the source population or source area well described?	++	+	++	++	++
1.2 Is the eligible population or area representative of the source population or area?	+	+	++	+	+
1.3 Do the selected participants or areas represent the eligible population or area?	+	+	++	+	-
2.1 Selection of exposure (and comparison) group. How was selection bias minimised?	NA	NA	NA	NA	NA

Table A.10.3 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 2*

Question	Kuzik (2019)*	Lin and Jones (2010)*	Quinton et al. (2020)*	Ready and White (2011)*	Thomas et al. (2010) †
2.2 Was the selection of explanatory variables (predictor variable) based on a sound theoretical basis?	++	++	++	++	++
2.3 Was the contamination acceptably low?	NA	NA	NA	NA	NA
2.4 How well were likely confounding factors identified and controlled?	+	+	+	-	+
2.6 Is the setting applicable to the UK?	-	+	++	+	-
3.1 Were outcome measures and procedures reliable?	+	+	+	+	+

Table A.10.3 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 2*

Question	Kuzik (2019)*	Lin and Jones (2010)*	Quinton et al. (2020)*	Ready and White (2011)*	Thomas et al. (2010) †
3.3 Were all outcome measurements complete?	NA	NR	NA	NR	+
3.3 Were all important outcomes assessed?	++	++	++	++	++
3.4 Was there a similar follow-up time in exposure and comparison groups?	NA	NA	MA	NA	NA
3.5 Was follow-up time meaningful?	NA	NA	NA	NA	NA
4.1 Was the study sufficiently powered to detect an intervention effect (if one exists)?	NR	NR	NR	NR	NR
4.2 Were multiple explanatory variables considered in the analyses?	++	++	++	+	++
4.3 Were the analytical methods appropriate?	+	+	+	+	+

Table A.10.3 *Systematic Literature Review: Quality Assessment Scores for Correlational Studies - Part 2*

Question	Kuzik (2019)*	Lin and Jones (2010)*	Quinton et al. (2020)*	Ready and White (2011)*	Thomas et al. (2010) †
4.4 Was the precision of association given or calculable? Is association meaningful?	-	+	+	+	+
5.1 Overall score for external validity (EV)	+	+	++	+	+
5.2 Overall score for internal validity (IV)	+	+	++	+	+

*= Scored by lead reviewer only †=Scored by both reviewers ¥=scored by bother reviewers and used for interrater reliability scores

Table A.10.4 *Systematic Literature Review: Quality Assessment Scores for Qualitative Studies*

Question	Escalante (2020)*	Hine et al. (2018b) ¥	Sierra-Arévalo (2019)†
1. Is a qualitative approach appropriate?	Appropriate	Appropriate	Appropriate
2. Is the study clear in what it seeks to do?	Clear	Clear	Clear
3. How defensible/rigorous is the research design/methodology?	Defensible	Defensible	Indefensible
4. How well was the data collection carried out?	Appropriately	Appropriately	Not sure / Inadequately reported
5. Is the role of the researcher clearly described?	Clear	Unclear	Clear
6. Is the context clearly described?	Clear	Clear	Not sure
7. Were the methods reliable?	Reliable	Reliable	Unsure
8. Is the data analysis sufficiently rigorous?	Rigorous	Rigorous	Not sure / Not reported
9. Is the data 'rich'?	Rich	Rich	Not sure/Not reported
10. Is the analysis reliable?	Reliable	Reliable	Unreliable
11. Are the findings convincing?	Convincing	Convincing	Not convincing
12. Are the findings relevant to the aims of the study?	Relevant	Relevant	Relevant
13. Conclusions	Adequate	Adequate	Inadequate
14. How clear and coherent is the reporting of ethics?	Appropriate	Not sure/Not reported	Not sure/Not reported

Table A.10.4 *Systematic Literature Review: Quality Assessment Scores for Qualitative Studies*

Question	Escalante (2020)*	Hine et al. (2018b) ¥	Sierra-Arévalo (2019)†
Overall assessment	++	++	-

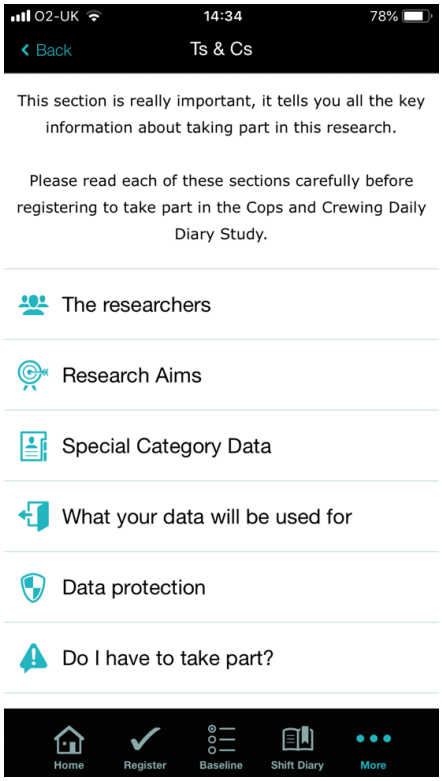
*= Scored by lead reviewer only †=Scored by both reviewers ¥=scored by bother reviewers and used for interrater reliability scores

Appendix 11 - Diary Study: Participant Information

Participant information was provided via the app under the title of the 'Ts & Cs.'

Figure A.11.1 – A.11.13 Diary Study: App 'Ts & Cs' screen shots

Figure A.11.1



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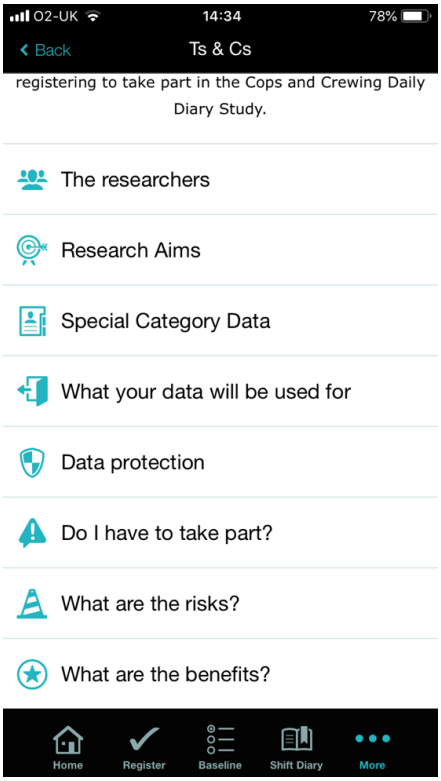
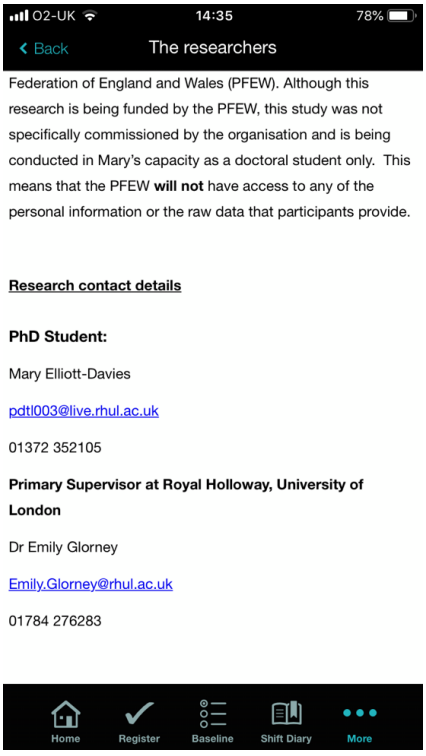


Figure A.11.3

Figure A.11.4



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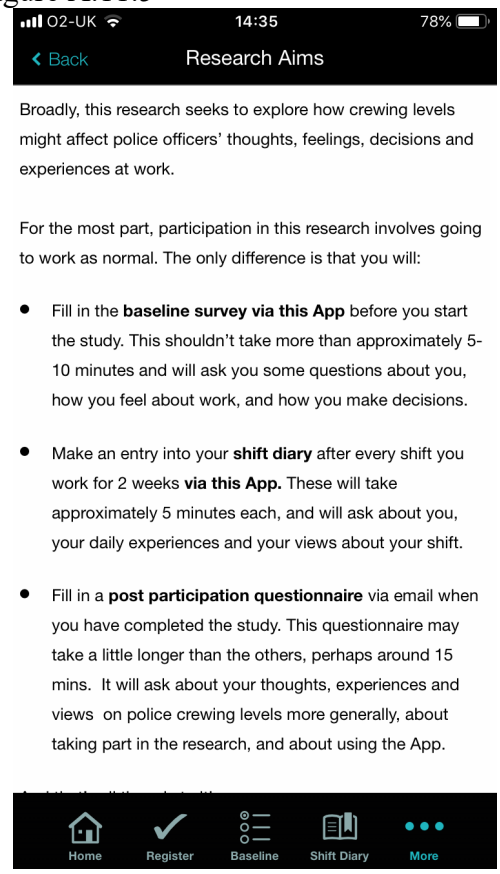

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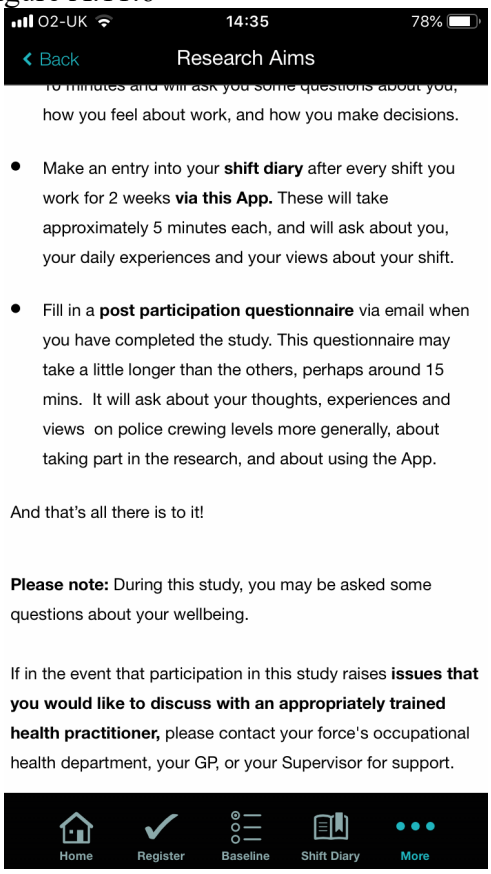

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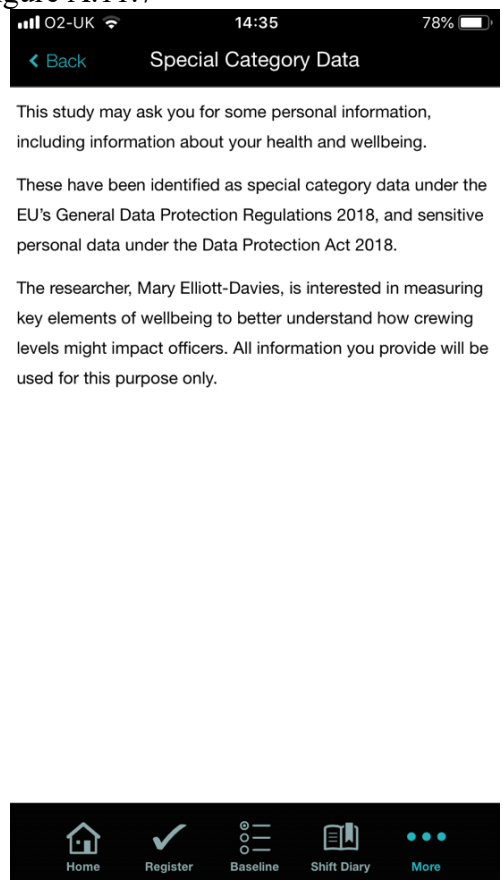

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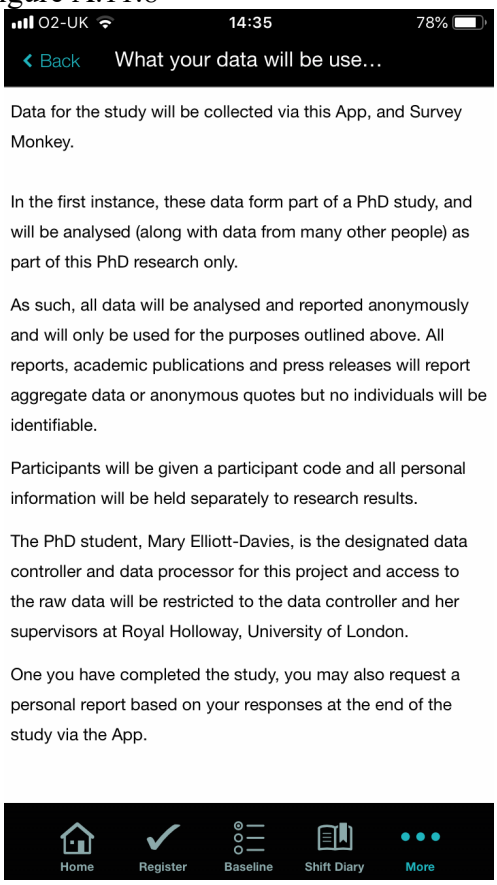

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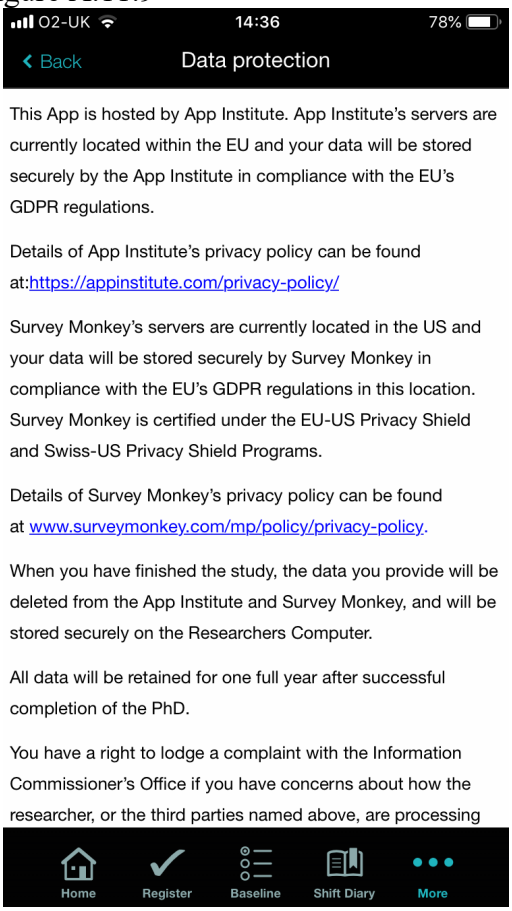

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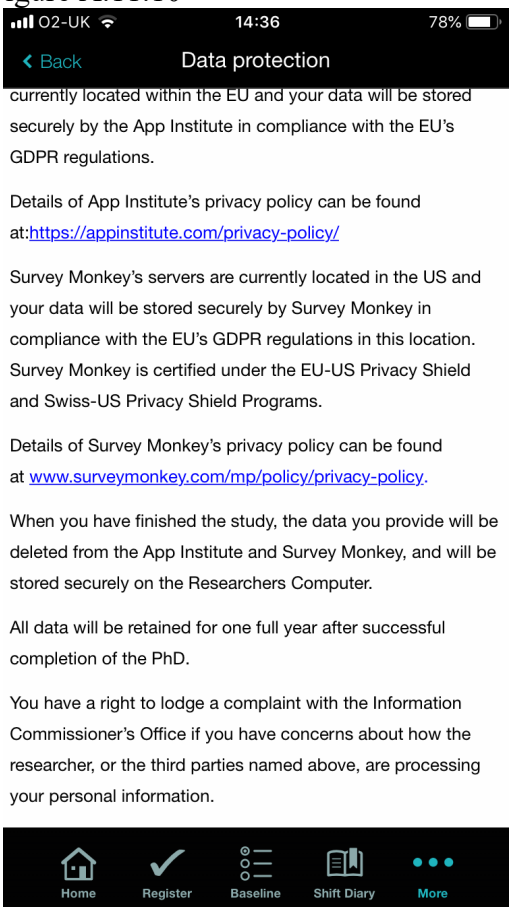

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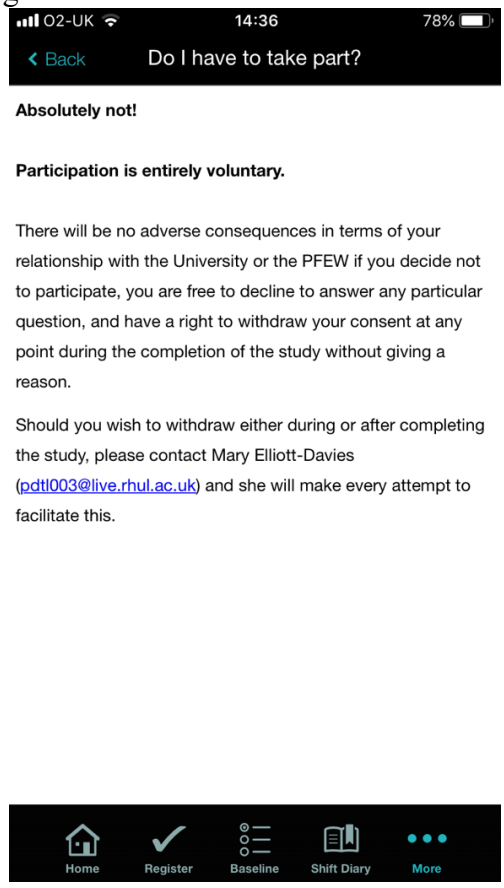

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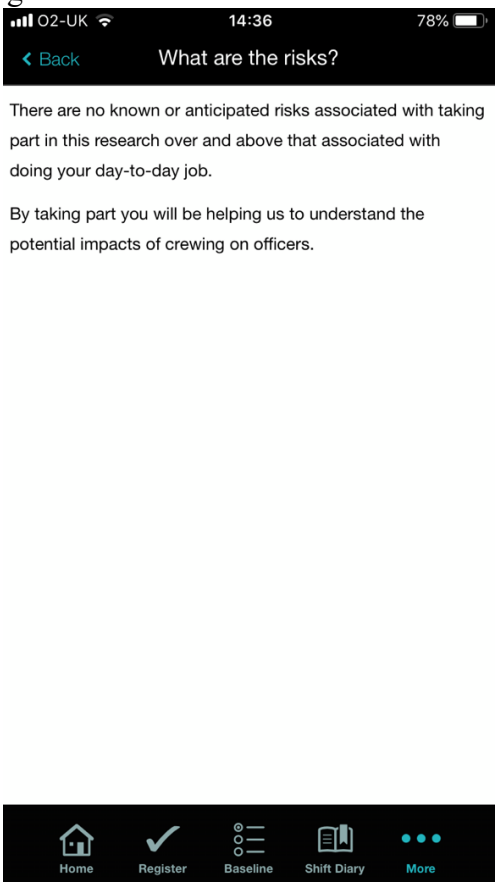
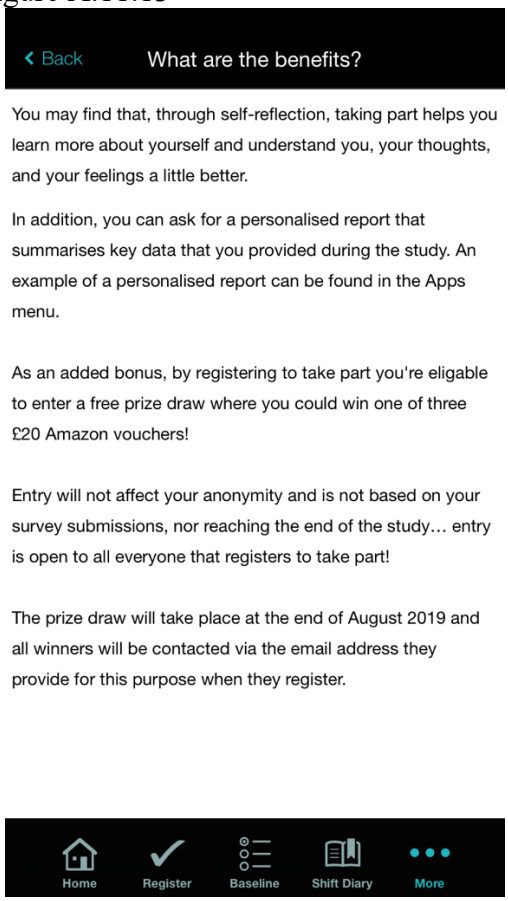


Figure A.11.13



Appendix 12 - Diary Study: Letter of Agreement between the Police Federation of England and Wales and Royal Holloway, University of London

Letter of Agreement

The Police Federation of England and Wales

The Police Federation of England and Wales (PFEW)
Federation House
Highbury Drive
Leatherhead, KT22 7UY
01372 352105
12th December 2018

Royal Holloway, University of London
Egham
Surrey
TW20 0EX

To Royal Holloway University London:

I am familiar with Mary Elliott-Davies' research project entitled '*Cops and Crewing a Daily Diary Study*' and understand the PFEW's involvement to be limited to population access by sending out an invitation email via our National Members Database to a random sample of three thousand police officers.

