Police Use of TASER: A systematic review of potential decision factors, including officer crewing levels.

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Abstract

Police use of TASER can have serious consequences; therefore, it is important to examine any modifiable operational factors that impact an officer's decision to use TASER. As previous research has identified a potential relationship between crewing and TASER use, a systematic review was undertaken to explore which factors might impact police use of TASER by the Police Service of England and Wales, including officer crewing levels.

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Key words

Police, TASER, Crewing, Conducted Energy Device.

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Introduction

Since the introduction of TASER (a type of Conducted Energy Device) into the Police Service of England and Wales (PSEW) in the early 2000s, police use of TASER has increased consistently and considerably. According to official Home Office statistics, TASER was used just over 34 thousand times by police in England and Wales between April 2021 and March 2022, approximately double the rate of use compared to the year ending March 2018 (Home Office, 2022a).

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), TASER has been linked to a number of harmful side-effects, including (but not limited to); puncture wounds, burns from electrical discharge, secondary injuries caused by falls or other uncontrolled movements associated with neuromuscular incapacitation and the subsequent loss of posture, as well as adverse effects on the heart, circulation, and respiratory system in those with pre-existing medical conditions (Childers, Chan & Vilke, 2020; DOMILL, 2012; Kroll, 2019; TASER International, 2013; Scientific Advisory Committee on the Medical Implications of Less-Lethal Weapons, 2016). Previous research has also indicated that TASER can impair cognitive function for up to an hour after exposure (Kane and White, 2015), which could have serious implications for whether or not a subject can understand their rights when cautioned or follow post-exposure instructions.

Given the above, perhaps it is somewhat surprising that, until recently, there has been little interest in the decision to use TASER, and to what extent, within the UK academic field. Since 2016, there have only been two key explorations into TASER use within English and Welsh police (i.e. Dymond, 2016 and 2018, and; Quinton et al, 2020), both of which explored

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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. A mandatory 'use of force' record is generated when an officer, or member of police staff, uses force against a member of the public,[1] and is a formal record of key incident characteristics. This includes information on, situational and subject characteristics, interactional elements, officer factors, and any resulting injuries to the subjects and/or officers in attendance.

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 two key academic explorations, that also sits firmly within the sphere of operational control, was the number of officers present during the incident. However, when inspecting their findings, the authors' results were in conflict; with Dymond (2016, 2018) finding no association between the number of officers present and TASER use, and Quinton et al. (2020) finding that officers were more likely to discharge their TASER when they were single-crewed (i.e. working alone).

Given the potential for harm associated with TASER and the increasing frequency with which TASER is used by the Police Service of England and Wales, it is imperative that

[1] Including, but not limited to: Batons, dog deployment or bite, firearms, handcuffing, irritant spray, limb/body restraints, spit and bite guards, shields, TASER, and unarmed skills.

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we extend our current understanding of when, and in which circumstances, officers are more or less likely to use TASER – paying particular attention to factors that are more likely to fall within the operational sphere of control, such as officer crewing.

This systematic literature review aims to provide the first step in this exploration by gathering and synthesizing all the currently available evidence regarding which factors might impact an officer's decision to use TASER within the PSEW, and, more specifically, whether officer crewing affects TASER use.

Method

Search process

The protocol for this systematic review was registered on PROSPERO - International Prospective Register of Systematic Reviews (registration number: CRD42019151366), and based on PRISMA-P checklist (Shamseer et al, 2015).

A comprehensive literature search was performed in December 2019, and 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 informally identified via practitioner recommendation (i.e. Quinton et al., 2020).

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

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For papers to be eligible, they had to be: a) original empirical research, b) written in English, c) relevant to the review aims described in the introduction, d) include participants from the policing population of England and Wales, or other countries with similar policing principles (e.g. those that have been notably influenced the British approach to policing referred to as 'policing by consent'),[2] and e) include one of the following as a key outcome measure or the main phenomenon of interest; the frequency and type of TASER use, the position of TASER use within sequential use of force situations, or the reasons for TASER use.