I understand that this research will be carried out adhering to sound ethical principles and data protection requirements and that participant involvement in this research study is strictly voluntary and provides confidentiality of research data, as described in the terms and conditions of the study (attached as Annex A). As participation in the study consists of several confidential questionnaires, a list of questions has also been included (Annex B) for your information.

Therefore, as a representative of the PFEW, I agree that Mary Elliott-Davies' research project may be conducted with the help of our organization as outlined above.

Sincerely,

Ché Donald
National Vice-Chair
Police Federation of England and Wales

Joan Donnelly

Dr Joan Donnelly
Head of Research and Policy Support
Police Federation of England and Wales

Appendix 13 - Diary Study: Examples of Participant Invitation Methods

Figure A.13.1 Diary Study: Invitation Flyer

Research Invitation:
The Cops and Crewing Diary Study

Why I'm conducting the research, and who can take part

I'm conducting a research project as part of a PhD programme at Royal Holloway University London, which aims to help better understand the issues that officers face day-to-day. More specifically, this research aims to explore (and evidence!) how crewing levels can affect how police officers think, feel and act.

If you're a front-line officer who has everyday contact with the public, and you have a spare 5 minutes after your shifts to complete a quick diary entry - then please read on!

What does taking part involve?

The project has been granted ethical approval from Royal Holloway University London (ref:1449) and involves 3 things:

- Filling in a baseline questionnaire.
- Filling in a quick 5-minute survey at the end of each shift for two weeks via a phone App called '*RH Cops and Crewing Study.*'
- Filling in a post participation survey the end of the study.

Why should you take part?

You may find that taking part in the study helps you, through self-reflection, to learn more about yourself and, if you want, you can request a personalised report detailing your answers to some of the key questions, including:

- Analysis on your decision-making style
- Trend analysis on your workload and stress ratings
- Working hour analysis, and
- Sleep scores.

Also, as an added bonus, you can enter into a free prize draw for the chance to **win one of three £20 Amazon vouchers** when you sign-up for the study!

How can you sign-up or find out more?

Download the App from the Google Play Store or the Apple Store (search for '*RH Cops and Crewing Study*').

Read the terms and conditions (Ts & Cs) in the App carefully.

If you're happy to take part, **submit a registration form via the App**, and you'll receive an email with your sign in details!

If you need any help or have any questions, please don't hesitate to contact me, Mary Elliott-Davies, at my University email address: pdtl003@live.rhul.ac.uk.

Thanks for taking the time to read this flyer and I hope you consider taking part!

A.13.2 Diary Study: Invitation Poster

How do single and double crewing affect the way police officers think, feel and act?

Interested in being part of a research study via an app on your phone?

Then please read on…

The Cops and Crewing Diary Study

As part of a PhD programme at Royal Holloway University London, a local student is conducting a research project to help better understand the issues that officers face day-to-day. More specifically, to explore (and evidence!) how crewing levels might affect how police officers think, feel and act.

If you're a front-line officer who has everyday contact with the public, then please consider taking part!

What does taking part involve?

The project has been granted ethical approval from Royal Holloway University London (ref:1449) and involves 3 things:

- Filling in a baseline questionnaire.
- Filling in a quick 5-minute survey at the end of each shift for two weeks via a phone app called '*RH Cops and Crewing Study*.'
- Filling in a post participation survey at the end of the study.

Also, as an added bonus, you can enter into a free prize draw for the chance to win one of three £20 Amazon vouchers when you sign-up for the study!

To sign up or find out more

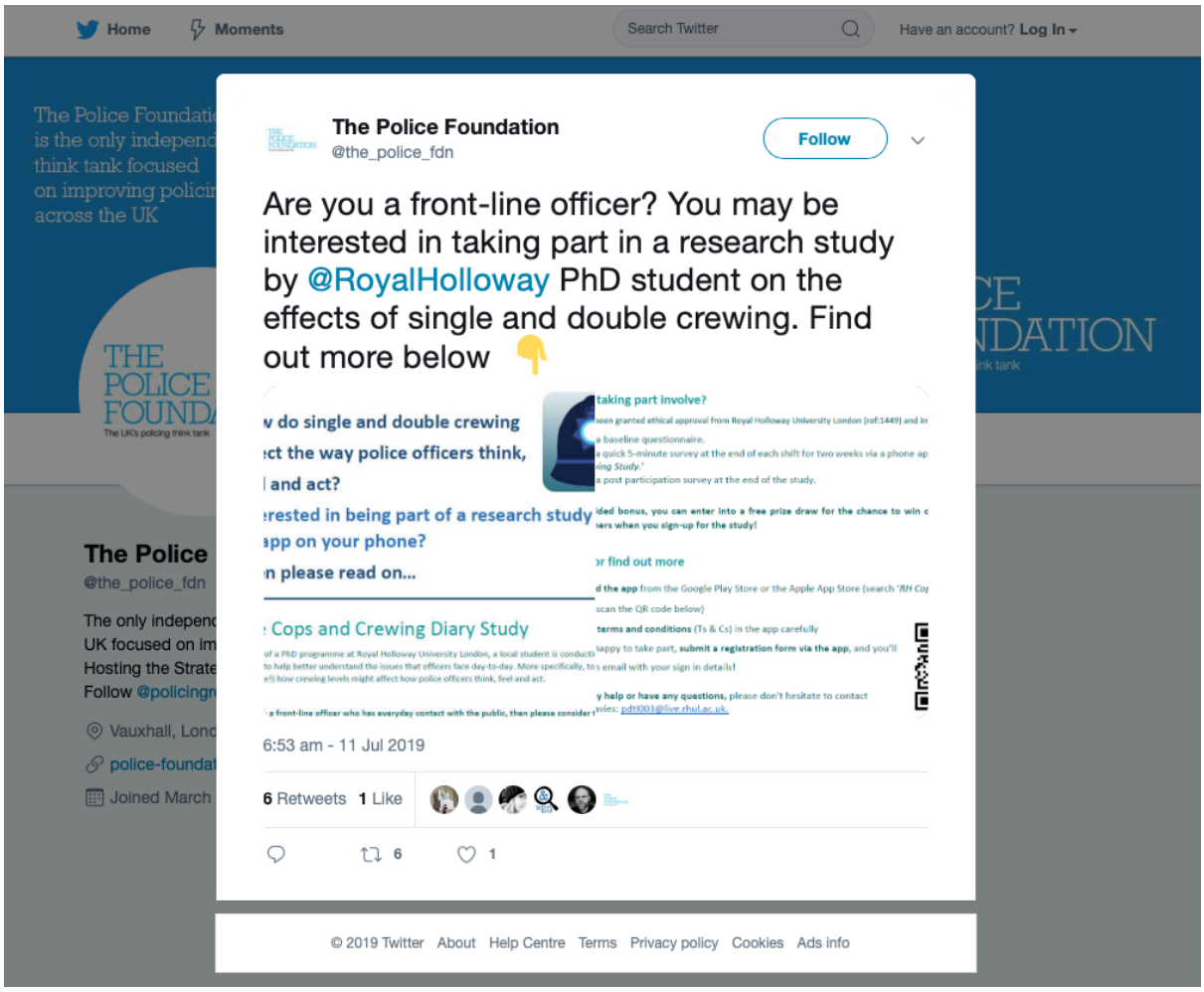
Download the app from the Google Play Store or the Apple App Store (search '*RH Cops and Crewing Study*' or scan the QR code below)

Read the terms and conditions (Ts & Cs) in the app carefully

If you're happy to take part, **submit a registration form via the app**, and you'll receive an email with your sign in details!

If you need any help or have any questions, please don't hesitate to contact Mary Elliott-Davies: pdtl003@live.rhul.ac.uk.

A.13.3 Diary Study: Invitation Tweet (example screen shot)

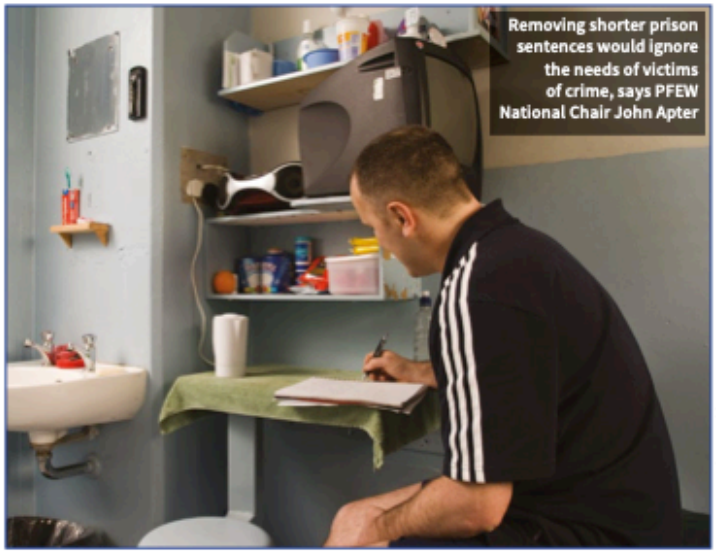


A.13.3 Diary Study: Invitation Article in Police Magazine[75]

Scrapping prison sentences of less than 12 months would be 'absurd'

Scrapping 12-month or less prison sentences would be absurd without investment in policing and probation services, and could render the new Assaults on Emergency Workers (Offences) Act useless, says Police Federation of England and Wales (PFEW) National Chair John Apter.

On April 3 the House of Commons Justice Select Committee released its full report addressing concerns over the growing prison population and re-offending. It concurred with the Government's view that ineffective prison sentences of less than six months should be removed, while further suggesting this should be extended to include 12-month sentences.



Removing shorter prison sentences would ignore the needs of victims of crime, says PFEW National Chair John Apter

Picture © Mark Harvey / Alamy

Ignoring justice

PFEW National Chair Mr Apter, said: "First and foremost, this is all driven by cost saving, it's not driven by the needs of the victim who must be at the heart of any decisions – to ignore them is to ignore justice. We talk about prison overcrowding and the pressure this adds to the prison system. The simple solution is to build more prisons. Sadly, it's clear that with the current Government this is not going to happen."

Mr Apter continued: "What we need is a full review and reform of the criminal justice system; people are being sent to prison who shouldn't be and visa-versa. This is perverse, and it is wrong."

Re-offending currently costs the Government £15bn a year – resulting in less funding for rehabilitative initiatives which would help curb this issue, the report said.

The prison population has grown significantly from 44,246 in 1993 to 82,384 as at December 2018, but has remained relatively stable since 2012. However, the amount spent on prisons has fallen in recent years, it added – advising the Treasury to keep in mind the implications in the run up to the next spending review.

> "First and foremost, this is all driven by cost saving, it's not driven by the needs of the victim who must be at the heart of any decisions – to ignore them is to ignore justice."
>
> **John Apter**
> National Chair, PFEW

Survey to uncover impact of single crewing on officers

Police officers are needed to take part in a survey intended to record their views and experiences of being single and double crewed.

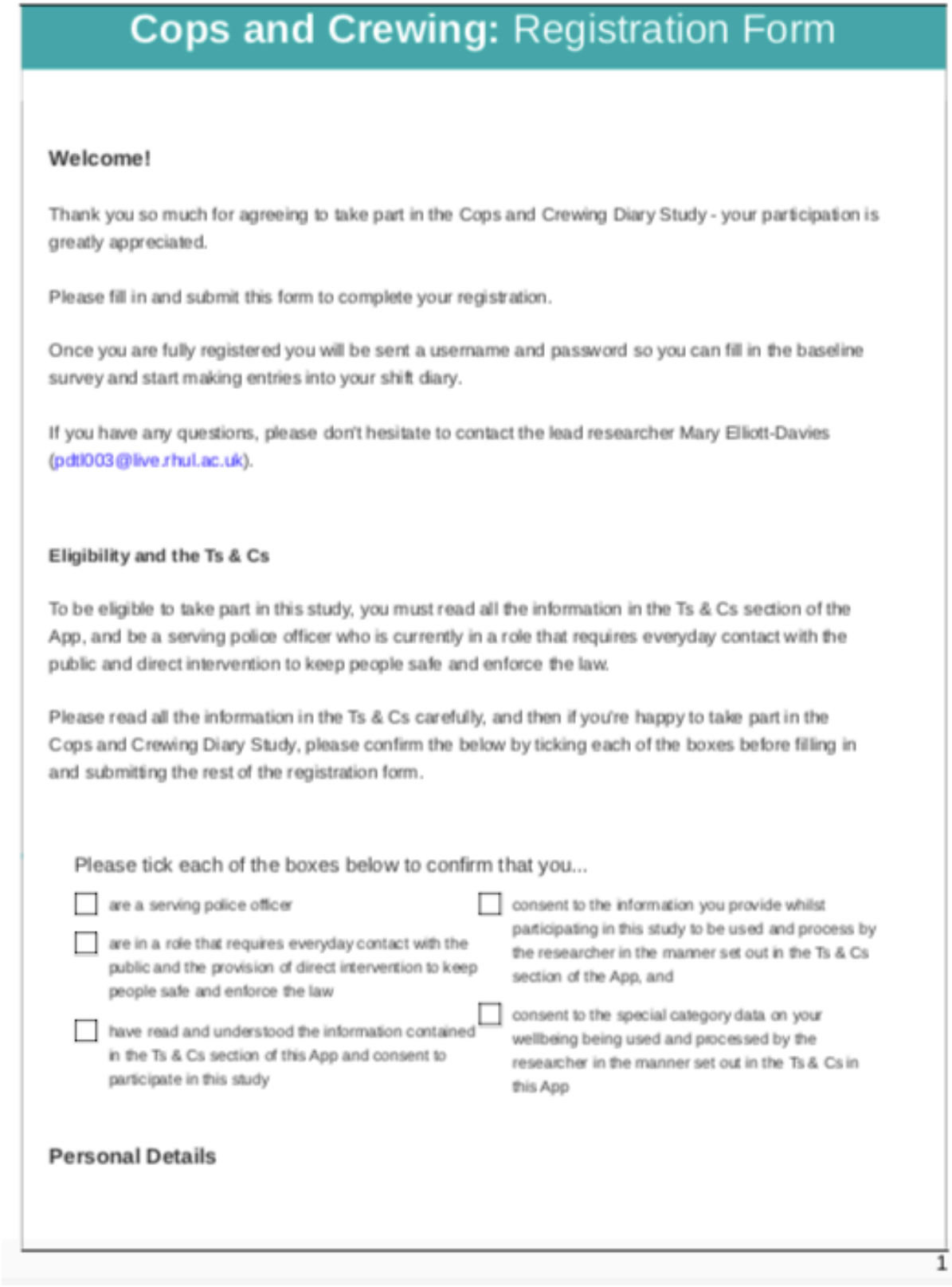
Mary Elliott-Davies, a researcher for the Police Federation of England and Wales (PFEW), wants to build an evidence base as part of her PhD studies, which can be used to influence policy makers and senior police leaders.

Mary said: "We know from the latest PFEW *Demand, Capacity and Welfare Survey* that single crewing may be on the rise for frontline officers, often as a way to maintain public visibility and geographic cover as the number of officers falls. I want to know how crewing levels affect how police officers think, feel and act."

Frontline officers who volunteer to take part in the survey complete a 10-minute questionnaire, briefly record their thoughts at the end of each shift during a two-week period, via a mobile phone app, and complete an exit questionnaire. You can take part by downloading 'RH Cops and Crewing' from your App store, or by emailing Mary direct: PDTL003@live.rhul.ac.uk

[75] To read this issue of police magazine, please visit: https://www.polfed.org/media/14853/police-june-july-2019-web-file-with-links.pdf

Appendix 14 - Diary Study: Registration Form on the RH Cops and Crewing app



Cops and Crewing: Registration Form

Welcome!

Thank you so much for agreeing to take part in the Cops and Crewing Diary Study - your participation is greatly appreciated.

Please fill in and submit this form to complete your registration.

Once you are fully registered you will be sent a username and password so you can fill in the baseline survey and start making entries into your shift diary.

If you have any questions, please don't hesitate to contact the lead researcher Mary Elliott-Davies (pdtl003@live.rhul.ac.uk).

Eligibility and the Ts & Cs

To be eligible to take part in this study, you must read all the information in the Ts & Cs section of the App, and be a serving police officer who is currently in a role that requires everyday contact with the public and direct intervention to keep people safe and enforce the law.

Please read all the information in the Ts & Cs carefully, and then if you're happy to take part in the Cops and Crewing Diary Study, please confirm the below by ticking each of the boxes before filling in and submitting the rest of the registration form.

Please tick each of the boxes below to confirm that you...

- ☐ are a serving police officer
- ☐ are in a role that requires everyday contact with the public and the provision of direct intervention to keep people safe and enforce the law
- ☐ have read and understood the information contained in the Ts & Cs section of this App and consent to participate in this study
- ☐ consent to the information you provide whilst participating in this study to be used and process by the researcher in the manner set out in the Ts & Cs section of the App, and
- ☐ consent to the special category data on your wellbeing being used and processed by the researcher in the manner set out in the Ts & Cs in this App

Personal Details

1

Full Name:

In order to confirm that you're a police officer, your log in details will need to be sent to your PNN email address.

But don't worry, if you prefer, you can request all subsequent contact to be sent to another email address - just add it in the second box below.

PNN Email address:

Preferred email (if different to your PNN address):

Would you like email reminders to fill in your shift diary?

- ◯ Yes
- ◯ No

How would you describe your gender identity?

- ◯ Male
- ◯ Female
- ◯ In another way
- ◯ Prefer not to say

How old are you?

How long have you been a police officer?

How long have you been in your current role?

What's your current rank?

- ◯ Constable
- ◯ Inspector
- ◯ Sergeant
- ◯ Chief inspector

Which police force do you serve in?

From the list of roles given below, please select the one which best describes the duties you perform in a typical working week..?

- ◯ Neighbourhood Policing
- ◯ Roads Policing or Traffic
- ◯ Response
- ◯ Another function
- ◯ Community Safety or Community Relations

What's your Job title?

Are you an authorised taser officer ?

- ◯ Yes
- ◯ No

Are you an authorised firearms officer ?

- ◯ Yes
- ◯ No

By registering to take part, you're eligible to enter a free prize draw to win one of three £20 Amazon vouchers!

Would you like to be entered into the free prize draw?

- ◯ Yes
- ◯ No

Cops and Crewing: Registration Form

You said that you would like to enter the free prize draw!

The draw will be held at the end of August 2019, and winners will be contacted via email.

Please enter the email address that you would like to be contacted by should you be one of the lucky winners!

Cops and Crewing: Registration Form

Thank you so much for registering to take part in the Cops and Crewing Diary Study.

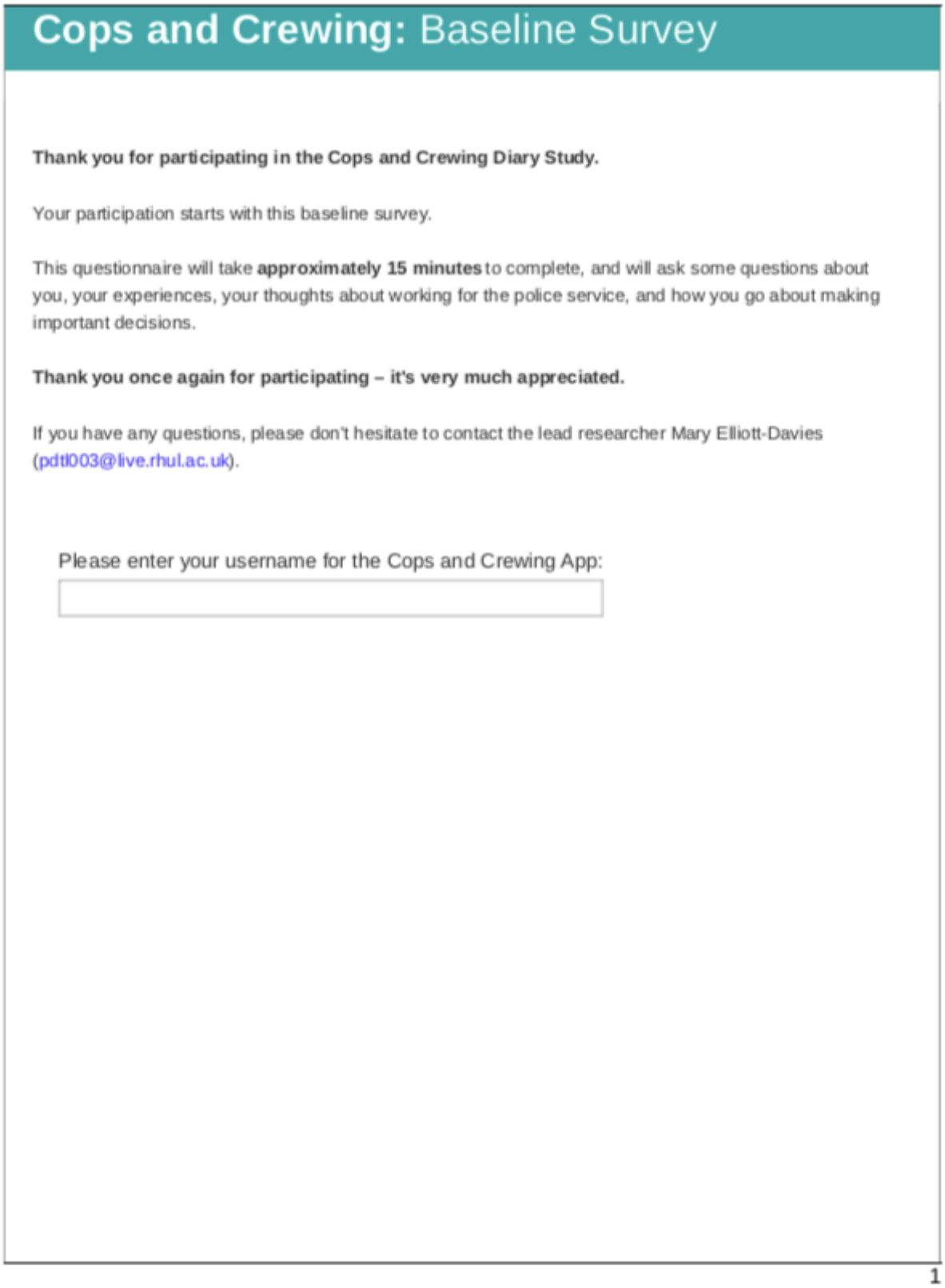
Once you submit the form using the button below, you will be sent your personal log in details for the App.

This may take up to 48 hours, so please be patient!

I hope you find the experience enjoyable, and if you have any questions, please don't hesitate to contact me at: pd8003@live.rhul.ac.uk.

5

Appendix 15 - Diary Study: Baseline Survey



Cops and Crewing: Baseline Survey

Thank you for participating in the Cops and Crewing Diary Study.

Your participation starts with this baseline survey.

This questionnaire will take **approximately 15 minutes** to complete, and will ask some questions about you, your experiences, your thoughts about working for the police service, and how you go about making important decisions.

Thank you once again for participating – it's very much appreciated.

If you have any questions, please don't hesitate to contact the lead researcher Mary Elliott-Davies (pdtl003@live.rhul.ac.uk).

Please enter your username for the Cops and Crewing App:

1

Cops and Crewing: Baseline Survey

Your experiences and thoughts about working for the police service

To take part in the diary study, you must make entries into a shift diary after every shift for 2 whole weeks.

Please look at your diary and choose an appropriate 2-week period before the end of August (where you are due to work for at east 7 shifts) and enter the start and end date in the boxes below:

Start date

DD/MM/YYYY

End date

DD/MM/YYYY

How would you **rate your workload** over the last **12 months**?

◯ Much too low ◯ Too low ◯ About right ◯ Too high ◯ Much too high

In general, how do you find your **job**?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately Stressful ◯ Very Stressful ◯ Extremely stressful

2

How **often** have citizens directed the following towards you in the last **12 months**....

	Never	Once or twice	More than twice	Once a month	Once a week	Daily
Verbal insults (e.g., swearing, shouting, abuse)	○	○	○	○	○	○
Verbal threats (e.g., threat of hitting, threat of kicking)	○	○	○	○	○	○
Spitting assaults (i.e. being deliberately spat upon)	○	○	○	○	○	○
Unarmed physical attacks (e.g., struggling to get free, wrestling, hitting, kicking)	○	○	○	○	○	○
Use of a deadly weapon (e.g., stick, bottle, axe, firearm)	○	○	○	○	○	○

How strongly does the **fear of future violence** from members of the public concern you?

○ Not at all ○ A little ○ Somewhat ○ A lot ○ Very much

3

Cops and Crewing: Baseline Survey

You, and how you go about making important decisions

In general, how do you find your **life outside of work**?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately Stressful ◯ Very Stressful ◯ Extremely stressful

Approximately **many hours sleep** do you **personally need**, per night, to wake up feeling **refreshed** and **alert**?

Listed below are statements describing **how individuals go about making important decisions**.

Please indicate the **extent** to which you **agree or disagree** with each statement...

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
When I make decisions, I tend to rely on my intuition	◯	◯	◯	◯	◯
I rarely make important decisions without consulting other people	◯	◯	◯	◯	◯
When I make a decision, it is more important for me to feel the decision is right than to have a rational reason for it	◯	◯	◯	◯	◯
I double-check my information sources to be sure I have the right facts before making decisions	◯	◯	◯	◯	◯

4

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I use the advice of other people in making my important decisions	○	○	○	○	○
I put off making decisions because thinking about them makes me uneasy	○	○	○	○	○
I make decisions in a logical and systematic way	○	○	○	○	○
When making decisions I do what feels natural at the moment	○	○	○	○	○
I generally make snap decisions	○	○	○	○	○
I like to have someone steer me in the right direction when I am faced with important decisions	○	○	○	○	○
My decision making requires careful thought	○	○	○	○	○
When making a decision, I trust my inner feelings and reactions	○	○	○	○	○
When making a decision, I consider various options in terms of a specified goal	○	○	○	○	○
I avoid making important decisions until the pressure is on	○	○	○	○	○
I often make impulsive decisions	○	○	○	○	○

5

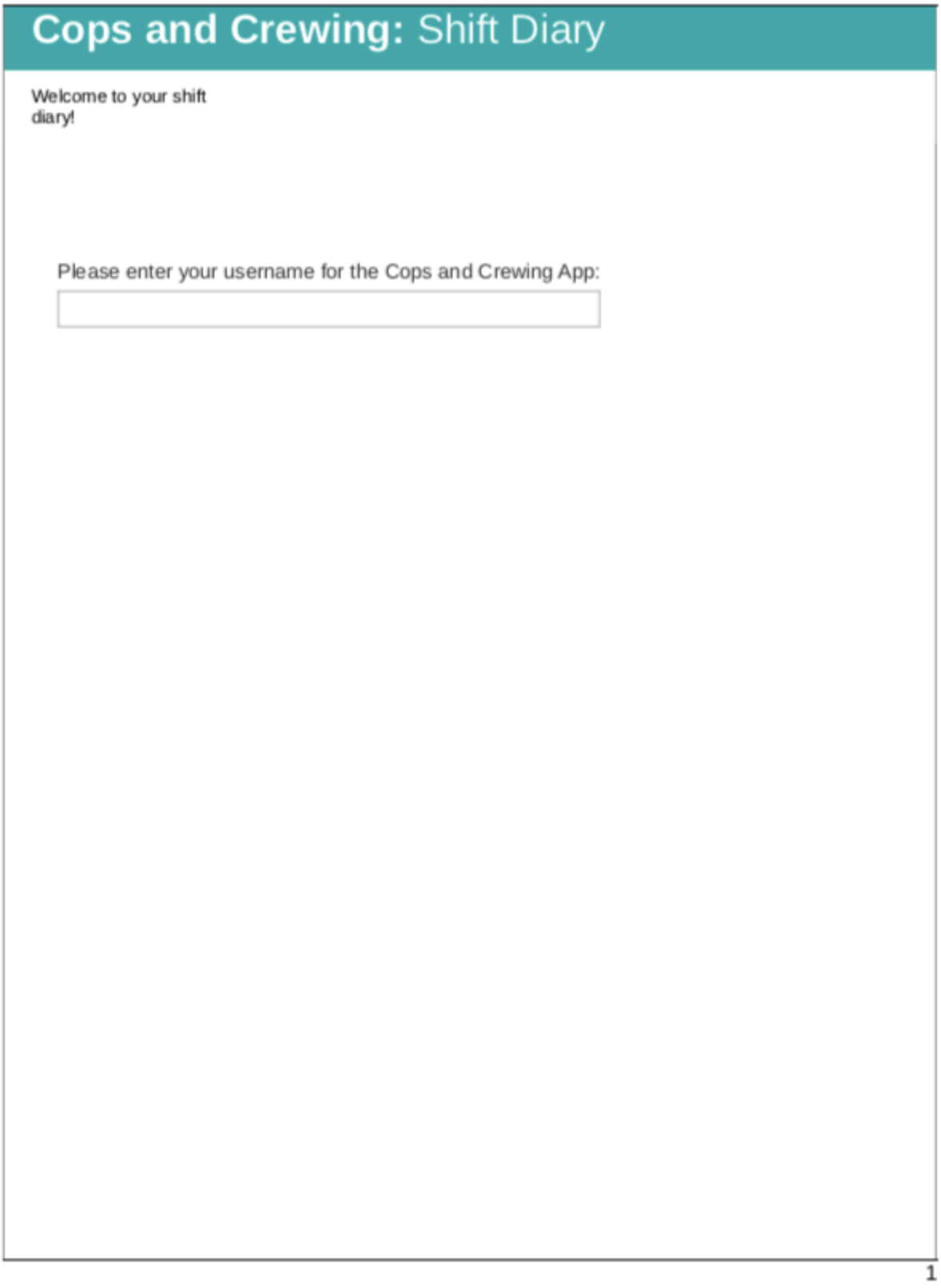
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
When making decisions, I rely upon my instincts	○	○	○	○	○
I generally make decisions that feel right to me	○	○	○	○	○
I often need the assistance of other people when making important decisions	○	○	○	○	○
I postpone decision making whenever possible	○	○	○	○	○
I often make decisions on the spur of the moment	○	○	○	○	○
I often put off making important decisions	○	○	○	○	○
If I have the support of others, it is easier for me to make important decisions.	○	○	○	○	○
I generally make important decisions at the last minute	○	○	○	○	○
I make quick decisions	○	○	○	○	○
I usually have a rational basis for making decisions	○	○	○	○	○

Thank you so much for taking part!

Don't forget to fill in your shift diary at the end of every shift!

6

Appendix 16 - Diary Study: Shift Diary



Cops and Crewing: Shift Diary

Please enter the date that your shift started.

Date:

DD/MM/YYYY

Time you went **on duty** (to the nearest hour):

Time you went **off duty** (to the nearest hour):

Today I was…(please select)

- ◯ Single crewed only
- ◯ Mostly single crewed
- ◯ Mostly double crewed
- ◯ Double crewed only
- ◯ Other

Were you (or your colleague) wearing **body worn video** equipment?

- ◯ Yes
- ◯ No

Were you (or your colleague) carrying a Conducted Energy Device (CED), e.g. **Taser**?

- ◯ Yes
- ◯ No

How **stressful** did you find your shift overall?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately stressful ◯ Very stressful ◯ Extremely stressful

2

How did you find your **workload** during your shift?

◯ Much too low ◯ Too low ◯ About right ◯ Too high ◯ Much too high

How many incidents did you attend during your shift? (please enter a numerical value between 0 and 100)

3

Cops and Crewing: Shift Diary

On a **scale of 1- 10** (where 0 = not at all, and 10 = extremely), please indicate the following:

How **safe** you felt during your shift:

(not at all) 0 5 (extremely) 10

How **physically tired** you felt at the end of your shift:

(not at all) 0 5 (extremely) 10

How **mentally drained** you felt at the end of your shift:

(not at all) 0 5 (extremely) 10

How many hours **sleep** (approximately) did you get in the 24 hours before your shift?

How many times did you have to **use force** during your shift?

4

Cops and Crewing: Shift Diary

You mentioned that you had to use force once during your shift.

Please answer the following about this incident.

How many **officers were present** when the use of force began?

- ○ Just me
- ○ One other officer
- ○ Two or more other officers

5

Please indicate which **tactical options** were used and in which order, using the grid below:

	Type of tactical option
First tactical option used	
Second tactical option used	
Third tactical option used	
Fourth tactical option used	
Fifth tactical option used	
Sixth tactical option used	
Seventh tactical option used	
Eighth tactical option used	
Ninth tactical option used	
Tenth tactical option used	

What was the **primary reason** for using force?

How **stressful** did you find the incident?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately stressful ◯ Very stressful ◯ Extremely stressful

6

Please indicate the **level of threat** posed by the subject to you, another officer, and/or a member of the public or the subject...

◯ Very Low ◯ Low ◯ Medium ◯ High ◯ Very High

7

Cops and Crewing: Shift Diary

If you had been **double crewed**, would you have responded to the incident differently and If so, how?

8

Cops and Crewing: Shift Diary

If you had been **singled crewed**, would you have responded to the incident differently and If so, how?

9

Cops and Crewing: Shift Diary

You mentioned that you had to use force more than once during your shift.

Please think about the incident where you had to use the **highest level of force,** and answer the following...

How many **officers were present**?

- ◯ Just me
- ◯ One other officer
- ◯ Two or more other officers

10

Please indicate which **tactical options** were used and in which order, using the grid below:

	Type of tactical option
First tactical option used	
Second tactical option used	
Third tactical option used	
Fourth tactical option used	
Fifth tactical option used	
Sixth tactical option used	
Seventh tactical option used	
Eighth tactical option used	
Ninth tactical option used	
Tenth tactical option used	

What was the **primary reason** for using force?

How **stressful** did you find the incident?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately stressful ◯ Very stressful ◯ Extremely stressful

11

Please indicate the **level of threat** posed by the subject to you, another office, and/or a member of the public or the subject...

◯ Very Low ◯ Low ◯ Medium ◯ High ◯ Very High

12

Cops and Crewing: Shift Diary

If you had been **double crewed**, would you have responded to the incident differently and If so, how?

13

Cops and Crewing: Shift Diary

If you had been **singled crewed**, would you have responded to the incident differently and If so, how?

14

Cops and Crewing: Shift Diary

Now, please think about the incident where you had to use the **lowest level of force** and answer the following...

How many **officers were present**?

- ◯ Just me
- ◯ One other officer
- ◯ Two or more other officers

15

Please indicate which **tactical options** were used and in which order, using the grid below:

	Type of tactical option
First tactical option used	
Second tactical option used	
Third tactical option used	
Fourth tactical option used	
Fifth tactical option used	
Sixth tactical option used	
Seventh tactical option used	
Eighth tactical option used	
Ninth tactical option used	
Tenth tactical option used	

What was the **primary reason** for using force?

How **stressful** did you find the incident?

◯ Not at all stressful ◯ Mildly stressful ◯ Moderately stressful ◯ Very stressful ◯ Extremely stressful

16

Please indicate the **level of threat** posed by the subject to you, another office, and/or a member of the public or the subject...

◯ Very Low ◯ Low ◯ Medium ◯ High ◯ Very High

17

Cops and Crewing: Shift Diary

If you had been **double crewed**, would you have responded to the incident differently and If so, how?

18

Cops and Crewing: Shift Diary

If you had been **singled crewed**, would you have responded to the incident differently and If so, how?

19

Appendix 17 - Diary Study: Post-participation questionnaire

Cops and Crewing: Post Participation Questionnaire

Thank you for finishing your diary entries - your participation in the Cops and Crewing Diary Study is almost complete.

All you need to do now is fill in the **Post Participation Questionnaire.**

This questionnaire will take approximately 15 minutes to complete, and will ask you about your thoughts, experiences and views on police crewing levels and how you go about making important work-related decisions.

Thank you once again for all your participation so far, and for giving us your time – it is very much appreciated.

If you have any questions, please don't hesitate to contact the lead researcher Mary Elliott-Davies (pdtl003@live.rhul.ac.uk).

Please enter your username for the Cops and Crewing App:

1

Cops and Crewing: Post Participation Questionnaire

When you're on shift, do you prefer to be... (please select one of the following options)

- ◯ Single crewed
- ◯ Double crewed
- ◯ Other

Please use the space below to tell us why you selected your choice above...

How does **crewing level** affect **you,** and **your fellow officers**?

How do **crewing levels** affect **officer performance** and your **ability** to do your job?

Cops and Crewing: Post Participation Questionnaire

What **factors** influence your **stress levels** the most when **responding to an incident?**

What **factors** influence your **confidence** the most when **responding to an incident?**

How do you go about **assessing the threat level during an incident**, and what factors are the most **important**?

3

Cops and Crewing: Post Participation Questionnaire

Please think back to **the last time you had to use force in the line of duty**.

Please **describe how** you made the **decision to use force**, and what **type** of force to use....

What **factors** are the most **influential** when you were **making the decision on how and when to use force**?

How often do you use the National Decision Making Model when making time pressured decisions in the line of duty?

◯ Never ◯ Rarely ◯ Sometimes ◯ Usually ◯ Always

How useful do you find the National Decision Making Model when making time pressured decisions in the line of duty?

◯ Not at all useful ◯ A little useful ◯ Somewhat useful ◯ Very useful ◯ Extremely useful

If you would like to add any additional comments about **crewing levels, responding to incidents,** or **how you make difficult decisions,** please use the box below:

4

Appendix 18 - Diary Study: Registration and Reminder Email Examples

A.18. 1 Registration email example

Thank you for your interest in taking part in the Cops and Crewing Diary Study!

Please find your username and password below, you must make sure that you enter these correctly when submitting any documents via the App.

Username: *EXA21*

Password: *c0p5!*

Your participation is greatly appreciated but please be aware that the study closes on the 31st of August.

As such, please make sure that you complete your baseline survey and all your diary entries before then.

If you have any questions, please don't hesitate to contact me.

Kindest regards

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.18. 2 Daily shift diary reminder email example

As requested in your registration form, I'm sending you an email as a gentle reminder to fill in your Cops and Crewing Shift Diary.

Thanks again for your support, and if you have any questions then please don't hesitate to email me!

Kindest regards,

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

PS. If you wish to stop receiving these emails, please just reply 'STOP'.

A.18.3 Engagement reminder (baseline and/or shift diary) email example

A.18.3.1 Example email for those that had not filled in their baseline survey nor any shift diary entries:

Hello there,

A little while ago you registered to take part in the Cops and Crewing Diary Study, but haven't yet filled in your baseline survey nor submitted any entries into your shift diary via the app.

If you'd still like to take part, please use your password and username (listed in the email below) to fill in the baseline survey and start your shift diary!

Kindest regards

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.18.3.2 Example email for those that had not filled in their baseline survey only:

Good evening,

Thank you so much for taking part in the Cops and Crewing study and for submitting your Shift Diary entries via the app!

Don't forget to also fill in a Baseline Survey via the app *– just look for the icon called 'Baseline' on the ribbon at the bottom of the app (it's on the left of the Shift Diary icon!)*

Thanks again for your support, and I hope you have a lovely day.

Kindest regards,

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.18.3.3 Example email for those that had not filled in any shift diary entries only:

Good afternoon,

Thank you so much for taking part in the Cops and Crewing study and for completing your Baseline survey via the app!

Don't forget to also fill in you ***shift diary*** *via the app too – just look for the icon called 'shift diary' on the ribbon at the bottom of the app (it's on the right of the Baseline Survey icon!)*

Thanks again for your support, and I hope you have a lovely day.

Kindest regards,

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.18.4 Example invitation email to the post-participation questionnaire

A.18.4.1 Example email for those that had provided their self-selected logging phase dates:

Good afternoon,

Thank you so much for taking part in the Cops and Crewing Diary Study – your support is very much appreciated.

According to the dates you submitted as part of your baseline survey, you should now have completed part-one and part-two of the study!

To complete the final part, please click on the link below and fill in the post-participation questionnaire:

https://www.surveymonkey.co.uk/r/PostPQ

The post-participation questionnaire asks you about you and your experiences of crewing levels, confidence, stressful incidents and how you make difficult decisions at work.