[ENTER TABLE I AROUND HERE]

The PRISMA diagram (Figure I) details the results of the literature search, screening, and selection processes. In total, the initial searches identified 14,447 published and unpublished records. After duplicates were removed, 13,399 articles were screened against the criteria above, resulting in the retention of 20 records and forming the basis of this review.

[ENTER FIGURE I AROUND HERE]

Quality Assessment

The following three quality appraisal checklists used by the National Institute for Health and Care Excellence (2012) in their development of Public Health Guidance were used to assess the quality of the available research to help inform interpretation of the findings: The quality appraisal checklist for quantitative intervention studies;[3] the quality appraisal

[2] This includes parts of the Commonwealth, such as Canada, Australia and New Zealand, as well as the United States of America (Archbold, 2013; Buttle, 2010; de Lint, 2004; Goldsmith, 2001).

[3] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-f-quality-appraisal-checklist-quantitative-intervention-studies

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checklist for quantitative studies reporting correlations and associations,[4] and; the quality appraisal checklist for qualitative studies.[5]

A fifth 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 15% 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 II), the scores from the primary reviewer were retained as the final scores for those three papers and the remaining papers were scored by the primary reviewer alone.

[ENTER TABLE II AROUND HERE]

Data management, extraction and synthesis

Data were mined from the review sample using a bespoke data extraction form developed by the primary reviewer and based on the eight categories covered in the Cochrane data collection form for intervention reviews for randomized control trials (2019). For studies that presented a number of 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 a quantitative synthesis/meta-analysis was not included. A summary iteration of the extraction sheet can be found below:

[ENTER TABLE III AROUND HERE]

Once data had been extracted from the studies, the information contained within the data extraction table was subject to thematic analysis loosely based on the six-phase method

[4] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-g-quality-appraisal-checklist-quantitative-studies-reporting-correlations-and

[5] For more information please see: https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-qualitative-studies

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by Braun and Clarke (2006). Thematic analysis was chosen as it allows a flexible and accessible approach to analysis that can span the inductive - deductive divide, and would allow the review to: a) identify gaps in the existing literature, and b) to explore common themes across the studies in line with the aims of this review.

Although no assumptions about the themes 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. As such, some decisions on what data to include in the analyses had already been made; thus, the approach is semi-deductive in nature. In order to answer the aims of the research, analysis focused on exploring the variables that were measured as outcomes, predictors or controls by the research papers.

Results

A brief overview of key study characteristics is presented before systematically examining the themes that emerged with regard to factors relating to TASER use.

Overview of key study characteristics

Most studies were conducted in the United States of America (USA; n=15). Only three studies used a policing population from England and Wales, and the final two were Antipodean. 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. Overall, 17 studies were quantitative and just three were qualitative, with official use of force forms and/or officer personnel files being the most frequently used source of data (n=13).

Although the quality assessments were fairly positive overall, the geographical location of the sample populations meant that the majority of studies were rated higher for internal than external validity.

Key outcome variables of interest

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Although 19 out of the 20 studies specifically examined the frequency of TASER use as a key outcome measure or the main phenomenon of interest (all except Sierra-Arévalo, 2019), the way in which 'frequency' was defined differed greatly from study to study. For example, Ready and White (2011) defined frequency at a personal level by identifying and categorizing 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). However, Crow and Adrion (2011) counted frequency of TASER use during an incident; Bishopp, Klinger and Morris (2015) compared instances of TASER use over time, and; Brandl and Stroshine (2017) compared instances of TASER with other types of force, such as firearms or oleoresin capsicum spray (OCS). Other studies provided descriptive accounts of TASER use without a comparator (e.g. White & Ready, 2007), and in some 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, for example, currently records seven different types of TASER use; four of which are classed as 'non-discharge uses' as no electricity is intended to be discharged into the subject (i.e., drawn, aimed, arced and red-dot), and the remaining three are categorized as 'discharge uses' (i.e., drive-stun, fired, and angle drive-stun; Home Office, 2019). Only six papers (Boehme et al., 2021; den Heyer, 2020; Dymond, 2016; Escalante, 2020; Quinton et al., 2020; Thomas et al., 2010), however, defined more than one type of TASER use; and even then, the distinctions were only between the TASER being fired, and drawn but not fired (with the exception of den Heyer, 2020).

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

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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 20 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., 2018; Lin & Jones, 2010).

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

Emergent or related variables of interest

From the 20 studies included in this review, 30 variables were identified through analysis of the data extraction table, all of which could be grouped into one of the following three global factor themes: 1) Situational, contextual, and interactional elements 2) Subject characteristics, and 3) Officer factors.

Only variables that were explored by four or more studies (and/or four separate datasets) were included in this review as a sub-theme. Those that were explored by only three or fewer were automatically considered to be factors of *indeterminant influence,* due to lack of evidence, and removed from the final thematic evaluation.

Variables that were explored by four or more studies (and/or at least four separate data sets), which predominantly found no associations between TASER use and the factor sub-theme under examination, were considered to be factors of *unlikely influence* and were also removed from the final thematic evaluation.

Factors of *uncertain influence* were variables that had been explored by four or more studies (and/or at least four separate data sets) and which had disparate findings in relation to whether or not an association was found between TASER use and the factor sub-theme under examination. Finally, for a factor sub-theme to be considered as a *potentially influencing*

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factor, the variable must have been explored by four or more studies (and/or at least four separate data sets), which predominantly found some sort of relationship between TASER use and the sub-theme under examination.

Only factors of *uncertain influence* or *potentially influencing* factors were included in the final thematic evaluation; resulting in the retention of 18 factor sub-themes that can be directly mapped onto the three global factor themes identified above. A brief narrative exploration of each of these factor themes, grouped according to their global factor theme will be presented hereafter, (please see Table IV for additional information).

Global Factor Theme One: Situational, contextual, and interactional elements

This global theme consisted of the following seven factor subthemes which are examined in turn below: (a) Level of subject resistance/compliance; (b) Local TASER and use of force policies; (c) Number of subjects and/or bystanders; (d) Location; (e) Type of call/offence/incident; (f) Number of officers present; and (g) Time of day and/or lighting.

a) *Level of subject resistance/compliance:* Fifteen studies assessed this factor, ten of which used inferential statistics to explore the data. All bar one of the quantitative studies that used inferential statistics found an association between subject resistance/compliance and TASER use. The direction of this association, however, was less consistent. Some studies found that TASER use was associated with higher levels of resistance or 'active' resistance, whilst others indicated that TASER was associated with lower levels of resistance.

b) *Local TASER and use of force policies:* Eight studies assessed this factor, seven of which were inferential studies. All bar one of the studies that used inferential statistics found an association between local TASER policies and TASER use, and the findings suggested that officers changed their use of TASER to comply with local policy changes.

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c) *Number of subjects and/or bystanders:* Five studies assessed this factor, three of which were multivariate studies. All three of the studies that used inferential statistics found an association between the number of subjects/bystanders and the use of TASER. The findings from these studies suggest that officers are more likely to use TASER when subjects are alone. These findings were also supported by the qualitative study, which suggested that 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 force decision.

d) *Location:* Five studies assessed this factor, including one multivariate study. The multivariate study found an association between incident location and TASER use; with TASER use being more likely in dwellings, and less likely in police or medical settings. This was supported by the findings from the qualitative study which also identified location as an emergent issue; with officers indicating that that both open and enclosed spaces posed contextual constraints on their use of force choices.

e) *Type of call/offence/incident*: Five studies assessed this factor, three of which were multivariate studies. Two out of the three multivariate studies found an association between type of call/offence/incident and TASER use, and one did not.

f) *Number of officers present:* Seven studies assessed this factor, four of which used inferential statistics to explore the data. However, it must be noted that two of the studies used the same data set. Of the four multivariate studies, two found an association between number of officers present and TASER use, and two did not.

g) *Time of day and/or lighting:* Four studies assessed this factor, all of which were multivariate studies. Three out of the four multivariate studies found no statistically significant associations between TASER use and time of day and/or lighting, and the remaining study found that incidents occurring at night were more likely to be 'high

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risk' for TASER use and, conversely, that daytime incidents were more likely to be at 'lower risk' of TASER use.