A lot of the questions are open ended, so you may find it easier to complete this questionnaire on a desktop (rather than your phone), and it should take around 15 minutes, depending on how much you want to share!

Thank you once again for your continued participation, your support is very much appreciated.

I hope you enjoyed taking part, and as ever, if you have any questions then please don't hesitate to email me

Kindest regards

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

PS – don't forget to fill in the report request form via the App if you would like a personalised report of your diary entries!

A.18.4.2 Example email for those that had not provided their self-selected logging phase dates:

Good afternoon and thank you for taking part in the Cops and Crewing Diary Study!

According to the date you registered, you should now have completed both part-one and part-two of the study! Hurrah!

If not, no worries – you can still complete the final part of the study by filling in the post-participation questionnaire by clicking on the link below:

https://www.surveymonkey.co.uk/r/PostPQ

The post-participation questionnaire asks you about you and your experiences of crewing levels, confidence, stressful incidents and how you make difficult decisions at work.

A lot of the questions are open ended, so you may find it easier to complete this questionnaire on a desktop (rather than your phone), and it should take around 15 minutes, depending on how much you want to share!

Thank you once again for your continued participation, your support is very much appreciated.

I hope you enjoyed taking part, and as ever, if you have any questions then please don't hesitate to email me

Kindest regards

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.18.5 Engagement reminder (post-participation questionnaire)

Good afternoon,

A little while ago you were sent a link to the final part of the Cops and Crewing Diary Study – but haven't yet filled it in. I know I've already asked a lot, but the final questionnaire tackles some really important issues and as the views of frontline officers are what really matter, it would be amazing if you could spare a final 10-15 minutes to share your thoughts and experiences.

If you're able to spend a few final minutes contributing to the study, then please do click on the link below and fill in the post-participation questionnaire:
https://www.surveymonkey.co.uk/r/PostPQ

Regardless of whether or not you complete the final part of the study however, I'd like to take this opportunity to say a final thank you – without wonderful people such as yourself, I wouldn't be able to complete this research and (hopefully!) provide the evidence that will help promote positive change for you and your colleagues.

Kindest regards

Mary Elliott-Davies

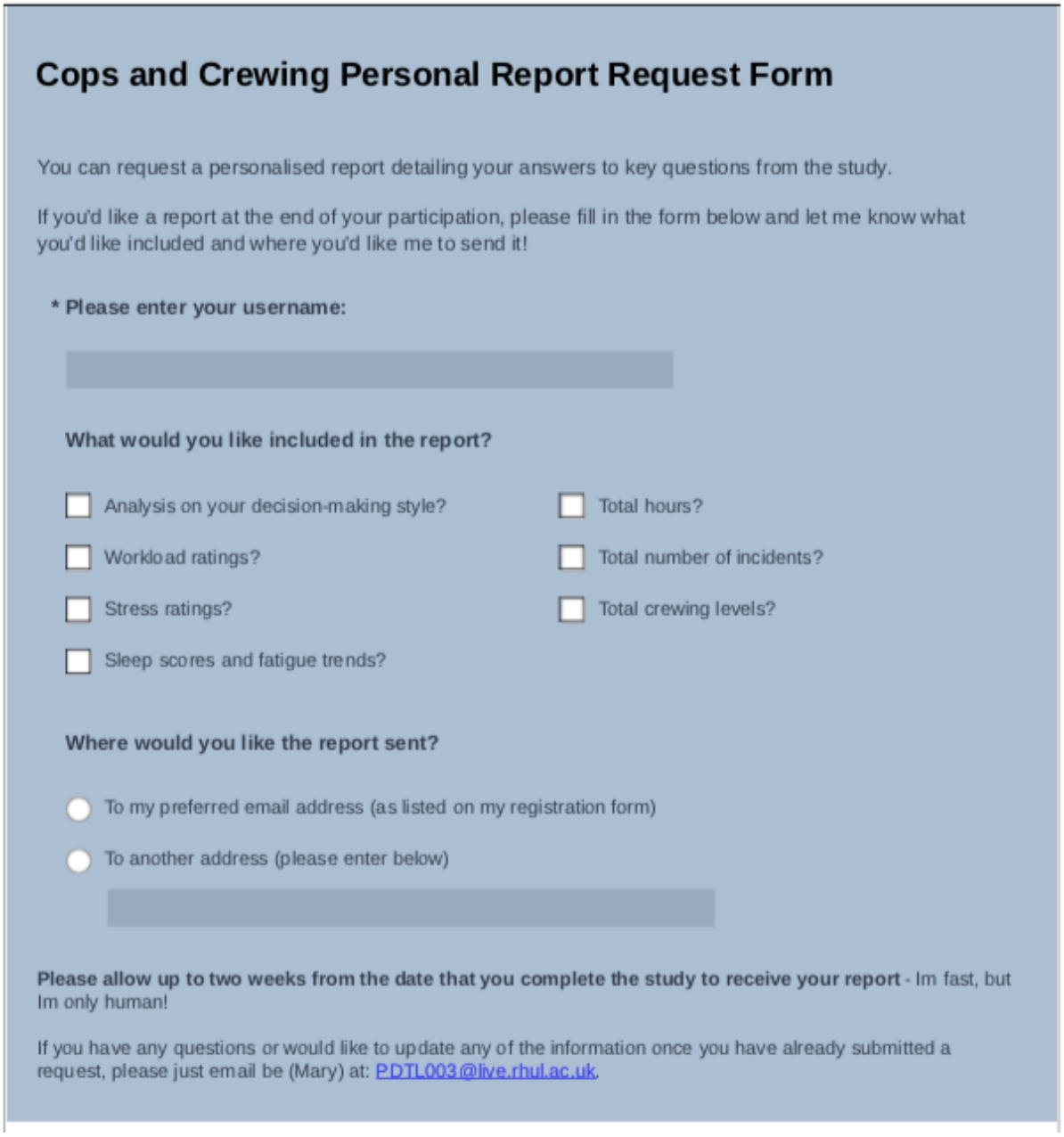
PhD Student

Royal Holloway University London

Egham

Surrey

Appendix 19 - Diary Study: Personal Report Request Form



Cops and Crewing Personal Report Request Form

You can request a personalised report detailing your answers to key questions from the study.

If you'd like a report at the end of your participation, please fill in the form below and let me know what you'd like included and where you'd like me to send it!

*** Please enter your username:**

What would you like included in the report?

- ☐ Analysis on your decision-making style?
- ☐ Workload ratings?
- ☐ Stress ratings?
- ☐ Sleep scores and fatigue trends?
- ☐ Total hours?
- ☐ Total number of incidents?
- ☐ Total crewing levels?

Where would you like the report sent?

- ○ To my preferred email address (as listed on my registration form)
- ○ To another address (please enter below)

Please allow up to two weeks from the date that you complete the study to receive your report - Im fast, but Im only human!

If you have any questions or would like to update any of the information once you have already submitted a request, please just email be (Mary) at: PDTL003@live.rhul.ac.uk.

Appendix 20 - Diary Study: Personal Report Example

Bobby Bobs: Personalised report from the Cops and Crewing Study

You signed up to the cops and crewing study on the 01.05.19, completed your baseline survey on the 01.05.19 and completed your shift diaries between 02.05.19 and 27.05.19. The figures below represent the data you reported during this period of time only.

Your decision-making style

Based on your responses to the baseline survey, you mostly use a **rational** decision making style. This means that you take a deliberate and logical approach to making decisions, and may prefer to approach rather than avoid problems. Your scores also indicate that you value the advice and guidance of others when making difficult decisions.

Stress levels

29% of the time you felt that your shift had been very or extremely stressful and **41%** of the time you felt like your shift had not been stressful at all.

Overall, you rated your job as **moderately stressful**.

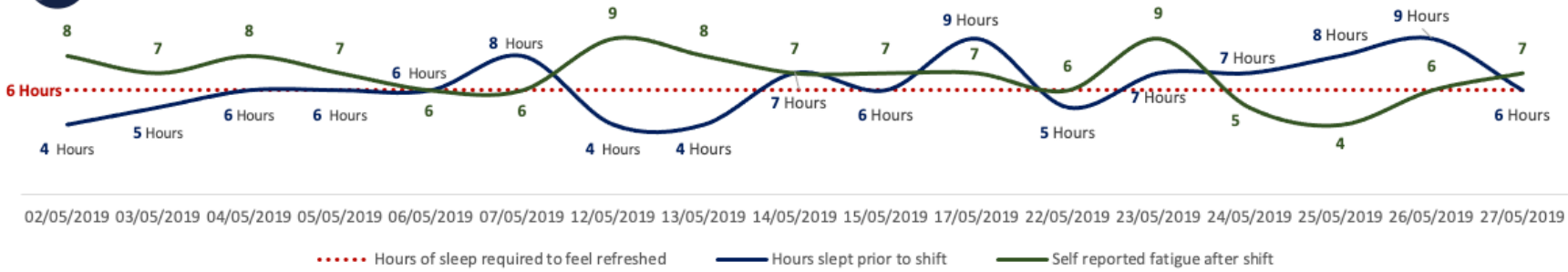
17 Shift diary entries

136 Hours worked (mean shift length of 8 hours)

51 Incidents attended

59% of the time you were mostly or only single crewed

Sleep and fatigue



Appendix 21 - Diary Study: Prize Draw Emails

A.21.1 Example or wining prize draw email

Good afternoon,

A little while ago you took part in a PhD study called the Cops and Crewing Diary Study and were entered into a prize draw to win one of three £20 Amazon vouchers.

Well, the prize draw has now been completed, and… well… ***you're one of the lucky winners!!***

You should receive an Amazon eGift Voucher to ***this email address*** *in the next few days. If you haven't received your gift voucher by Wednesday the 25th of September, then please get in contact.*

I'd also like to take this opportunity to let you know that I'm planning on putting together a brief summary (outlining a few key descriptive results from this particular study) for participants who are interested in some of the basic findings. If you'd like to receive a copy of this, then please do let me know by replying 'YES' to this email and I'll make sure to include you when circulating the findings next year (hopefully around Easter).

Thank you once again for taking part in my study; without wonderful people such as yourself, I wouldn't be able to complete this research and (hopefully!)

provide the evidence that will help promote positive change for you and your colleagues.

I hope you enjoy the rest of your weekend, and if you have any questions, then please don't hesitate to email me.

Kindest regards

Mary Elliott-Davies
PhD Student
Royal Holloway University London
Egham
Surrey

A.21.2 Example of non-winning prize draw email

Good afternoon,

A little while ago you took part in a PhD study called the Cops and Crewing Diary Study, and were entered into a prize draw to win one of three £20 Amazon vouchers.

Sadly, if you're receiving this email then ***you're not one of the lucky winners****. Nevertheless, I would like to say a* ***MASSIVE thank you*** *for taking part in the study.*

Without wonderful people such as yourself, I wouldn't be able to complete this research and (hopefully!) provide the evidence that will help promote positive change for you and your colleagues.

I'm also planning on putting together a brief summary (outlining a few key descriptive results from this particular study) for participants that are interested in hearing about some of the basic findings.

If you'd like to receive a copy of this, then please do let me know by replying 'YES' to this email and I'll make sure to include you when circulating the findings next year (hopefully around Easter).

Kindest regards

Mary Elliott-Davies
PhD Student
Royal Holloway University London
Egham
Surrey

A.21.3 Example of final thank you email to those who did not take part in the prize draw

Good afternoon,

A little while ago you took part in a PhD study called the Cops and Crewing Diary Study.

The study has now finished, and as such, I just wanted to send a quick email to say a ***massive thank you*** *for taking the time to be a part of this project!*

Without wonderful people such as yourself, I wouldn't be able to complete this research and (hopefully!) provide the evidence that will help promote positive change for you and your colleagues.

I'm planning on putting together a brief summary (outlining a few key descriptive results from this particular study) for participants that are interested in hearing about some of the basic findings.

If you'd like to receive a copy of this, then please do let me know by replying 'YES' to this email and I'll make sure to include you when circulating the findings next year (hopefully around Easter).

Kindest regards

Mary Elliott-Davies
PhD Student
Royal Holloway University London
Egham
Surrey

Appendix 22 - Diary Study: Brief Study Summary and Circulation Email

A.22.1 Example of Brief Study Summary Email

Good evening,

Last year you took part in a PhD study called the Cops and Crewing Diary Study.

If you're receiving this email then you signed up to receive a brief summary document outlining a few key descriptive results from the initial analysis of the data gathered as part of this study.

I hope you find the attached interesting and if you have any questions then please feel free to give me an email and I'll do my best to answer them.

Thanks again for taking part, your contributions are very much appreciated and I'm looking forward to exploring the data in a lot more detail soon!

Kindest regards

Mary Elliott-Davies

PhD Student

Royal Holloway University London

Egham

Surrey

A.21.2 Example of Brief Study Summary

Summary of initial findings from

The Cops and Crewing Diary Study

Thanks to all the officers that have given their time to take part in the study. Without their contributions, I wouldn't be able to complete this research and feed into an evidence base aimed at promoting positive change within the police service for the officers and organisation alike. I would also like to thank those that helped to promote the study via social media, closed forums and at their local stations – their help in getting the word out was invaluable and was key in raising awareness of the study, and ultimately, officer participation.

Brief Background: Police crewing levels is an important issue, one which is of increasing interest and concern day by day. To help better understand the issues that officers face, I'm studying the impact of crewing levels on frontline officers as part of a PhD programme at Royal Holloway University London. The project was granted ethical approval from Royal Holloway University London (ref:1449) and involved officers around the UK filling in a baseline questionnaire, a quick 5-minute survey at the end of each shift for two weeks via a progressive web app called '*Cops and Crewing,*' and, finally, a post-participation questionnaire.

Study Aim: To explore and evidence how crewing levels might affect how police officers think, feel and act.

Methodology:

Officers completed the following three activities as part of the study:

- **A baseline survey** via the Cops and Crewing app: This asked participants some questions about themselves, how they feel about work, and how they make decisions.
- **Shift diary entries** for 2 weeks via the Cops and Crewing app: This asked participants some questions about their daily shift experiences.
- **A post-participation questionnaire** via email: This asked participants some questions about their thoughts, experiences, and views on police crewing levels more generally.
- For a demonstration of how the Cops and Crewing app: worked, please follow this link: https://youtu.be/xlhp_HJMV3o

A few initial findings

151 officers successfully registered to take part in the study via the app

- **33 completed all three parts** of the study.
- **38 completed two parts** only of the study.
- **27 completed one part only** of the study.
- **53 officers registered only.**

Demographics of participants (that completed one or more parts of the study)

- **82%** of officers indicated they were **Male**; **16%** female, and; **2%** preferred not to say.
- The **majority of participants were between 26 and 55 years of age (82%)**, with only 17% being 25 or young, and only 1% being older than 55.
- The vast majority of participants were **Constables** (**87**%).
- Responses from **33 separate forces** within England and Wales were received, but the majority of officers came from **Surrey Police.**

Average workloads, job related stress, crewing preferences and decision-making style of officers

- **70%** said their overall workloads were **high** or **too high.**
- **32%** said that their job was **very** or **extremely** stressful.
- **87%** said they **preferred to be double-crewed** when on shift.
- The most frequently **dominant decision-making style was rational** (62%), followed by **intuitive** (16%).

Shift diary entries

- In total, there were **591 shift diary entries** by **86 different officers**.
- **Across these 591 entries:**[1]
  - **49%** indicated that the officer was **predominantly single-crewed.**
  - **31%** of entries completed when an officer was **single-crewed** indicated that the officer's workload was **too high**; **8 percentage points higher** than in entries completed when an officer was **double-crewed** (23%).
  - **12%** of entries completed when an officer was **single-crewed** indicated that the officers found the shift to be **very** or **extremely stressful**; **2 percentage points higher** than in entries completed when an officer was **double-crewed** (14%).

[1] **Please note** – differences have not been tested for *statistical significance* and as such, may represent normal variation caused by chance rather than a meaningful relationship between crewing levels, workloads and stress.

Next steps:

The results on the previous page indicate that officers are not double-crewed as often as they would like, and that there *might* be a relationship between being single-crewed and a) having a higher workload, and b) feeling more stressed. The next steps are to explore those relationships in more detail; using statistical analysis to ascertain whether these differences (and any others that I find) are due to chance, or whether there really is likely to be a relationship between these variables. Amongst other things, I will be testing to see if there is a statistically significant relationship between crewing and the following: shift stress; shift workloads; how safe officers feel during their shift; how tiring officers found their shifts; the number of incidents they attended, and; what happened when they attended incidents where they had to use force. I'll also be reading through all the comments that participants have provided, to see if any overarching themes emerge about how crewing might affect the way that officers think, feel and act.

Thank you again for your continued interest in this study, and please feel free to contact me on the email address below if you would like to know more about any of the findings in this document, or if you have any other questions.

Email: PDTL003@live.rhul.ac.uk

Appendix 23 - Diary Study: Quantitative Variables Table

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Registration form	Confirmation of status as a serving police officer	Confirmation of eligibility to take part in study.	NA
Registration form	Officer role	Confirmation of eligibility to take part in study, normal recording practice, and officer demographics.	Officer role is a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Registration form	Consent	Confirmation of eligibility to take part in study.	NA
Registration form	Police National Network (PNN) email address	Confirmation of eligibility to take part in study.	NA

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Registration form	Preferred email address	Required for administration.	NA
Registration form	Prize draw participation preference	Required for administration.	NA
Registration form	Officer name	Required for administration.	NA
Registration form	Officer gender	Officer demographic information, normal recording practice, and existing literature.	Officer gender was explored in relation to TASER use by the Police Service of England by Quinton et al. (2020), who found that male officers were more likely to draw (but not discharge) TASERs.