Global Factor Theme Two: Subject characteristics

This global theme consisted of the following six factor subthemes which are examined in turn below: (a) Gender; (b) Perceived mental health status; (c) Ethnicity; (d) Intoxication; (e) Subject armed or believed to be armed with a weapon; and (f) Age.

a) *Gender*: Ten studies assessed this factor, seven of which were multivariate studies. All bar one of the multivariate studies that used inferential statistics found an association between subject gender and TASER use. The findings from these studies indicated that TASER was more likely to be used against male subjects than female subjects. This was supported by the findings from the qualitative study which found officers considered female subjects as less threatening and consequently did not feel as much force was necessary.

b) *Perceived mental health status:* Seven studies assessed this factor, five of which were multivariate studies. All five of the multivariate studies found an association between the perceived mental health and wellbeing of a subject and the use of TASER. More specifically, all five found that TASER was more likely to be used against subjects that were considered to have a mental health issue, a mental 'disability,' mental 'instability,' appeared 'mentally disturbed,' and/ or mental health was otherwise considered to be an impact factor.

c) *Ethnicity:* Ten studies examined this factor; eight of which were multivariate in nature. The findings, however, were far from convergent. Half of the multivariate studies found an association between ethnicity and TASER use, whilst the other half found no such associations. Studies that found associations identified several minority communities that might be at higher risk of TASER being used against them (e.g.

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those from Black or Hispanic communities), and one that might be at lower risk (i.e., those from Asian communities).

d) *Intoxication:* Eight studies assessed this factor, five of which were multivariate studies. Three multivariate studies found an association between subject intoxication and TASER use, whilst four found no such associations. It is worth noting that the findings from these studies were divergent both within and between types of intoxication (i.e., drugs / alcohol).

e) *Subject armed or believed to be armed with a weapon:* Seven studies assessed this factor, four of which used multivariate analysis to examine the data. Four of these multivariate studies focussed on armed subjects, and one examined the *belief* that a subject was armed. Of the four multivariate studies that focussed on armed subjects, three found an association between armed subjects and TASER use. However, it must be noted that two of these studies utilised the same dataset – so cannot wholly be considered as distinct studies.

f) *Age:* Six studies assessed this factor, four of which were multivariate studies. Whist three of the four multivariate studies found no association between TASER use and subject age, the remaining study 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.

Global Factor Theme Three: Officer factors

This global theme consisted of the following five factor subthemes which are examined in turn below: (a) Ethnicity; (b) Role; (c) Length of Service; (d) Gender; and (e) Age.

a) *Ethnicity:* Six studies assessed this factor, all of which used inferential statistics to explore the data. Five of these studies found an association between officer ethnicity and TAESR use, and only one did not. The direction of these associations, however, were far from consistent. Some studies found that TASER was less likely to be used

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by officers of specific ethnicities (e.g., Black officers), whilst others found that non-White officers were more likely to be involved in a TASER incident.

b) *Role:* Six studies examined this factor; five of which used inferential statistics to examine the data. All bar one of the quantitative studies that used inferential statistics found an association between subject officer role and TASER use; with TASER use being more likely for some roles (e.g., firearms officers, patrol officer), and less likely for others (e.g., Response).