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			Several non-UK centric studies have also examined officer gender but with varying results (Bishopp et al., 2015; Crow & Adrion, 2011; Gau et al., 2010; Lin & Jones, 2010; Ready & White, 2011). Please see Chapter Three for more detail on the findings of these studies. Officer gender is also a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Registration form	Officer age	Officer demographic information, normal recording practice, and existing literature.	Several non-UK centric studies have examined officer age in relation to TASER use (Crow & Adrion, 2011; Gau et al., 2010; Ready & White, 2011; please see Chapter Three for more detail on the findings of these studies). Officer age is also a standard part of

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Registration form	Officer length of service	Officer demographic information, normal recording practices, and existing literature.	The impact of an officer's length of service was explored by Quinton et al. (2020) who found that officers with more than 15 years service were less likely to draw (but not discharge) their TASERs. Dymond (2016, 2018) also explored this variable and found TASER was more likely to be fired, and more likely to be drawn (but not fired) when the most experienced officer involved in the incident had a length of service of six to ten years. Lin & Jones and also examined length of service in relation to TASER use in 2010, and Ready & White did similar in 2011. Please see Chapter Three for more detail on the findings of these studies. Length of

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			service is also a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Registration form	Officer rank	Officer demographic information, normal recording practices, and existing literature.	Dymond (2016) explored the impact of an officer's rank on their use of TASER. However, no significant relationships were identified. Several non-UK centric studies have also examined officer rank in relation to TASER use (Crow & Adrion, 2011; Gau et al., 2010; Ready & White, 2011). Please see Chapter Three for more detail on the findings of these studies. Officer rank is also a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Registration form	Police force	Officer demographic information.	NA
Registration form	Authorised Firearms Officer (AFO) status	Officer demographic information.	NA
Registration form	Authorised TASER Officers (ATO) status	Officer demographic information and normal recording practices.	Status as a specially trained officer (or ATO) is a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Baseline survey	Overall workload	Officer demographic information and wider theory/evidence.	It is conceivable that a perception of constantly high workloads might be a covariate of chronic stress, which is related to high allostatic load (McEwen, & Stellar, 1993). High allostatic loads have the potential to negatively impact on physiological and

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			psychological functioning, and impair the bodies response to a critical incident (Giessing et al., 2020; Guidi et al., 2020). Consistently high workloads may also be a covariate for fatigue which has also been linked to a number of cognitive processes that are associated with decision-making and are known to increase errors, accidents and poor judgement (Dembe et al., 2005; Hafner et al., 2016; Health and Safety Executive, n.d., 2006; National Health Service, 2018; Söderström et al., 2012). Pertinent issues in decision-making, especially where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Baseline survey	Job related stress	Required for participation administration (personalised study report), officer demographic information, and wider theory/evidence.	It is possible that consistently high levels of job-related stress could be linked to the presence of chronic stress, which is related to high allostatic load (McEwen, & Stellar, 1993). As previously mentioned, high allostatic loads have the potential to negatively impact on physiological and psychological functioning, as well as impair the bodies response to a critical incident (Giessing et al., 2020; Guidi et al., 2020). Pertinent issues in decision-making, especially where the decision outcomes could have serious consequence, such as TASER use (please see Chapter One for more information).
Baseline survey	Stress outside of work	Required for administration (to gauge the potential as a	Criticism is sometimes directed at the single-item indicator of job-related stress being used to measure the above, as it cannot identify

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
		confounding factor) and officer demographic information.	individuals whose job-related stress may merely be a consequence of acute stress in their personal lives. An item on stress outside of work was included to gauge (and if appropriate, control for) stress that is not related to work.
Baseline survey	Violent victimisation	Officer demographic information and wider theory/evidence.	Single-crewing in the UK has recently been linked to officer assaults (Houdmont et al., 2019; Quinton et al., 2020) and previous research has identified that as exposure to violence increases, so does the reporting of stress symptoms; a relationship that also appears to be mediated by feelings of fear or vulnerability (Harris & Leather, 2012). Moreover, acute stress is one of the key factors being examined within Study Two of this thesis, as activation of the physiological stress reaction has been linked to a number of

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			cognitive and affectual processes linked to decision-making (Het & Wolf, 2007; Putman et al., 2007; Putman, Hermans, et al., 2010; Soravia et al., 2006; Wolf, 2003). Pertinent issues in decision-making where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).
Baseline survey	Fear of future violence	Officer demographic information and wider theory/evidence.	Research has indicated that fear of violence appears to mediate the relationship between previous experience of work-related violence and stress (Lerner, J. & Keltner, 2001) and there is evidence to suggest that fearful individuals exhibit more pessimistic risk estimates and risk aversion (Harris & Leather, 2012). Moreover, threat is one of the factors that the College of Policing states that

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			officer should be considering when making decisions on use of force (College of Policing, 2013c).
Baseline survey	Sleep requirements	Required for participation administration (personal report).	Many health institutions recommend that healthy adults need and/or should aim to achieve between six and nine hours of sleep per 24 hours (Centers for Disease Control and Prevention, 2017; National Health Service, 2018, 2019) and consistently unmet sleep requirements are likely to results in fatigue. Moreover, mental and physical fatigue are key factors being examined within Study Two of this thesis as poor sleep, physical fatigue and tiredness have previously been linked to a number of cognitive processes that are associated with decision-making and are known to increase errors, accidents and poor judgement (Dembe et al., 2005; Hafner et al.,

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			2016; Health and Safety Executive, n.d., 2006; National Health Service, 2018; Söderström et al., 2012).
Baseline survey	General Decision-Making Style	Required for participation administration (personal report), officer demographic information and wider theory/evidence.	There is evidence to suggest that individuals have preferences when it comes to their decision-making (Loo, 2000; Scott & Bruce, 1995; Thunholm, 2004) and these preferences may dictate the type of cognitive processes used during the act of decision-making and thus, could potentially influence the decision outcome.
Baseline survey	Logging phase self-selection	Required for participation administration.	NA

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Shift diary	Shift details	Required for participation administration (personal report), and shift demographics.	NA
Shift diary	Shift crewing	Shift demographics and wider theory/evidence.	Crewing practices is one of the fundamental phenomena being explored by this thesis. Though shift and incident crewing are likely to be strong correlates, they are qualitatively and qualitatively different (please see Chapter One for additional detail) and as such, information on both types of crewing is needed.
Shift diary	Available equipment (body worn video)	Shift demographics, and wider theory/evidence.	Body worn video (BWV) has previously been examined in relation to officer assaults, with some evidence to suggest that BWV might

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			reduce the likelihood of an officer becoming assaulted (ODS Consulting, as cited in Jameel & Bunn, 2015) and others suggesting that officers are *more likely* to be assaulted when wearing BWV (Ariel et al., 2016b, 2016a, 2018). Moreover, there is evidence to suggest that BWV does not affect officer use of force, unless an officer's level of discretion to turn the BWV cameras on or off is minimised – which results in reduced use of force (Ariel et al., 2016a). This may mean that officers use of force, and thus potentially their use of TASER may be influenced by BWV access.
Shift diary	Available equipment (TASER)	Required for control purposes, shift demographics, normal	TASER use is one of the fundamental phenomena being explored by this thesis, and as such, availability of said device is a key factor to control for during analysis. TASER access is also a standard part

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
		recording practices, and wider theory/evidence.	of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).
Shift diary	Stressfulness of shift	Shift demographics and wider theory/evidence.	It is conceivable that high levels of shift stress could be related to repeated exposure to acute stress which has been related to high allostatic load (McEwen, & Stellar, 1993). As previously mentioned, high allostatic loads have the potential to negatively impact on physiological and psychological functioning, and impair the bodies response to a critical incident (Giessing et al., 2020; Guidi et al., 2020). Pertinent issues in decision-making where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
Shift diary	Overall workload on shift	Shift demographics and wider theory/evidence. .	Previous research has shown that heavy cognitive load typically creates error or interference in the task at hand, and can influence the use of stereotyping (a system one type decision-making process: Biernat et al., 2003; Moreno & Mayer, 1999; Paas, 1992). If an officer perceives their workload as extremely high, it could also indicate high cognitive loads, which the wider research has identified as impacting on cognitive processes – especially whilst under stress (Lupien et al., 1999). It is also conceivable that overall workload on shift could be a covariate for both fatigue and stress which have previously been linked to a number of cognitive processes that are associated with decision-making (Dembe et al., 2005; Hafner et al., 2016; Health and Safety Executive, n.d., 2006;

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			Het & Wolf, 2007; Putman et al., 2007, 2010; Söderström et al., 2012; Soravia et al., 2006; National Health Service, 2018; Wolf, 2003); and, as such, are pertinent issues in decision-making where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).
Shift diary	Number of incidents attended	Required for participation administration (personal report), shift demographics, and wider theory/evidence.	The number of incidents attended could be a covariate of perceived officer workloads (with the more incidents that officers attend resulting in higher perceived workloads). Similar to perceived workloads, attending a high number of incidents during a single shift could also potentially be a covariate of chronic stress, or repeated exposure to acute stress (depending on the incident types), both of which are related to high allostatic load (McEwen, &

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			Stellar, 1993). High allostatic loads have the potential to negatively impact on physiological and psychological functioning, and impair the bodies response to a critical incident (Giessing et al., 2020; Guidi et al., 2020). High workloads or frequent incident attendance may also be a covariate for fatigue which has previously been linked to a number of cognitive processes that are associated with decision-making and are known to increase errors, accidents and poor judgement (Dembe et al., 2005; Hafner et al., 2016; Health and Safety Executive, n.d., 2006; National Health Service, 2018; Söderström et al., 2012); and, as previously mentioned, these are pertinent issues in decision-making where the decision outcomes

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			could have serious consequences, such as TASER use (please see Chapter One for more information).
Shift diary	Shift safety	Shift demographics and wider theory/evidence.	Crewing has previously been linked to officer assaults and violent victimisation by the public (Houdmont et al., 2019; Quinton et al., 2020), and as such crewing could impact on an officers perceived safety whilst on shift.

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	**Information requested (self-reported measures)**	**Rationale for collection**	**Precedential or related literature**
Shift diary	Sleep	Required for participation administration (personal report).	As mentioned above, mental and physical fatigue are key factors being examined within Study Two of this thesis as poor sleep, physical fatigue and tiredness have previously been linked to a number of cognitive processes that are associated with decision-making and are known to increase errors, accidents, and poor judgement (Dembe et al., 2005; Hafner et al., 2016; Health and Safety Executive, n.d., 2006; National Health Service, 2018; Söderström et al., 2012); and, as previously mentioned, these are pertinent issues in decision-making where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).
Shift diary	Fatigue	Required for participation administration (personal report), shift demographics, and wider theory/evidence.	
Shift diary	Mental exhaustion	Shift demographics and wider theory/evidence.	

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
Shift diary	Total number of uses of force incidents	Required for administration, use of force demographics, and wider theory/evidence.	TASER use is a type of police force and is one of the fundamental phenomena being explored by this thesis.
Shift diary: Use of force section	Incident crewing (i.e., the number of officers present when use of force began)	Normal recording practices, use of force demographics, wider theory/evidence, and existing literature.	As previously mentioned, crewing practices is one of the fundamental phenomena being explored by this thesis. Though shift and incident crewing are likely to be strong correlates, they are qualitatively and qualitatively different (please see Chapter One for additional detail) and as such, both items need collecting. Previous research from the UK on indecent crewing has, thus far, resulted in conflicting findings: Quinton et al., (2020) found that single-crewed officers were more likely to discharge their TASER, but were not more likely to draw (but not discharge) their TASER.

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			Dymond (2016, 2018), however, found no change in likelihood of TASER use between officers that were alone compared to when there were 2 or more officers present. Other non-UK studies have also examined this variable in relation to TASER, with varying results (Brandl & Stroshine, 2017; DeLone & Thompson, 2009; Hine et al., 2018b; White & Ready, 2007; please see Chapter Three for more detail). Incident crewing is also now a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018).

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
Shift diary: Use of force section	Tactical options used, in order	Normal recording practices, use of force demographics, and wider theory/evidence.	The type, number and order of tactical options used during a use of force is a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018). Moreover, the positioning of TASER use during a use-of-force incident has not been explored by any of the extant literature and is a key area of interest within Study Two of this thesis.
Shift diary: Use of force section	Reason for use of force	Normal recording practices, use of force demographics, and wider theory/evidence.	The reason for using force is a standard part of the use of force forms completed by police officers within the England and Wales (National Police Chiefs' Council, 2018). Moreover, existing literature has identified this as a correlate of TASER use with Dymond (2016, 2018) finding that officers that reported using force

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			to protect themselves or others were more likely to both fire their TASER and draw (but not fire) their TASER.
Shift diary: Use of force section	Level of threat posed during the incident	Use of force demographics, and wider theory/evidence.	According to the College of Policing, threat is a core factor for officer consideration when making decisions on use of force (College of Policing, 2013c), and thus should be associated with TASER use.
Shift diary: Use of force section	Level of stress experienced	Use of force demographics, and wider theory/evidence.	Acute stress is one of the key factors being examined within Study Two of this thesis, as activation of the physiological stress reaction has been linked to a number of cognitive and affectual processes linked to decision-making (Het & Wolf, 2007; Putman et al., 2007; Putman, Hermans, et al., 2010; Soravia et al., 2006; Wolf, 2003);

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
			and as such, are important factors to consider, especially where the decision outcomes could have serious consequences, such as TASER use (please see Chapter One for more information).
Post-participation questionnaire	Crewing preference	Officer demographics, wider theory/evidence, and existing literature.	Crewing practices is one of the fundamental phenomena being explored by this thesis and previous research has highlighted that officers have a preference for double crewing (Bailey, 1992 as cited in Bailey, 2008; Brewer & Karp 1991 as cited in Anderson & Dossetor, 2012)
Post-participation questionnaire	How often officers use the National Decision Model when making time	Officer demographics, wider literature/theory.	The National Decision Model (NDM) is the prescriptive decision-making tool utilised by the Police Service of England and Wales. However, previous research has highlighted mixed views in regard

Table A.23.1 *Diary Study: Quantitative Variable Table - Rationale and Precedent*

Collection tool	Information requested (self-reported measures)	Rationale for collection	Precedential or related literature
	pressured decisions in the line of duty		to the value of the NDM in certain situations, such as pursuit driving and that some officers felt that the NDM was not well understood by 'rank and file' officers (Christie, 2020). Given the above, it is would not be unreasonable to suppose that the NDM in other high risk, time pressured decision-making scenarios – such as use of force – may not be as useful, and thus may not be used as frequently by officers.
Post-participation questionnaire	How useful officers find the National Decision Model when making time pressured decisions in the line of duty	Officer demographics, wider literature/theory.	

Appendix 24 - General Decision-Making Style Inventory

When the original General Decision-Making Style (GDMS) inventory was published by Scott and Bruce (1995), the publication was missing an item relating to rational decision-making. Since then, several subsequent studies to utilise this particular psychometric tool have included slight adaptions to the scale. In some instances this is to account for cultrual differences when translating the items into other language (e.g. Baiocco et al., 2009), whilst in others, the rationale for the adaptions are not made explicit (Sadovykh et al., 2015; Thunholm, 2009). However, these adaptations may be to account for the missing item in the original publication. The adapted inventory used by Sadovykh et al. (2015) was selected for use as it included an additional item on rational decision-making (presumably to account for the omitted item in the original publication by Scott and Bruce in 1995) and it was one of the few studies to explicity list the survey items within their own article. The items from Sadovykh et al.'s adapted GDMS are below, and deviations from the original inventory are indicated via footnotes.

1. '*When I make decisions, I tend to rely on my intuition'* (Intuitive)
2. '*I rarely make important decisions without consulting other people'*(Dependent)
3. '*When I make a decision, it is more important for me to feel the decision is right than to have a rational reason for it'*(Intuitive)
4. *'I double-check my information sources to be sure I have the right facts before making decisions'*(Rational)
5. '*I use the advice of other people in making my important decisions'*(Dependent)
6. *'I put off making decisions because thinking about them makes me uneasy'*(Avoidant)
7. *'I make decisions in a logical and systematic way'*(Rational)
8. *'When making decisions I do what feels natural at the moment'* (Spontaneous)

9. *'I generally make snap decisions'* (Spontaneous)
10. *'I like to have someone steer me in the right direction when I am faced with important decisions'*(Dependent)
11. *'My decision-making requires careful thought'*(Rational)
12. *'When making a decision, I trust my inner feelings and reactions'* (Intuitive)
13. *'When making a decision, I consider various options in terms of a specified goal'*(Rational)
14. *'I avoid making important decisions until the pressure is on'*(Avoidant)
15. *'I often make impulsive decisions'*(Spontaneous)
16. *'When making decisions, I rely upon my instincts'*(Intuitive)
17. *'I generally make decisions that feel right to me'* (Intuitive)
18. '*I often need the assistance of other people when making important decisions'*(Dependent)
19. *'I postpone decision-making whenever possible'*(Avoidant)
20. '*I often make decisions on the spur of the moment'*(Spontaneous)
21. *'I often put off making important decisions'*(Avoidant)[76]
22. '*If I have the support of others, it is easier for me to make important decisions'* (Dependent)
23. '*I generally make important decisions at the last minute'*(Avoidant)
24. *'I make quick decisions'*(Spontaneous)
25. *'I usually have a rational basis for making decisions'*(Rational)[77]

[76] This item replaces 'I often procrastinate when it comes to making important decisions,' from the original scale used by Scott and Bruce (1995).
[77] This item is not in the original tool and is presumed to replace the missing item (relating to 'rational' decision-making) from Scott and Bruce's original publication.

Appendix 25 - Diary Study: Details of Shift Diary Items Pertaining to Use of Force

To ensure that the questions about any uses of force whilst on shift were appropriate, the following filter question was applied: *'How many times did you have to use force during your shift?'*

A drop-down list was provided with '*None*' as the first available answer followed by single unit intervals until '*9*' with the final option available being '*10 or more times.*'

If a respondent indicated that they had not used force during the shift, they were directed to the end of the shift diary and thanked for their submission. When respondents indicated that they had to use force during their shift once they were asked the following additional questions:

- Item 1: '*How many **officers were present** when the use of force began?'*

  Participants were given a 3-point response scale of; (i) Just me, (ii) One other officer, and (iii) Two or more other officers.

- Item 2: '*Please indicate which **tactical options** were used and in which order, using the grid below:'*

  Participants were provided with the same twenty-item drop-down list for the first, second, third, fourth, fifth, sixth, seventh, either, ninth, and tenth tactical option used which included: (i) Tactical Communications, (ii) Unarmed Skills, (iii) Handcuffing, (iv) Ground restraint, (v) Limb restraints, (vi) Baton (drawn), (vii) Baton (used), (viii) Irritant Spray (drawn), (ix) Irritant Spray (used), (x) TASER (drawn), (xi) TASER (aimed), (xii) TASER (arced), (xiii) TASER (red dotted), (xiv) TASER (drive stun), (xv) TASER (angle drive stun), (xvi) TASER

(fired), (xvii) TASER (repeat cycle), (xviii) Attenuating energy projectile (drawn), (xix) Attenuating energy projectile (used), (xx) Other.

- Item 3: '*What was the primary reason for using force?'*

  Participants were provided with the following eleven-point response list: (i) To protect myself, (ii) To protect other officers, (iii) To protect the subject, (iv) To protect the public, (v) To prevent an offence, (vi) To secure evidence, (vii) To effect a search, (viii) To effect an arrest, (ix) As a method of entry, (x) To prevent escape, and (xi) Other.

- Item 4: '*How stressful did you find the incident?'*

  Participants were provided with the following five-point response scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately stressful, (iv) Very stressful, and (v) Extremely stressful.

- Item 5: '*Please indicate the level of threat posed by the subject to you, another officer, and/or a member of the public or the subject...'*

  Participants were provided with the following five-point response scale: (i) Very low, (ii) Low, (iii) Medium, (iv) High, (v) Very high.

- Item 6 (presented to respondents that indicated that they had been single crewed during the use-of-force incident only): '*If you had been double crewed, would you have responded to the incident differently and if so, how?*'

  Participants were invited to give textual feedback via an open text box.

- Item 7 (presented to respondents that indicated that they had **not** been single-crewed during the use-of-force incident only): '*If you had been single-crewed, would you have responded to the incident differently and if so, how?*'

  Participants were invited to give textual feedback via an open text box.

If participants indicated that they had used force more than once during their shift, they were asked to complete the above questions (items 1 through 7) twice – once for the incident where they used the highest level of force, and once for the incident where they used the lowest level of force.

Appendix 26 - Diary Study: Data Conversions and New Variable Creation

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
1	**Incident crewing levels**	Respondents were asked to indicate how many officers were present when the use of force began, using the following three-point response scale: (i) Just me, (ii) One other officer, (iii) Two or more other officers.	Responses were aggregated into a dichotomous variable indicating that officers were either *alone* when the use of force began (responses of '*Just me'*) or that they were *not alone* when the use of force began (responses of '*One other officer'* and '*Two or more officers'*).	1
2	**Shift crewing levels**	Respondents to indicate their crewing levels during their shift from the following five-point scale: (i) Always single-crewed,	Responses to the above question were aggregated into a dichotomous variable indicating that officers were either *predominantly single-crewed* during their shift (responses of '*Mostly*' and '*Always*' single-crewed) or *predominantly*	2

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		(ii) Mostly single-crewed, (iii) Mostly double-crewed, (iv) Always double-crewed, or (v) Other	*double-crewed* on their shift (responses of '*Mostly*' and '*Always*' double-crewed). Responses indicating any other type of crewing during their shift were excluded from the analysis (n= 2).	
3	**Incident stress ratings**	Respondents were asked to indicate how stressful they found incidents where force were used using the following five-point scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately	Responses were aggregated into a dichotomous variable indicating either a *low to moderate* level of stress during an incident (responses of '*Not at all stressful*,' '*Mildly stressful*,' and '*Moderately stressfu*l') or *high* levels of stress during an incident (responses of '*Very stressful*,' and '*Extremely stressful'*).	1

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
4		stressful, (iv) Very stressful, and (v) Extremely stressful.	Responses were re-coded into a numerical scale from one to five, where one equated to '*Not at all stressful*' and five equated to '*Extremely stressful*.'	1
5			Numerical data above were used to create an *average incident stress rating* for each officer.	2, 3, 4
6			Numerical data above were used to create two additional *average incident stress ratings* for each officer: one for when they were *alone* at the start of use-of-force incidents, and one for when *other officers were present.*	2
7			Numerical data above were also used to create another two additional *average incident stress ratings* for each officer: one for when they were *predominantly single-crewed*, and one for	3

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
			when they were *predominantly double-crewed* during their shift.	
8			Numerical data above were used to create a final two *average incident stress ratings* for each officer: one for when they *had access to TASER* during their shift and, one for when they *did not have access to TASER.*	5
9	**Incident threat ratings**	Respondents were asked to indicate what level of threat was posed during an incident where force was used using the following five-point scale:	Responses were aggregated into a dichotomous variable indicating either a *low to moderate* level of perceived threat during an incident (responses of '*Very low'*, '*Low'* and '*Medium*') and *high* levels of threat during an incident (responses of '*High'* and '*Very high'*).	1

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
10		(i) Very low, (ii) Low, (iii) Medium, (iv) High, and (v) Very high.	Responses were re-coded into a numerical scale from one to five, where one equated to '*Very low*,' and five equated to '*Very high.*'	1
11			Numerical data above was used to create an *average incident threat rating* for each officer.	2, 3, 4
12			Numerical data above were used to create two additional *average incident threat ratings* for each officer: one for when they were *alone* at the start of use-of-force incidents, and one for when *other officers were present.*	2

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
13			Numerical data above were also used to create another two additional *average incident threat ratings* for each officer: one for when they were *predominantly single-crewed*, and one for when they were *predominantly double-crewed* during their shift.	3
14			Numerical data above were used to create a final two *average incident threat ratings* for each officer: one for when they *had access to TASER* during their shift, and one for when they *did not have access to TASER*.	5
15	**Primary reason for using force**	Respondents were asked to identify the main reason that force was used by selecting one of the	Due to the small frequencies in many of the response categories, responses were aggregated into four groups to indicate officers using force to protect themselves and their	1

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		following: (i) To protect myself, (ii) To protect another officer, (iii) To protect the subject, (iv) To protect the public, (v) To effect an arrest, (vi) To prevent an offence, (vii) To secure evidence, (viii) To effect a search, (ix) As a method of entry, (x) To prevent escape, and (xi) Other	colleagues (responses of *i.* and *ii.*), to protect the public (responses of *iii.* and *iv.*), to effect an arrest (responses of *v.*), and for any other reason (responses of *vi.* through *xi*.)	
16			Due to the small frequencies in many of the response categories and the intention to explore reasons for use of force when single vs double crewed, an additional aggregate variable for *reasons for use of force* was created in order to be able to differentiate initiating a use of force to protect *oneself,* and to protect *another officer*. This consisted of five groups indicating that officers were using force to protect themselves (responses of *i*), protect another officer (responses of *ii*), protect the public (responses of *iii.* and *iv*), effect an arrest	2

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
			(responses of *v.*), and for any other reason (responses of *vi.* through *xi*.)	
17	**Stressfulness of shift**	Respondents were asked how stressful they found their shift on the following five-point scale: (i) Not at all stressful, (ii) Mildly stressful, (iii) Moderately stressful, (iv) Very stressful, and (v) Extremely stressful	Responses were re-coded using a corresponding numerical scale from one to five, where one equated to '*Not at all stressful,*' and five equated to '*Extremely stressful*.'	3, 4
18			Numerical data above was used to create an *average shift stress rating* for each officer.	4
19			Numerical data above were used to create two additional *average shift stress ratings* for each officer: one for when they were *predominantly single-crewed*, and one for when they were *predominantly double-crewed* during their shift.	3

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
20			Numerical data above were also used to create another two *average shift stress ratings* for each officer: one for when they *had access to TASER* during their shift, and one for when they *did not have access to TASER.*	5
21	**Overall workload**	Respondents were asked to rate their workload during their shift, using the following five-point scale: (i) Much too low, (ii) Too low, (iii) About right, (iv) Too high, and (v) Much too high	Responses were re-coded using a corresponding numerical scale from one to five, where one equated to '*Much too low*,' and five equated to '*Much too high.*'	3
22			Numerical data above were then used to create an *average shift workload rating* for each officer.	4
23			Numerical data above were used to create two additional *average shift workload ratings* for each officer: one for when	3

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
			they were *predominantly single-crewed*, and one for when they were *predominantly double-crewed* during their shift.	
24	**Physical fatigue**	Respondents were asked to rate their physical fatigue at the end of their shift using a numerical scale between zero and ten; where zero equated to '*Not at all*,' and ten equated to '*Extremely*.'	Scores were used to create an *average physical fatigue rating* for each officer.	4
25			Two additional averages were created using the raw numerical data, one for when officers were *predominantly single-crewed,* and one for when officers were *predominantly double-crewed* during their shift.	3, 4
26	**Mental exhaustion**	Respondents were asked to rate their mental exhaustion at the end of their shift using a numerical scale between zero and ten; where	These scores were used to create an *average mental exhaustion rating* for each officer.	3, 4
27			Two additional averages were created using the raw numerical data, one for when officers were *predominantly single-*	4

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		zero equated to '*Not at all*,' and ten equated to '*Extremely*.'	*crewed,* and one for when officers were *predominantly double-crewed* during their shift.	
28	**Shift safety**	Respondents were asked to rate how safe they felt during their shift using a numerical scale between zero and ten; where zero equated to '*Not at all*,' and ten equated to '*Extremely*.'	These scores were used to create an *average shift safety rating* for each officer.	3, 4
29			The data were used to create two additional *average shift safety ratings* for each officer: one for when they were *predominantly single-crewed*, and one for when they were *predominantly double-crewed* during their shift.	4
30			The data were also used to create another two additional *average shift safety ratings* for each officer: one for when they *had access to TASER* during their shift, and one for when they *did not have access to TASER.*	5

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
31	**The number of incidents attended**	Respondents were asked how many incidents they attended during their shift. Responses were collected via open text box that was formatted to only accept numerical responses.	These scores were used to create two averages for each officer: i.e. the average no. of incidents attended per shift when officers were *predominantly single-crewed,* and an average no. of incidents attended per shift for when officers were *predominantly double-crewed.*	3
32	**Total number of incidents where force was used**	As above	As above.	3

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
33	**Gender**	Respondents were asked to indicate their gender by selecting one of the following: (i) Male, (ii) Female, (iii) In another way, or (iv) Prefer not to say	No participants selected '*In another way'* and those that had selected '*Prefer not to say'* were considered the same as those that had not specified their gender identity. As such, for the purposes of these analyses gender became a mutually exclusive binary variable, with participants falling into one of two categories: (i) Male, or (ii) Female.	4
34	**Role**	Respondents were asked to indicate their role by selecting one of the following: (i) Response, (ii) Roads policing or Traffic, (iii) Neighbourhood policing, (iv) Community Safety or Community	Due to the small number of participants that had indicated having a neighbourhood policing role (n=3) and the similarities between the role of Response and Neighbourhood policing, these two groups were aggregated into one for the purposes of these analyses. No respondents had indicated working within a Community safety or Community relation	4

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		Relations, and (v) Another function	role, and only three had selected '*Another function*.' As such, these two groups were excluded and role became a mutually exclusive binary variable with respondents falling into one of two categories: (i) Response and Neighbourhood policing, or (ii) Roads Policing or Traffic.	
35	**Length of service**	Respondents were asked to indicate their length of service via a drop-down list that provided the option '*less than a year,'* followed by options representing yearly intervals from '*One year*' to *'35*	No participants reported a length of service over 28 years and as such, the responses were recoded into numerical values; with '*less than one year*' being recoded as 0, '*One year*' being recoded as 1, '*Two years*' being recoded as 2, and so on.	4

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		years' and then a final option of '*More than 35 years.*'		
36	**NDM use (frequency)**	Respondents were asked to indicate how frequently they use the NDM when making time pressured decisions in the line of duty by selecting one of the following: (i) Never, (i) Rarely, (iii) Sometimes, (iv) Usually, and (v) Always.	Responses were recoded as a numerical scale from one to five, where one equated to '*Never,*' and five equated to '*Always*.'	**4**

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
37	**NDM perceived utility**	Respondents were asked to indicate how useful they found the NDM when making time pressured decisions in the line of duty by selecting one of the following: (i) Not at all useful, (i) A little useful, (iii) Somewhat useful, (iv) Very useful, and (v) Extremely useful	Responses were recoded as a numerical scale from one to five, where one equated to '*Not at all useful,*' and five equated to '*Extremely useful*.'	**4**

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
38-42	**Rational, Avoidant, Dependent, Intuitive and Spontaneous decision-making styles.**	General decision-making styles were assessed using an adapted version of Scott & Bruce's (1995) General Decision-Making Style inventory (GDMS; please see Appendix 24) which comprised 25 items where respondents were asked to indicate the extent to which they agreed or disagreed with 25 statements about decision-making using the following five-point scale:	Responses were weighted on a corresponding scale from one to five, where one equated to '*Strongly disagree,*' and five equated to '*Strongly agree.*' Participants' scores for each of the five decision-making styles were then calculated by averaging their scores across the five corresponding items for each decision-making style: resulting in a single overall score for Rational, Avoidant, Dependent, Intuitive and Spontaneous decision-making styles.	6

Table A.26. 1 ***Diary Study: Data Conversions***

New variable	Original Variable	Original Response Options	Details of data conversion(s) for the purposes of analyses	Utilised in Analyses Cluster
		(i) Strongly disagree, (ii) Disagree, (iii) Neither agree nor disagree, (iv) Agree, (v) Strongly agree.		

Appendix 27 - Diary Study: Theme Tables for Phase Three of the Qualitative Analysis

Table A.27.1 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Positive impacts	(i) Risk reduction	18 codes generated from 11 separate incidents across 10 individual officers	Officers indicated that the level of risk involved in the incident would be lower if they had been double-crewed and some even indicated that less force would have been required.	• *"It would have allowed me to isolate both parties and de-escalate the situation faster and maybe not have to use force on the subject."* • *"More of a show of strength so may de-escalate."* • *"Would have had an officer to watch traffic as I was dealing on the hard shoulder"* • *"My colleague would have been able to cover me during the incident and prevent the decamper from attacking"*

Table A.27.1 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Increased efficacy	7 codes generated from 6 incidents across 4 separate officers	Respondents highlighted that being double-crewed would enhance performance and efficiency through an increased ability to do complete work-related tasks, such as; securing evidence, and isolating or arresting subjects.	• *"Yes. Secured more evidence from vehicle."* • *"Would have been able to check vehicle more thoroughly"* • *"[…]. Had I been double crewed there would have been no hesitation and at least two males would have been apprehended"*
2. No impacts	(i) No difference in response	13 codes generated from 13	Respondents indicated that they would not have responded differently if they had been	• *"No"* • *"No change"*

Table A.27.1 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
		incidents across 8 separate officers	double-crewed by providing a short answer with minimal detail.	• *"No difference"*
	(ii) Same outcome	5 codes generated from 5 incidents across 3 separate officers	Officers indicated that they would have attempted to achieve the same outcome, or could not respond differently if they had been double-crewed.	• *"I was double crewed but my colleague was inside the property with the victim, I effected the arrest just before another crew arrived to back us up and convey the prisoner. My response and arrest would have been to same [sic]"*

Table A.27.1 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"I would have still responded in the same way but would have felt safer"*

Table A.27.2 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Negative impacts	(i) Risk escalation	78 codes generated from 59 incidents across 29 separate officers	Officers highlighted that if they had been single-crewed, they may well have had to use a higher level of force to remain safe and take control of the situation.	• *"Would have had to use a greater level of force to restrain subject. Suicidal female trying to jump out of window"* • *"Much higher level of force would of been used to ensure my safety, prevent assault and gain immediate control of subject due to direct threats and attempts to cause grievous bodily harm to myself"*
	(ii) Decreased efficacy	50 codes generated from 43	Officers indicated that if they had been single-crewed during the incident it would have	• *"I would have requested back up to assist before I made the arrest to prevent others present cashing [sic] me problems"*

Table A.27.2 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
		incidents across 26 separate officers	decreased their efficacy, giving examples that included having to wait for backup to arrive, or taking longer to resolve the incident.	• *"Further and continued tactical communications would have calmed this subject down I believe, but it would have taken longer to take full control"*
	(iii) Impact of risk on efficacy	13 codes generated from 13 incidents across 11	A small section of the data overlaps between risk escalation and decreased efficacy; whereby officers highlighted that had they been single-crewed, there would have been an increased level of	• *"Yes, the male that was arrested has multiple warning signals for extreme violence so I would not have attempted to arrest him on my own"* • *"Would have not stood a chance in talking the female down from the bridge, would have struggled to save*

Table A.27.2 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
		separate officers	risk that would then directly impact on their ability to do their job.	*her by pulling over the railings. Would have waited for other units to attend to assist"*
2. No impacts or not sure/NA	(i) Same outcome	14 codes generated from 14 incidents across 10 separate officers	Officers indicated that they would have attempted to achieve the same outcome, or could not respond differently if they had been single-crewed.	• *"It was an arrest for DIC the police response is the same wether [sic] single or double crewed."* • *"I could not have avoided entering the property and speaking to the male who eventually attacked police, as paramedics were inside requesting assistance. This would have still occurred if I was singly crewed."*

Table A.27.2 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"I would have still conducted the arrest but due to fighting I would have resulted in using ASP or PAVA or strikes"*
	(ii) No difference in response	22 codes generated from 10 incidents across 7 separate officers	Respondents indicated that they would have not responded differently if they had been single-crewed by providing a short answer with minimal detail.	• "No" • "No change" • "No different"

Table A.27.2 *Diary Study: Phase Three Theme Table for Responses to the Shift Diary Question 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Global theme	Subtheme	Size	Description	Grounding quotations
	(iii) Not sure / NA	9 codes generated from 9 incidents across 6 separate officers	In a small number of cases the responses indicated that being single-crewed was not applicable in the circumstances, or that they were unsure whether or not they would have to responded differently to the situation.	• *"Not attended due to firearms risk"* • *"Hard to say as this was an assistance call so there was plenty of officers I just helped restrain the suspect"* • *"Unknown"*

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
1. Occupational explanations	(i) More effective and efficient	32 codes across 17 individual officers	Officers felt that they were more effective and/or efficient when double-crewed than when single-crewed.	• *"When double crewed I feel that we can deal with jobs more effectively, feel safer and have the option to take more robust action if it is needed"* • *"Being double crewed enables you to address incidents quicker and more efficiently"*
	(ii) Alternative options and different ideas	13 codes across 10 individual officers	Officers identified that being double-crewed can provide opportunities for collaboration,	• *"It takes a tiny bit of the pressure of your shoulders, i can speak with my crew mate and we bounce ideas off each other"*

[78] Question 1a was a multiple-choice question '*When you're on shift, do you prefer to be... (please select one of the following options)*.' Participants could then select '*Single-crewed*,' 'D*ouble-crewed'* or '*Other*'. This table only includes the 34 respondents that selected 'Double crewing' only. Qualitative responses from respondents that preferred single-crewing, or another type of crewing were not subjected to analysis due to the small sample size (n=5).

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
			discussion and learning which in turn could enhance performance.	• *"It also allows officers to discuss an incident between themselves before deciding on the best method to deal with it if they are unsure or it is complicated"* • *"Enables newer officers to see differing ways of approaching incidents"*
2. Personal reasons	(i) Physical safety	21 codes across 20 individual officers	Officers mentioned that being double-crewed was safer for officers, both in a general sense and within the context of public interaction. Some officers also highlighted that officer safety was	• *"Being double crewed is a much safer way of Policing"* • *"Safer for officers to be in two's when dealing with violent or dangerous situations"*

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
			improved by double crewing for specific reasons, such as potentially protecting them from work-related hazards such the division of attention whilst driving.	• *"Being double crewed is safer. Having a second person available to assist with incidents provides physical safety"* • *"It is usually safer for the passenger to listen to call details on the radio"*
	(iI) Psychosocial impacts	26 codes across 14 individual officers	Officers identified a range of associated psychosocial benefits, including reduced levels of loneliness and enhanced psychological wellbeing, improved morale, more	• *"Less lonely and more productive as the confidence to stop people as if it kicks off you have support."* • *"I feel a lot safer when double crewed which in turns make me more confident in dealing with situations. I*

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
			confidence, and reduced levels of stress.	*also work 12 hour shifts which is a long time to be on your own for"* • *"Promotes a feeling a wellbeing / prevents loneliness (when I am single crewed in rural areas I can go a whole shift without human contact... Except with offenders)"* • *"Being double crewed also makes you feel more confident and massively reduces stress levels."*
	(iii) Lighter workload	11 codes across 11	Officers emphasised the positive impact of double crewing on officer workload, demands, and	• *"I feel safer and it is easier to share out the work and deal with jobs more efficiently"*

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
		individual officers	the number of things that they need to attend to.	• *"You have an additional set of eyes to be alert to more things than can possibly be taken in by one person, who is driving, listening to the radio for jobs, potentially searching for a person or vehicle and alert and aware of live unfolding incidents whilst on patrol"* • *"Work wise, we can spread the crimes, the common thing we do when double crewed is one job for me one job for you so on so forth. This would decrease the amount of stress imposed on us with workload"*

Table A.27.3 *Diary Study: Phase Three Theme Table for Responses to Question 1b in the Post-participation Questionnaire "Please use the space below to tell us why you selected your choice above*[78]

Global theme	Subtheme	Size	Description	Grounding quotations
	(iv) More proactive and productive	6 codes across 6 individual officers	Officers made reference to the impacts of double crewing on their productivity and ability to conduct proactive policing. Though most of these references were non-specific in nature, some responses linked these improvements to enhanced confidence and the additional capacity afforded by an extra pair of hands.	• *"Less lonely and more productive as the confidence to stop people as if it kicks off you have support"* • *"Allows for more proactive work as on drives and the other can do checks"*

Table A.27.4 *Diary Study: Phase Three Theme Table for Responses to Question 2 in the Post-participation Questionnaire "How does crewing level affect you, and your fellow officers?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. The impacts of single-crewing	(i) Negative impacts on performance	9 codes across 5 individual officers	Overall, participants highlighted the negative impact of single-crewing on officer performance. Some mentioned that this was due to a reduction in their preparedness to engage in proactive policing, whilst others highlighted a reluctance to make important decisions.	• *"When solo crewed I am less likely to actively target known criminals or persons of interest in particular if they are dangerous individuals especially as half of my (often minimum staffed) team are not response drivers meaning back up is a long delay"* • *"I know officers who are single crewed can often be less willing to make big decisions, such as arrest someone, because they are by themselves. This has happened to me before too"*
	(ii) Negative impacts on safety	8 codes across 5	Some officers made reference to a relationship between officer	• *"Leaves us vulnerable to assault and often calls are unsuitable for a lone officer to attend"*

Table A.27.4 *Diary Study: Phase Three Theme Table for Responses to Question 2 in the Post-participation Questionnaire "How does crewing level affect you, and your fellow officers?"*

Global theme	Subtheme	Size	Description	Grounding quotations
		individual officers	crewing levels and officer safety, with participants highlighting that lone working makes them more vulnerable to assault and, interestingly, complaints from the public.	• *"Also open to complaints as it is your word against there's [sic]"*
2. The impacts of double crewing	(i) Positive Psychosocial impacts	4 codes across 4 individual officers	A small number of officers highlighted the positive psychosocial impacts of being double-crewed.	• *"Double crewing, and the knowledge that there are other units nearby, increases confidence, well-being and motivation"* • *"Generally I find everyone is happier when double crewed"*

Table A.27.4 *Diary Study: Phase Three Theme Table for Responses to Question 2 in the Post-participation Questionnaire "How does crewing level affect you, and your fellow officers?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Positive impacts on safety	3 codes across 3 individual officers	A couple of officers drew attention to a potentially positive relationship between double crewing and perceived officer safety.	• *"I'd be a liar if I said I prefer single crewed, I feel safer with a partner"* • *"All officers I know prefer to be double crewed and feel safer than when they are single crewed."* • *"I am confident working single crewed most of the time yet feel double crewed boosts confidence and safer"*
3. General staffing levels and current circumstances	(i) Low overall staffing and associated impacts	7 codes across 7 individual officers	Respondents discussed the negative impacts of low overall staffing levels, including higher workloads, increased levels of	• *"Levels are constantly low, impacting on ability to carry out proactive work and enforcement"* • *"Less colleagues = more work = more corner cutting/mistakes = more stress"*