c) *Length of Service:* Seven studies examined this factor; six of which used inferential statistics to examine the data. The majority of these studies found an association between an officer's length of service and TASER use. The direction of this relationship, however, was less clear. Some studies indicated that officer with longer lengths of service were more likely to use TASER, whilst anther indicated that those with shorter tenures were more likely to be 'high-frequency' TASER users. These results dovetail with those from the qualitative study which identified 'rookie' officers as ~~being~~ utilising TASER more often.

d) *Gender:* Seven quantitative studies assessed this factor, all of which used inferential statistics to examine the data. Five of these studies found no association between officer gender and TASER, and the remaining two found that male officers were more likely to use TASER.

e) *Age:* Four studies assessed this factor, all of which used inferential statistics to examine the data. Four of these studies found an association between age and TASER use, whilst one found no such association.

[ENTER TABLE IV AROUND HERE]

Discussion

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This review sought to explore the currently available evidence regarding the factors that impact an officer's decision to use TASER within the PSEW, and, more specifically, whether officer crewing levels affect TASER use. As such, the discussion will begin by examining the factors that are likely to be associated with, or effect the decision to use TASER, before moving on to discuss the evidence relating to crewing levels and concluding by presenting implications for current practice and future research.

What 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 sub-themes), 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., incident location, local policies, level of subject resistance/compliance, and the number of subjects/bystanders), two of which were related to the characteristics of the TASER subject (i.e., gender and perceived mental health status) and the remaining three were related to officer factors (i.e., officer ethnicity, role, and length of service).

However, it must be noted, that even within these factor sub-themes the direction of the association was not always clear. Whilst the evidence seems to suggest that TASER use predominantly reflects local policy, that TASER subjects are more likely to be male than female, and a subject is more likely to be involved in a TASER incident if they are perceived as having mental health difficulties; the relationships between TASER use and the number of bystanders, a subject's level of resistance/compliance, and the officer factors all appear to be less clear.

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Nonetheless, it is plausible that there is a common underlaying between several of these sub-themes relating to threat. Hine et al. (2018), for example, found that their participants overtly considered female subjects to be less threatening, and consequently did not feel as much force was necessary, whilst Quinton et al. (2020) found that subjects were more likely to have TASER used against them if they were perceived as mentally 'disabled' or if mental health was otherwise listed as an impact factor.

Given that over a third of the public think, incorrectly, that people with mental health problems are likely to be violent (Time to Change, 2015), perhaps it is not unreasonable to propose that officers consider these subjects as higher-risk due to assumptions about violent and unpredictable behaviour. However, according to the Home Office, protecting the subject was cited as a reason for using force in 43% of TASER incidents during the year ending March 2022 (Home Office, 2022a), indicating that officers may not just be worried about being the victim of violence themselves; but that they harbour serious concerns with regard to the risk that the subject poses 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 international, national and local policing contexts in which these TASER incidents are taking place. For example, officers within different roles, units, regions, and countries will have varying levels of contact with the public, varying types of equipment, as well as differing access to TASER and the requisite training. Consequently, the opportunity and necessity to use TASER will vary depending on the officer, their role, and the wider context at hand.

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In addition, Quinton et al. (2020) was the only study to explicitly control for access to TASER at the incident level (i.e. whether an officer had access to TASER during the incident where force was required). Access to TASER would, naturally, have a considerable influence on an officers' 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, rather than crewing, as it could be that the likelihood of a *TASER carrying officer* being present increases with the number of officers in attendance.

Another potential source of the conflicting results of this review is the inconsistent way in which the variables were measured across studies. A good example of this is the way in which a subject's level of resistance was measured. Although resistance was included in two thirds of the review sample, operationalisation ranged from a single binary question (Delone & Thompson, 2009) to response scales which listed three or four differing levels of resistance (Brandl & Stroshine, 2017; Dymond, 2018). Pronounced differences in variable measurements like these are likely to render any direct comparisons across studies meaningless, as the variables cannot be compared like for like.