Table A.27.4 *Diary Study: Phase Three Theme Table for Responses to Question 2 in the Post-participation Questionnaire "How does crewing level affect you, and your fellow officers?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			stress, and a reduced ability to engage in proactive policing	
	(ii) Identify as often being single-crewed	4 codes across 4 individual officers	Some officers used the space to mention that they were often single crewed. Though a small subtheme, it gives a useful (albeit small) widow of understanding into officers' everyday experiences.	• *"We only double crew on nights, we all have our own stuff to do during earlies and lates"* • *"double crewing not allowed during the day but workload still exhists [sic]"*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. The impacts of single-crewing	(i) Reduced effectiveness	16 codes across 12 individual officers	Officers highlighted the negative impact of single-crewing on officer effectiveness, with several pointing out negative impacts on proactive policing and the physical limitations of working alone in particular.	• *"Single-crewed, it's easy to miss a call or crucial details about a call you're attending. It's too tempting not to instigate a proactive stop if it involves a group of people."* • *"Being primarily single crewed definitely lowers performance. Apart from the positive effect of having a team member with you, being double crewed allows you to undertake more of the functions of a police officer, making that unit more productive"*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Reduced officer safety	12 codes across 9 individual officers	Officers chose to highlight the impacts of crewing on their own safety, and several respondents also drew attention to the potential impacts of perceived safety on their performance.	• *"If I am single crewed I think twice about making arrests due to safety."* • *"Officers who are solo crewed will, quite naturally, avoid putting themselves in danger. i.e. I'm solo crewed in a rural area at 0200hrs and see a vehicle with 4 males in it and my closest back up is 10 minutes away. Am I going to stop this vehicle? As a supervisor I have to make allowances for officers making these decisions"*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(iii) Reduced efficiency	6 codes across 4 individual officers	Though this subtheme was comparatively small, it is important to note that many participants felt that it took longer to do their job when they were working alone.	• *"Harder, typically, it takes more time to investigate a crime when single crewed"* • *"Less proactive work single crewed and workload is out of control. Incidents are often resolved quicker though as officers are more free to separate based on demand"*
2. Crewing impacts and current circumstances	(i) Current under-resourcing	11 codes across 8 individual officers	Low overall staffing levels were highlighted a number of officers, with several mentioning that the current under-resourcing had led	• *"Significantly. With lower numbers on a daily basis I cannot complete workload enquiries due to a constant roll of new jobs coming in that have to be dealt with in a time critical process. It means my workload jobs*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			to higher workloads and more pressure.	*get put on hold to go to other incidents, which then become additional jobs on my workload, adding to circle of frustration"* • *"IF UNDER STRENGTH THEN PLACES MORE PRESSURE ON MY ABILITY TO COVER ALL ASPECTS OF MY ROLE AND WILL IMPACT ON PERFORMANCE SUSCH [sic] AS PRIORITIES SLIPPING"*
	(ii) Effectiveness	11 codes across 7	Participants indicated that poor overall staffing levels are linked	• *"Low crewing levels does not affect my personal performance (although I do feel more*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
		individual officers	to poor victim support, and a reduction in proactive policing.	*pressure/stress), however, it reduces my ability to provide a good service to victims and the public as a whole"* • *"Fewer officers attending a job means fewer discussions about the best way to deal with it. Fewer officers means longer response times. Fewer officers means more tired officers which affects officer performance negatively. Fewer officers means more jobs are written off and filed"*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"We are very reactive and have very few opportunities to get out and be proactive and provide a visible presence to the public"*
3. The impacts of double crewing	(i) Improved effectiveness	7 codes across 7 individual officers	Participants indicated that being double-crewed meant that they were able to better perform their duties. Some highlighted that efficacy was improved due to lighter workloads or increased proactivity, whilst others spoke of efficacy in more general terms.	• *"Being double crewed improves officer performance because it is easier to manage a job and ensure all tasks are completed when there are two of you"* • *"When double crewed I'm less stressed as work gets completed twice as quick. You're more proactive as there's two of you, so more likely to stop persons and vehicle you wouldn't on your own"*

Table A.27.5 *Diary Study: Phase Three Theme Table for Responses to Question 3 in the Post-participation Questionnaire "How do crewing levels affect officer performance and your ability to do your job?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"We perform better when we are double crewed"*
	(ii) Improved efficiency	6 codes across 6 individual officers	Participants indicated being double-crewed meant that could be more efficient. Some described being able to deal with incidents more quickly and thus attend more incidents, whilst others were less specific.	• *"Better being double crewed as you can complete jobs more efficiently and to the best of your ability. Things are done in quicker time and this means more jobs attended"* • *"You get jobs dealt with quicker and more efficiently by being double crewed"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Incident characteristics	(i) Volatility, violence and weapons	29 codes across 24 individual officers	These references highlighted that incident related stress was linked to the perceived volatility of the situation or the likelihood of conflict or harm, whether violence had already been reported at the scene, and, whether there were any weapons present.	• *"Threat of harm. Any weapons seen"* • *"The subject and whether they are volatile."* • *"Violence and aggression"* • *"Whether there are weapons at the location"* • *"The general officer safety warnings of any individuals or places I am responding to are of the forefront of the stress levels"*
	(ii) Who (the people present)	21 codes across 19 individual officers	The number of officers, bystanders and subjects were also highlighted an important factor in	• *"The proximity of large numbers of people"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			how stressful officers found an incident.	• *"I find dealing with conflict stressful when responding to an incident, and it's also very difficult to manage multiple people at one scene"* • *"Whether I am responding alone or with other officers, who those other officers are"*
	(iii) What (the type of incident)	9 codes across 9 individual officers	The type of incident was raised being influential in how stressful an officer found an incident. Though most just mentioned this in general terms, those that provided additional detail	• *"Type of incident, including the risk of harm posed to members of the public"* • *"How complex will this incident be, how serious is the threat"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			mentioned the associated threat levels, the seriousness, and/or the complexity of the incident or situation in particular.	• *"Seriousness of the incident, competence to deal with incident, threat posed by the incident or subjects"*
	(iv) Where and when	5 codes across 3 individual officers	Though comparatively small, this subtheme emerged as some officer mentioned that incident stress could be influenced by where and when an incident took place, including; location, time of day, and temporal position in an officers shift.	• *"Distance to travel to it, time of day, traffic congestion"* • *"Type of incident, time of day (start, middle or end of shift)"* • *"Distance traveled [sic] to the incident"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
2. Wider context	(i) Availability of backup	16 codes across 16 individual officers	The availability of timely back-up was also mentioned as a key factor in how stressful officers found an incident. More specifically, officers highlighted that they found incidents more stressful when they didn't know where their back-up was, or knew that there was no back-up available and/or back-up would not be imminent.	• *"Knowledge that assistance could be 30 mins away"* • *"The follow on being where is my nearest back up and how quick will they be there. Knowing there is no back up or it is a long way off when the subject is armed or volatile"* • *"Not Knowing how far away the next officer is"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Organisational and occupational issues	14 codes across 11 individual officers	Many officers also highlighted a range of organisational and occupational factors that influence incident related stress. Emergent factors from this group included overall workloads, a lack of organisational support, and poor communication between the control room and the officers on route to the incident.	• *"how will this job influence the rest of my day and my workload commitments. Will I have to cancel appointments and will this incident add to my protractions for the rest of my day/week/month etc."* • *"balancing increasing workloads; apparent lack of interest from supervisors as to my safety, lack of comprehension from comms staff as to what they are sending me to and how that may impact on my safety"* • *"Also blame culture within the job fear of making mistakes"*

Table A.27.6 *Diary Study: Phase Three Theme Table for Responses to Question 4 in the Post-participation Questionnaire "What factors influence your stress levels the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Fear of making a mistake and being criticized"* • *"LACK OF INFO FROM CONTROL WHEN EN ROUTE"*

Table A.27.7 *Diary Study: Phase Three Theme Table for Responses to Question 5 in the Post-participation Questionnaire "What factors influence your confidence the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Officer resources	(i) Crewing levels	13 codes across 13 individual officers	Though some just indicated that crewing impacted on their confidence, others went further and specifically identified that having another officer with them increased their confidence.	• *"I have far more confidence when backed up by a colleague"* • *"Factors that influence me are the type of incident and if I am on my own. I feel more confident when I attend an incident with colleagues"* • *"Whether I am alone or responding with other officers"*
	(ii) Availability of backup	12 codes across 12 individual officers	The availability of back-up was also considered a factor that	• *"The level of resources nearby"* • *"Backup and availability"* • *"Having back up from other staff members"*

Table A.27.7 *Diary Study: Phase Three Theme Table for Responses to Question 5 in the Post-participation Questionnaire "What factors influence your confidence the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			influenced officer confidence when responding to an incident.	• *"Backup nearby if things go wrong"*
	(iii) Colleague quality	6 codes across 6 individual officers	The subtheme colleague quality is concerned with other officers, but less about attendance or availability to provide back-up, and more with the officers perception of their colleagues experience, competence, and how supportive they are.	• *"Experience and ability of colleagues"* • *"Knowing that my sergeant is available for a call. Knowing that other officers on my team will back me up"* • *"Competence, both mine and the officers dealing"*
	(iv) Equipment	4 codes across 4 individual officers	Though comparatively small, it was important to include this subtheme given that three of the four	• *"I carry taser which is an additional piece of kit to most of our officers. That said, being double*

Table A.27.7 *Diary Study: Phase Three Theme Table for Responses to Question 5 in the Post-participation Questionnaire "What factors influence your confidence the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			references included direct references to TASER.	*crewed is always the ultimate confidence boost in any scenario. Having taser as an additional tool. Knowing back up is nearby if required"* • *"Attending with a competent like minded officer and if required, someone who is carrying a taser"* • *"I carry Taser which is quite comforting"* • *"Knowing I have the skills and ability to deal with the incident I am being sent to. also having the suitable kit and equipment when needed"*

Table A.27.7 *Diary Study: Phase Three Theme Table for Responses to Question 5 in the Post-participation Questionnaire "What factors influence your confidence the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
2. Situational factors	(i) Incident characteristics	13 codes across 11 individual officers	Many officers highlighted that the type of incident that they are attending impacts their confidence, as does the number of subjects at the scene and whether the subject(s) were known to the police.	• *"If subject is already known or not ....if known possible to know what to expect"* • *"Type of incident, number involved, if I have back up"* • *"Type of incident, whether I know those involved, if I have back up"*
	(ii) Officer factors	11 codes across 10 individual officers	Some officers highlighted a relationship between confidence and their experience and/or knowledge. One officer also	• *"Knowing how to deal with a job"* • *"If I have dealt with a similar incident before, if I understand fully what has happened, who I am working with"*

Table A.27.7 *Diary Study: Phase Three Theme Table for Responses to Question 5 in the Post-participation Questionnaire "What factors influence your confidence the most when responding to an incident?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			mentioned the impact of more transient personal factors, such as fatigue and stress.	• *"My knowledge of the type of incident/law involved in the incident"* • *"How tired and stressed I'm feeling when on route"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Development of threat assessment	(i) Information gathering	29 codes across 22 individual officers	Officers highlighted that a key part of assessing threat is to gather as much information about the incident as possible; with two key sources of information being identified. The first being the information that they can access via their colleagues, including: the details provided in the emergency call, intelligence from background checks on the subject and location, and information on availability of	• *"I try and get information from the control room and get them to check intelligence"* • *"Being passed a good update from Comms and any previous incidents at the address or involving the named people"* • *"My 23 years experience helps !!"* • *"If no info then when I arrive at scene I typically like to know my surroundings, know who is around, their friends, family or violent people. What the subjects demeanour is like, how they speak, what they have in their hands,*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			back-up. The second source of information identified was the officer themselves, with key details being ascertained by the officer upon their arrival at the scene, and/or previous experience, and existing knowledge about the subject or location.	*am I capable being single crewed to properly subdue them, what if my PAVA and ASP don't work"*
	(ii) Experience and training	11 codes across 10 individual officers	Officers indicated that they drew directly on their own skills and experience to assess the level of threat, as well as using the NDM	• *"Using the National Decision-making Model."* • *"My 23 years experience helps !!"* • *"Using the NDM, coming up with plans"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			model as the basis of their decision-making (as per their police training).	• *"THREAT ASSESSMENT FOR ME NOW COMES WITH EXPERIENCE (20 YRS IN)"*
	(iii) Process	9 codes across 7 individual officers	Officers discussed the process for making threat assessments and identified threat assessment as being a non-linear, dynamic and unremitting process, which for some, started by gathering information from their colleagues on the way to the incident,	• *"Assess threat level based on info passed on way to job as well as dynamic assessment when on scene"* • *"I assess threat on my way towards a job depending on what information has been given during 999 call, however, this can obviously change when you arrive so you need to constantly be considering risk and threat*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			potentially indicating a 'first step' in the process.	• *"There is a combination of static and dynamic risk. The assessment is influenced by information from the scene and our previous information"*
2. Resource factors	(i) Crewing and back-up	20 codes across 15 individual officers	Many officers highlighted that available resources are an important factor when assessing threat, including; whether they are single or double-crewed and how far away their back up is.	• *"I will always assess where my back-up is going to be. If officers are close, I am more inclined to enter a volatile situation knowing that I have back-up around the corner. If I am alone, I will think through an incident to bring it to a conclusion by avoiding the use of force at all costs"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Level of backup"* • *"The amount of officers at the scene dealing"* • *"Whether I am alone or with another officer and if single crewed - availability of backup"*
	(ii) Equipment, skills and operational support	6 codes across 6 individual officers	Some officers highlighted the impact of having the appropriate personal protective equipment (PPE), skills, operational support (such as availability of dog units) and wider technological support	• *"Most important factors are access to PPE and presence of colleagues as back up"* • *"An important factor is the equipment/skills I have to deal with the situation"* • *"Contingencies such as Tazer/Dog etc"* • *"Whether it can be seen on CCTV"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			such as CCTV when assessing threat.	
3. Situational factors	(i) Locus of risk, impact factors, and volatility	19 codes across 16 individual officers	Many officers highlighted that *who* is at risk during an incident is a key factor in their assessment, with some indicated a hierarchy of importance. Others also indicate that the presence of weapons and/or other impact factors are also important when assessing threat.	• *"Most important factors are whether the person is armed and who is at risk of that subject and why"* • *"MY SAFETY IS MOST IMPORTANT, THEN PUBLIC, THEN SUSPECT, THEN REPUTATION"* • *"Weapons, impact factors"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Space and time	14 codes across 12 individual officers	Some officers highlighted important factors relating to the physical space and time that the incident takes place in, such as the location type, time of day, and how far they need to travel.	• *"Location of the incident"* • *"Location is second concern dependent on situation type."* • *"Distance to travel to it, time of day, traffic congestion"* • *"Time of day Location type (club, private dwelling)"*
	(iii) Other persons present	9 codes across 9 individual officers	Officers emphasised the importance of the number of people present at an incident, their behaviour, and the level of risk that these individuals	• *"For me the threat is assessed on how the subject is towards not only me, but any other person present"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			are exposed to when assessing the threat levels at an incident.	• *"If no info then when I arrive at scene I typically like to know my surroundings, know who is around, their friends, family or violent people"* • *"Behavioural factors of individuals at the incident and how those people are responding to commands/ pleas etc from police"*
	(iv) Type of call	4 codes across 4 individual officers	The type of emergency call was also raised by a small number of officers as a key factor in the assessment of threat.	• *"What the response has been graded, type of incident"* • *"Type of call (eg domestic)"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
4. Subject factors	(i) Behaviour and perceived state-of-mind	7 codes across 7 individual officers	This subtheme identifies subject behaviour and their perceived state-of-mind as being an important factor in assessing risk, including; intoxication, mental health, and affect.	• *"I assess threat on a case by case basis. Warning markers help me with the assessment but I find it's how the person is behaving at the time. The most important thing is mental health"* • *"The persons behaviour How they are reacting to you"* • *"Intoxication of subject"* • *"What state the subject is in"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Armed with a weapon	5 codes across 5 individual officers	Although access to and the *presence* of weapons has already been raised as part of the global theme 3, subtheme i. (i.e. Locus of risk, impact factors, and volatility), five officers specifically identified that a subject *being armed* with a weapon was also a key factor in assessing threat levels at an incident. Though similar, these were coded differently to account for the potential qualitive	• *"Most important factors are whether the person is armed and who is at risk of that subject and why. Subject being armed or volatile"* • *"What state the subject is in, do they have weapons, how many of you there are, is a taser officer available"*

Table A.27.8 *Diary Study: Phase Three Theme Table for Responses to Question 6 in the Post-participation Questionnaire "How do you go about assessing the threat level during an incident, and what factors are the most important?"*

Global theme	Subtheme	Size	Description	Grounding quotations
			differences between the mere presence of a weapon (with no further detail) and a subject actively wielding one.	
	(iii) Physical characteristics of subject	6 codes across 4 individual officers	This subtheme relates to the number of subjects and their associated physical characteristics, such as their sex, size and strength.	• *"Numbers of aggressors"* • *"Past experience of a suspect, sex, size and behaviour of suspect are they armed"* • *"The size/strength of the person"*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Reasons for use of force and influencing factors	(i) Subject characteristics and behaviours	38 codes across 23 individual officers	Officers referenced several behavioural factors, such as violence and aggression, attempting to flee, or choosing to carry a weapon that would feed into their decision to use force. They also mentioned several factors related to their perception of the subjects affect or state of mind. This included reference to them appearing to be angry or agitated, whether they displayed symptoms of	• *"Subject had already used force during a robbery and had run away from me. The victim had been struck with some form of weapon, causing a GBH injury to his head. I did not know where the weapon was. I therefore used force, once I'd caught up with him, to stop him from running further and to stop him from attacking me"* • *"Aggressive suspect wanted for threatening behaviour inside his flat refusing to allow my*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
			intoxication or a disturbed mental state. Others mentioned an individual's physical characteristics like size or gender.	*colleague and I access and making threats to harm himself. Decision was made to force entry to address and handcuff and forcibly remove suspect if necessary"* • *"Single crewed. Drunk make [sic]. Just smashed up a car. Middle of nowhere. Had a weapon (crowbar)"* • *"I made the decision to do this as the person had been arrested, was extremely drunk and agitated"*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Suicidal mental health male stated he was armed with a knife and had taken pills. Lashed out at attending officer, Taser drawn and red-dot"* • *"Based on the fact this male was of large muscular build tall and not complying with the arrest. I decided to put handcuffs on him, so we didn't loose [sic] control of the situation and to ensure the arrest was effective."*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Protection and risk reduction	30 codes across 18 individual officers	Officers highlighted that the use of force had been required to either protect the subject, their colleagues, the public, or themselves.	• *"Decision made to secure prisoner and ensure my and colleagues safety. Cuffs"* • *"I responded to an assistance call where a male had resisted arrest. Upon my arrival there were plenty of officers dealing with him however he started to kick out again and has been taken to the ground, I have grabbed hold of his head to prevent him from harming himself or head butting anyone. I have then stood the male back up and he has again*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
				kicked off so have helped take him back to the floor" • *"Male was extremely verbally aggressive and threatening members of public. He was cuffed before he was taken from the ground and then tried to bite officers when in the vehicle. Force used to protect officers and public"*
	(iii) Situational characteristics	21 codes across 14 individual officers	This subtheme emerged from officers highlighting that incident characteristics and the context in which the incident took place	• *"Suspect was compliant with all instructions so still being aware of the victim injury I still chose to compliantly handcuff the suspect to*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
			impacted on their decision to use force. This included officer crewing levels and availability of back-up, the physical environment (such as limited lighting), victim injuries, the equipment available to the officers, and the type of crime.	*the front to maintain control of them and negate further injuries to anyone"* • *"The subject was also within a dark room with many objects that could have been used as a weapon"* • *"Decision was made based on what equipment available (no MOE kit), what other resources available and suspect's behaviour"*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(iv) Proactive use of force	10 codes across 10 individual officers	Some officers spoke about using force proactively in an attempt to prevent escape or to reduce the risk of harm. However, it is important to note that using force proactively in this manner was related to the use of tactical communication and handcuffing only.	• *"Info/intel suggested male involved in drug supply and likely to make off from police. Male was in vehicle and could be concealing weapon. Male young and capable of causing injury if he decided to escape. No immediate support from colleague. Handcuffed to prevent escape and harm"* • *"I assessed that she had the potential to fight with us as we were unable to calm her down and so handcuffs were applied"*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Nothing exciting, compliant handcuffing of subjects, whilst excuting [sic] a firearms warrant at a property. The decision was a no brainer, searching for firearms at location which included persons and didn't want to get shot"*
2. Decision to use force and which force to use	(i) Decision to use force	7 codes across 7 individual officers	Some, though not many, officers discussed the decision process in detail; with most referring to the National Decision Model and one individual highlighting the	• *"Using the national decision-making model and asking myself... Is the force absolutely necessary? What powers do I have? What is proportionate? What am I aiming to achieve*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
			challenges of using such a structure. A few officers also indicated that the decision was not always theirs to make (due to the intended goal, e.g. effecting an arrest).	*by using the force? It is difficult to break a dynamic decision-making process down to be as structured as the NDM, but decision are always based around this process/ structure"* • *"Arresting a person always leads to a use of force, because at a minimum you should be taking hold of that person by the arm to keep them under control when arrested. That's a use of force. Whether this is enough or its required to use handcuffs or ground restraint*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
				depends on the subjects response to being arrested really"
	(ii) Justification of level of force used	5 codes across 5 individual officers	This subtheme emerged as some officers chose to use the space provided to justify their use of force rather than explain the process which they used to arrive at their decision. More specifically, these officers sought to validate the use of force by explicitly stating that their choice was proportionate and/or necessary	• *"The decision to use force of this kind was proportionate and absolutely necessary in this example."* • *"It is all based around the NDM which is how I justify it, because I was double crewed and they offered low threat I could not justify using handcuffs. They were arrested and my hand went under their arm which is it."*