Another potential source of inconsistency is the method by which the data were treated in preparation for the multivariate analyses. The majority of multivariate analyses included in this review artificially dichotomised 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 in this way may well obscure more subtle differences between similar

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use of force options, as well as providing a limited scope in which the wider context of TASER use cannot be examined. For example, it may be that crewing does not impact the use of TASER when compared to all other types of force combined (including use of force at the polar ends of a spectrum such as verbal commands and firearms), but it may influence an officer's selection between uses of force that are more closely situated along the spectrum of force, such as baton or OCS. This relationship might be masked if all non-TASER force is aggregated into a single binary outcome.

Although this 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 and found that few variables examined across the studies included in the review were highly influential in the decision to use force, and many variables were found to have mixed or poor relationships with use of force. Interestingly, they also concluded that male suspects, those who were intoxicated, offered resistance, or were arrested during their encounter with police were much more likely to experience police force. This perhaps indicates that TASER use may follow the broader patterns seen within the wider use of force continuum.

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, which includes (but is not restricted to) an officer's beliefs, values, prior learning, their previous experiences and affect, cognitive ability, and the availability of their cognitive resources (e.g. working memory). Only these factors can account for why individuals facing the same decision, within the same context, often differs in their final choices. Indeed,

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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).

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 fairly thin. 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, as such, could not be used to explore any potential relationship between crewing and TASER use by police officers, and one was qualitative (Hine et al., 2018).

The remaining four studies used multivariate inferential analyses to explore the impact of crewing on the use of TASER, but 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 associations between the two variables (Dymond, 2016, 2018).

It is 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.

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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 (who 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 data were treated during analysis. For example, in Dymond (2016, 2018) the analyses compared TASER use between incidents where there was a single officer present, 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*.

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

Implications for 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 public. 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, the public, and the police

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service alike. It is perhaps unsurprising then, that the role of the police and, more specifically their use of TASER, within mental health emergencies is a hotly debated topic. Many health professionals have raised concerns around the appropriateness of use of TASER and the potential for creating additional trauma to those who are already in distress (Little, Hogbin & Burt, 2013; O'Brien, & McKenna, 2007; O'Brien & Thom, 2014).

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 more 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; His Majesty's Inspectorate of Constabulary and Fire & Rescue Services, 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 police forces are investing in mental health training, the quality and accessibility is, overall, quite variable.

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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 Metropolitan Police Service; and whether they perhaps also need to be implemented in other forces.

Conversely, it is also worth policy makers noting that *avoiding* the use of TASER when the appropriate circumstances arise may also be problematic as TASER use has been found to reduce the odds of officers being assaulted (Quinton et al., 2020), and the vast majority of TASER uses in England and Wales are non-discharge uses (i.e. where the TASER is not fired at a subject; Home Office, 2022b)

Finally, due to the disproportionate use of TASER against the Black community within the UK and the recent commencement of the independent review into this disproportionality (Home Office, 2020; IOPC, 2020; National Police Chiefs' Council, 2020), 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 data from England and Wales (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 than White subjects during use of force incidents.

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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 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.

Implications for research

Policing policy should be based on evidence and, as such, it is important to fully understand the nature and extent of TASER use. Only then can training protocols be tailored to the appropriate use of TASER, and deliver policy that is formulated to instruct officers as to appropriate use.

The results of this review not only indicate that the understanding of the factors associated with TASER use and the underlying mechanisms driving them could be improved, but also the way in which data relating to these factors are collected, measured, and analysed. In particular, it would be useful for future research to work towards a more constant measurement framework so that data collection and analysis methods relating to TASER use are more standardised, comparable and, ultimately, more useful.

The existing studies also appear to neglect the role of discretionary decision-making of individual officers, and the internal factors of individual officers that may influence their decision outcomes. As such, it would be beneficial for additional future research to concentrate on officers' thoughts, feelings, and behaviours in addition to their socio-occupational demographic characteristics.

Finally, future research may also benefit from taking a qualitative approach to examine 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.

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Figure 1 – PRISMA Diagram

Adapted from Moher, Liberati, Tetzlaff, and Altman (2009).

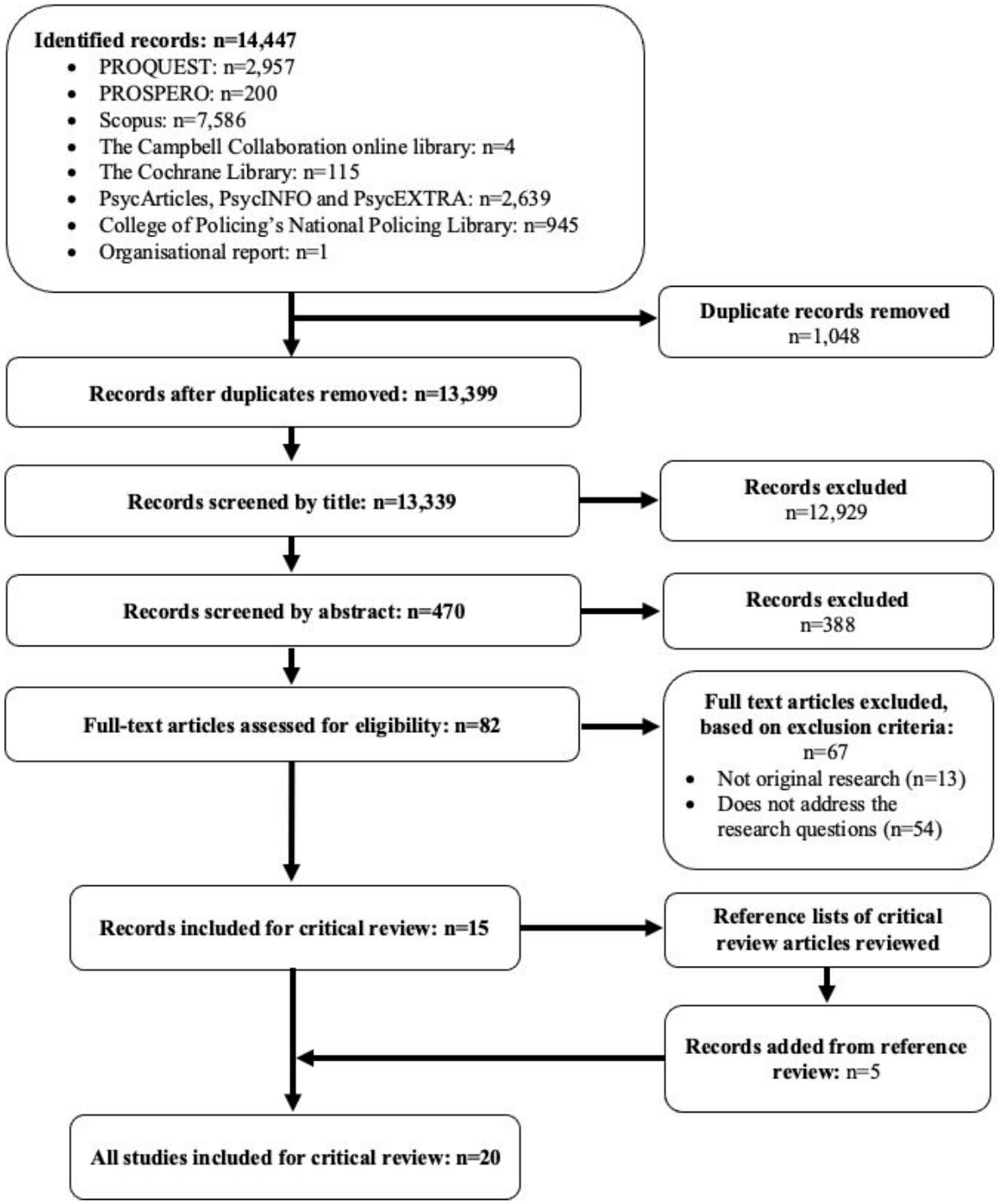

Table I: Key Concepts and Related Search Terms

	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"[1]
4	**Police**	Polic*, Officer*, Constable*.