Table A.27.9 *Diary Study: Phase Three Theme Table for Responses to Part A of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "Please describe how you made the decision to use force, and what type of force to use…"*

Global theme	Subtheme	Size	Description	Grounding quotations
			or explaining why additional force would have been unjustified.	• *"This was compliant, so verbal communication and the handcuffs themselves were effective, and no escalation of force was necessary"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Situational and contextual factors	(i) Wider context	22 codes across 17 individual officers	Officers highlighted several factors related to the wider context in which the incident took place that were influential in when and how they used force. This included the level of risk, availability of back up, how likely it was that using force would help the officer achieve their overall aim, and the legal and ethical context in which the use of force could be framed.	• *"The risk of her being violent towards us."* • *"Threat level, legal power available and would using force be the most effective option"* • *"How long til assistance gets to me"* • *"Behaviour of suspect and what resources are available to assist me"* • *"If it is reasonable and justified. How effective it will be in the aim I am trying to achieve"* • *"How it will be perceived after the events"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Physical environment and situation	14 codes across 10 individual officers	Multiple factors pertaining to the physical environment and situation that the incident was taking place in were identified as being influential. This includes the number of officers present, the number of subjects present, the physical location, and whether or not there had been any injuries	• *"The more officers that are present generally leads to the amount of force used. Higher numbers of officers equals less force used by each officer"* • *"IF I WAS ALONE POSSIBLY WOULDNT HAVE LAID HANDS ON - WAITED FOR SUPPORT OR USED PAVA / DRAWN TASER ETC. ALWAYS THINKING ABOUT MY SAFETY AND TO EFFECT ARREST WITH LIMITED IF NO USE OF FORCE"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Level of violence, location, number of offenders, size, strength etc and number of officers"* • *"The environmental factors such as lighting or lack of lighting"* • *"The degree of injury already evidenced to the victim and not knowing who the suspect was or whether they were still armed"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
2. Subject characteristics and behaviours	(i) Subject behaviour	12 codes across 9 individual officers	Many officers felt that subject behaviour was one of the most influential factors when deciding how and when to use force, with officers specifically mentioning violent or aggressive behaviour and compliance (or lack thereof).	• *"Aggression of subject known previous violence weapons"* • *"Normally; rapport, body language, any verbal threats, situation"* • *"Whether they are compliant"* • *"Subject behaviour [sic]. Whether I think I can get them to listen to what I'm saying. If not, then force will probably be necessary"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Their general attitude towards Police and whether they are alone are also important factors"*
	(ii) Physical characteristics of subject	8 codes across 7 individual officers	Officers highlighted that the sex, size and build of the subject were important factors when deciding how and when to use force.	• *"Size of the subject I'm using force on, and warning signs that they may want to fight"* • *"The size and build of the suspect"* • *"Single or double crewed, my ability/their ability, size and gender, type of offence"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
3. Reason for use of force	(i) Protection and risk reduction	17 codes across 9 individual officers	Similarly to the responses for Part A of Question 7, many officers highlighted that their use of force had been required to either protect themselves, their colleagues, the public or even the subject themselves.	• *"The persons behaviour or threat towards me or other members of the public is always considered first and foremost. Using force is my last resort in trying to resolve a situation"* • *"The behavior [sic] of the suspect and the need to protect myself, my colleagues and members of the public"* • *"Threat presented to myself or the public"* • *"Keeping all parties safe (including the subject) is the most important factor"*

Table A.27.10 *Diary Study: Phase Three Theme Table for Responses to Part B of Question 7 in the Post-participation Questionnaire - Participants were asked to think back to the last time they had to use force in the line of duty and were then asked "What factors were the most influential when you were making the decision on how and when to use force?"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Securing evidence and taking control of the situation	7 codes across 6 individual officers	Officers highlighted that that last time they used force (in the line of duty), their reasons for doing so were more operational in nature. Some indicated that they needed to either gain or maintain control of the situation, whilst others emphasised a need to prevent escape or secure evidence.	• *"Securing the suspect soonest to prevent evidential losses"* • *"Necessity and the need to take control of a situation"* • *"Personal safety and to prevent escape which could have caused harm to public if male tried to make off in car at speed"* • *"To retain control of the situation and the subject. Force was used at the point of arrest"*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
1. Decision-making	(i) How the NDM is used	11 codes across 8 individual officers	This subtheme emerged as officers used the space provided to explained how the NDM is used in practice. Some felt that they subconsciously using the model when making decisions in the field, whilst other spoke of using it more intentionally.	• *"The National decision model simply puts into words how we make decisions all the time. If I'm dealing with something there and then, I don't stop to think about the model, I just make the decision based on the information I have at the time"* • *"The NDM is always used, whether consciously or subconsciously"* • *"I do use the NDM to make decisions but if in doubt I err on the side of extreme caution when feeling unsure as I do not feel that I would be*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
				supported by senior officers if something went wrong" • *"Subconsciously we may be using the NDM due to our training, assessing the various steps in quick time, but in reality, an officer just reacts to what happens in front of them and do not necessarily have the time to move through the NDM"*
	(ii) When the NDM is used	6 codes across 4 individual officers	Some officers used the space to discuss when the NDM is most and least useful. In particular, officers seemed to differentiate between time-	• *"NDM is an interesting concept when making decisions. It is fantastic when rationalising slow paced decisions, however I think it is less useful*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
			critical situations and those where time is a more abundant commodity. Though the use of NDM for slow-time decisions was viewed quite positively, some indicated that they found it to be less useful when decision-making was more reflexive or involved high-stakes	*when making instant decisions. Subconsciously we may be using the NDM due to our training, assessing the various steps in quick time, but in reality, an officer just reacts to what happens in front of them and do not necessarily have the time to move through the NDM"* • *"Decision-making - when someone is aggressive and threatening, the NDM is not exactly the first thing on your mind. There is an immediate need to neutralise the threat and then begin appropriate procedures. Having said that, there may be a few minutes en route to an*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
				incident to assess intel, risk assess and consider a plan if possible"
	(iii) Positives and negatives of NDM	4 codes across 4 individual officers	This subtheme was very modest and encompasses a small number of evaluative statements about the good and the bad aspects of the NDM.	• *"The NDM is very useful as a duty officer (Inspector) in making decisions fast and slow time. I have become adept at writing rationale which includes the desired objective, options considered, powers and procedures and the pros and cons which led me to my decision."* • *"The NDM is something that everyone uses on a daily basis, even civilians. It is a process*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
				which can help with explaining decisions to people in a sensible and simple way" • *"NDM at the time of an incident when a split decision is to be made is too easily scrutinised when NDM is reviewed by someone who is not under pressure, has more than the basic facts and time to review whether their officers acted correctly"*
2. Crewing	(i) Positives of double crewing	7 codes across 7 individual officers	Several officers used the space provided at the end of the post-participation questionnaire to share some additional thoughts about	• *"I feel that double crewing is more efficient as most of the time two officers need to me deployed to a job anyway. Being double crewed*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
			crewing practices; with many officers highlighting the positive aspects of double crewing; with efficacy, efficiency and officer wellbeing (both physical and psychological) being common threads.	*is better for staff wellbeing as it reduces stress levels and means that we can deal with jobs more quickly and efficiently"* • *"I believe all Officers should be double-crewed primarily for safety, however, I find that I achieve more and feel less stressed each time I am double crewed"* • *"Double crewing would reduce the number of 'wrong' decisions made as officers can discuss options with someone accountable at the scene"*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
				• *"Decision-making is always easier when double crewed in a tight-knit team as ideas and knowledge can be shared"*
	(ii) Negatives of single-crewing	6 codes across 6 individual officers	Several additional officers used the space provided at the end of the post-participation questionnaire to share a similar opinion as the previous theme, but from the opposite perspective; i.e. by highlighting the negative aspects of single-crewing. Officer wellbeing (both physical and psychological) and	• *"Crewing levels - rarely am I called to act independently - however, solo work would be more stressful and less safe. Responding - we often respond to incidents on G1 immediate putting members of public and ourselves at risk of traffic collision to find that there is no need to have done so"*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
			safety being the most frequent of these arguments to be presented.	• *"Being single crewed is not safe and does not allow officers to do their job properly. Officers are not being given tasers as standard and this is concerning when we are single crewed as a norm. Especially the more rural areas of the UK"*
3. Current challenges	(i) Operational issues	9 codes across 9 individual officers	The most commonly raised operational issue was the overall numbers of frontline officers and the impacts of poor resourcing on officer wellbeing, safety, and performance. Other operation issues that were raised	• *"The job we do is dangerous and difficult, having to make split second decisions that could prevent someone from coming to harm or even sometimes save someones [sic] life. The fact that we are sent into dangerous or volatile*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
			in the space provided included difficulties with partner agencies, colleagues, and contact centres.	*situations on our own is a sad reflection on the lack of resources the police have. I often feel that in my force it is only a matter of time until someone is seriously injured or worse due to having to deal with an incident alone."* • *"Contact centres need to better assess the need for immediate responses to reduce safety issues on the road"* • *"Dealing with partner agencies and other colleagues is a nightmare"*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
	(ii) Organisational issues	7 codes across 5 individual officers	Some officers used the space to indicate feeling unsupported by those in charge, and that they were currently facing high levels of demand, large workloads, and inappropriate or excessive expectations from management.	• *"So many response officers are now young in service and inexperienced and they are dealing with multiple stressful incidents and with a very high workload and all of this with no checks being made on their stress levels or mental health wellbeing. This can only bode ill for the future"* • *"Do use the NDM to make decisions but if in doubt I err on the side of extreme caution when feeling unsure as I do not feel that I would be*

Table A.27.11 *Diary Study: Phase Three Theme Table for Responses to Question 10 "If you would like to add any additional comments about crewing levels, responding to incidents, or how you make difficult decisions, please use the box below"*

Global theme	Subtheme	Size	Description	Grounding quotations
				supported by senior officers if something went wrong"

Appendix 28 - Diary Study: Top-level detail on each of the relationships depicted in Figure 5.5

Table A.28.1. *Diary Study: Integrated Inferential Findings – Supporting Evidence*

Association	Detail of Supporting Inferential Evidence for Figure 5.5
1	**Relationship:** Shift crewing and workloads. **Direction:** Average shift workload ratings were higher when officers were predominantly single-crewed than when double-crewed. **Statistical results:** U=65.00, p=.01, r=-.44.
2	**Relationship:** Workloads and mental exhaustion at the end of a shift. **Direction:** A positive correlation was found between average shift workload ratings and mental exhaustion at the end of a shift. **Statistical results:** rs(50) = .358, p = .009.
3	**Relationship:** Workloads and physical fatigue. **Direction:** A positive correlation was found between average shift workload ratings and physical fatigue at the end of a shift. **Statistical results:** rs(51) = .463, p = .000.
4	**Relationship:** Workload and shift stress **Direction:** A positive correlation was found between average shift stress ratings and average shift workload ratings **Statistical results:** rs(51) = .594, p = .000.
5	**Relationship:** Shift crewing and incident crewing. **Direction:** A higher proportion of incidents where officers were alone when a use of force began had occurred during a shift where the officer was single-crewed (compared to double-crewed). **Statistical results:** p=.000, V=.287.

Table A.28.1. *Diary Study: Integrated Inferential Findings – Supporting Evidence*

Association	Detail of Supporting Inferential Evidence for Figure 5.5
6	**Relationship:** Incident crewing and TASER Outcome 1. **Direction:** A larger proportion of incidents where force was used included the use of TASER when officers were alone when the use of force began, than when other officers were also present. **Statistical results:** p=.050, V=.226.
	Relationship: Incident crewing and TASER Outcome 2. **Direction:** A larger proportion of incidents where force was used included the use of TASER (as the first tactical option) when officers were alone when the use of force began, than when other officers were also present. **Statistical results:** p=.011, V=.328.
7	**Relationship**: TASER availability and shift stress. **Direction:** Average ratings for shift stress were lower when officers had access to TASER during their shift than when they did not. **Statistical results:** t(42)=-2.092, p=.043, *g*=0.64
8	**Relationship**: TASER availability and threat assessment. **Direction:** Average incident threat ratings were higher when officers did not have access to TASER during their shift than when they did. **Statistical results:** U=151.50, p=.034, r=-.32

Table A.28.1. *Diary Study: Integrated Inferential Findings – Supporting Evidence*

Association	Detail of Supporting Inferential Evidence for Figure 5.5
9	**Relationship**: Number of tactics used during an incident and incident stress. **Direction:** A positive correlation was found between the average no. of tactics used during a use-of-force incident and average incident stress ratings. **Statistical results:** rs(179) = .247, p = .001.
10	**Relationship**: Incident stress and shift stress. **Direction:** A positive correlation was found between average shift stress ratings and average incident stress ratings. **Statistical results:** rs(51)=.538, p=.000.
11	**Relationship**: Incident stress and incident threat. **Direction:** A strong positive correlation was found between incident stress ratings and incident threat ratings. **Statistical results:** rs(51)=.271, p=.049.
12	**Relationship**: Gender and incident stress. **Direction:** Male officers had lower average ratings for incident stress than female officers. **Statistical results:** U=66.50, z=-2.063, p=.037, r=-.29
13	**Relationship:** Gender and shift safety. **Direction:** Male officers had a higher average shift safety rating than female officers. **Statistical results:** U=37.50, z=-2.887, p=.002, r=-.40.

Table A.28.1. *Diary Study: Integrated Inferential Findings – Supporting Evidence*

Association	Detail of Supporting Inferential Evidence for Figure 5.5
14	**Relationship**: Shift safety and incident stress **Direction:** A negative correlation was found between shift safety and average ratings of incident stress. **Statistical results:** rs(51)=-.325, p=.001
15	**Relationship**: Shift safety and incident threat. **Direction:** A negative correlation was found between average shift safety ratings and average incident threat ratings. **Statistical results:** rs(51)=-.231, p=.023
16	**Relationship**: General decision-making style and incident threat. **Direction:** A positive correlation was found between the spontaneous decision-making dimension of the general decision-making style inventory and average incident threat ratings. **Statistical results:** rs(44)=.355, p=.015.
17	**Relationship**: General decision-making style and perceived utility of the NDM. **Direction:** A negative correlation was found between avoidant making dimension of the general decision-making style inventory and perceived utility of the NDM. **Statistical results:** rs(31)=-.345,p=.049
18	**Relationship**: General decision-making style and use of the NDM. **Direction:** A negative correlation was found between avoidant making dimension of the general decision-making style inventory and NDM use.

Table A.28.1. *Diary Study: Integrated Inferential Findings – Supporting Evidence*

Association	Detail of Supporting Inferential Evidence for Figure 5.5
	Statistical results: rs(31)=-.475, p=.005 **Direction:** A positive correlation was found between rational decision-making dimension of the general decision-making style inventory and NDM use. **Statistical results:** rs(31)=.381, p=.029 **Direction:** A negative correlation was found between dependent decision-making dimension of the general decision-making style inventory and NDM use. **Statistical results:** rs(31)=-.397, p=.022
19	**Relationship**: Perceived utility of the NDM and NDM use. **Direction:** A positive correlation was found between perceived utility of the NDM and frequency of NDM use. **Statistical results:** rs(35)=.767, p=.000.
20	**Relationship:** Incident threat levels and TASER outcome 1. **Direction:** The average threat level rating was slightly higher for incidents where TASER was used. **Statistical results:** U=188.00, z=-1.769, p=.038, r=.18.

Appendix 29 - Diary Study: Respondent Demographics for Use of Force Items

All qualitative responses to the Question '*If you had been double-crewed, would you have responded to the incident differently and if so, how?*' in the shift diary.

This follow-up question was posed to 15 individuals relating to 31 separate incidents; with 15 respondents providing information across 30 incidents. Demographics for these 15 respondents can be found in Table A.28.1.

Table A.29.1 *Diary Study: Demographics for those Responding to the Question: 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Characteristic		Question respondents		
		N	%	Valid %
Gender	Female	2	13.3%	13.3%
	Male	12	80.0%	80.0%
	Other	0	0.0%	0.0%
	Preferred not to say	1	6.7%	6.7%
	Not specified	0	0.0%	-
	Total	**15**	**100.0%**	**100.0%**
Age	<25	3	20.0%	20.0%
	26-40	6	40.0%	40.0%
	41 plus	6	40.0%	40.0%
	Not specified	0	0.0%	-
	Total	**15**	**100.0%**	**100.0%**

Table A.29.1 *Diary Study: Demographics for those Responding to the Question: 'If you had been double-crewed, would you have responded to the incident differently and if so, how?'*

Characteristic		Question respondents		
		N	%	Valid %
Rank	Constable	12	80.0%	80.0%
	Sergeant and above	3	20.0%	20.0%
	Not specified	0	0.0%	-
	Total	**15**	**100.0%**	**100.0%**
Length of service	0-9 years	9	60.0%	60.0%
	10-19 years	5	33.3%	33.3%
	20 years or over	1	6.7%	6.7%
	Not specified	0	0.0%	-
	Total	**15**	**100.0%**	**100.0%**

All qualitative responses to the question *'If you had been single-crewed, would you have responded to the incident differently and if so, how?'* in the shift diary.

This follow-up question was posed to 50 individuals relating to 150 separate incidents; with 48 respondents providing information across 133 incidents. Demographics for these 48 respondents can be found in Table A.28.2.

Table A.29.2 *Diary Study: Demographics for those responding to the question: 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Characteristic		Question respondents		
		N	**%**	**Valid %**
Gender	Female	5	10.4%	10.4%
	Male	42	87.5%	87.5%
	Other	0	0.0%	0.0%
	Preferred not to say	1	2.1%	2.1%
	Not specified	0	0.0%	-
	Total	**48**	**100.0%**	**100.0%**
Age	<25	8	16.7%	16.7%
	26-40	27	56.3%	56.3%
	41 plus	13	27.1%	27.1%
	Not specified	0	0.0%	-
	Total	**48**	**100.0%**	**100.0%**

Table A.29.2 *Diary Study: Demographics for those responding to the question: 'If you had been single-crewed, would you have responded to the incident differently and if so, how?'*

Characteristic		Question respondents		
		N	**%**	**Valid %**
Rank	Constable	43	89.6%	89.6%
	Sergeant and above	5	10.4%	10.4%
	Not specified	0	0.0%	-
	Total	**48**	**100.0%**	100.0%
Length of service	0-9 years	35	72.9%	72.9%
	10-19 years	11	22.9%	22.9%
	20 years or over	2	4.2%	4.2%
	Not specified	0	0.0%	-
	Total	**48**	**100%**	**100.0%**

Appendix 30 - Diary Study: Respondent Demographics for Qualitative Items

Two qualitative questions regarding whether officers would have responded differently to the use-of-force incident if they had been crewed differently were posed to 53 individuals relating to 181 separate incidents, with 51 respondents providing information across 163 incidents.

- Those that had been alone when the use of force began were asked: *If you had been double-crewed, would you have responded to the incident differently and if so, how?*
- Those that had been with at least one other officer when the use of force began were asked: *If you had been single-crewed, would you have responded to the incident differently and if so, how*

Demographics for these 51 respondents can be found in Table A.27.1 below.

Table A.30.1 *Diary Study: Demographics for those Responding to Either Qualitative Question within their Shift Diary*

Characteristic		**Question respondents**		
		N	%	Valid %
Gender	Female	6	11.8%	11.8%
	Male	44	86.3%	86.3%
	Other	0	0.0%	0.0%
	Preferred not to say	1	2.0%	2.0%
	Not specified	0	0.0%	-
	Total	**51**	**100.0%**	**100.0%**

Table A.30.1 *Diary Study: Demographics for those Responding to Either Qualitative Question within their Shift Diary*

Characteristic		Question respondents		
		N	%	Valid %
Age	25 and below	9	17.6%	17.6%
	26-40	28	54.9%	54.9%
	41 plus	14	27.5%	27.5%
	Not specified	0	0.0%	-
	Total	**51**	**100.0%**	**100.0%**
Rank	Constable	45	88.2%	88.2%
	Sergeant and above	6	11.8%	11.8%
	Not specified	0	0.0%	-
	Total	**51**	**100.0%**	**100.0%**
Length of service	0-9 years	36	70.6%	70.6%
	10-19 years	12	23.5%	23.5%
	20 years or over	3	5.9%	5.9%
	Not specified	0	0.0%	-
	Total	**51**	**100.0%**	**100.0%**