[1] 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.

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Table II: Interrater Reliability Scores

Record	Kappa	95% CI	Agreement level (Landis & Koch, 1977).
Dymond (2018)	0.59 (p<.000)	(0.331, 0.857)	Moderate
White and Ready (2007)	0.56 (p<.000)	(0.619, 1.000)	Moderate
Hine et al., (2018)	0.62 (p<.000)	(0.190, 0.928)	Moderate

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Table III – Final Review Sample Data Summary

Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
1	Bishopp, Klinger and Morris (2015)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. 4,400 observations across 275 officers (monthly TASER use frequency for each officer).	• Frequency of TASER use	• Local TASER and use of force policies • Officer ethnicity • Officer gender
2	Boehme, Martin & Kaminski (2021)	USA	**Mixed methods with two designs.** *Design 1*: Descriptive *Design 2:* Complex correlational design	**Quantitative Studies** *EV Score:* + *IV Score:* +	*Design 1:* Data were collected via a survey of local police agencies. 74 survey responses out of 169 eligible agencies were received (44% response rate). *Design 2:* Data were collected from official use of	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge)	• Local TASER and use of force policies

[1] Only outcome and predictor variables included in the final evaluation are presented in this table

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
					force forms/data collection processes. 60-62 observations (monthly TASER use frequency for the local agency).		
3	Brandl and Stroshine (2017)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. Use of force forms between 2010 and 2011 where oleoresin capsicum spray (OCS), TASER or both, were used. In total, 528 cases were included.	• Frequency of TASER use • Sequential position of TASER use during incident	• Number of officers present • Number of subjects and/or bystanders • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Subject age • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Subject armed, or believed to be armed with a weapon
4	Crow and Adrion (2011)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. In total, 461 cases were included.	• Frequency of TASER use	• Type of call/offence/incident • Local TASER and use of force policies • Time of day and/or lighting • Level of subject resistance/compliance

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
							• Subject ethnicity • Subject gender • Subject age • Officer ethnicity • Officer gender • Officer age
5	Delone and Thompson (2009)	USA	**Quantitative:** Descriptive	**Quantitative Studies** *EV Score: +* *IV Score: +*	Data were collected from official use of force forms/data collection processes. In total, 26 cases were included.	• Frequency of TASER use	• Type of call/offence/incident • Number of officers present • Number of subjects and/or bystanders • Location • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Perceived intoxication of subject
6	den Heyer (2020).	New Zealand	**Quantitative:** Descriptive	**Quantitative Studies** *EV Score: ++* *IV Score:: -*	Data were collected from official use of force forms/data collection processes. In total, 7,675 cases were included.	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge)	• Location • Subject ethnicity • Subject gender • Subject age • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Subject armed, or believed to be armed with a weapon

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
7	Dymond (2016)	UK	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score: ++* *IV Score: ++*	Data were collected from official use of force forms/data collection processes. In total, 23,556 cases were included.	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge)	• Type of call/offence/incident • Number of officers present • Number of subjects and/or bystanders • Local TASER and use of force policies • Time of day and/or lighting • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Subject armed, or believed to be armed with a weapon • Officer role • Officer length of service
8	Dymond (2018)	UK	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score: ++* *IV Score: ++*	Data were collected from official use of force forms/data collection processes. In total, 23,556 cases were included.	• Frequency of TASER use	• Number of officers present • Local TASER and use of force policies • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
							• Subject armed, or believed to be armed with a weapon • Officer role • Officer length of service
9	Escalante (2020)	USA	**Qualitative:** Semi-structured interviews	**Qualitative Studies** *Overall score:* ++	Data were collected from five police officers.	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge) • Reason for using TASER	• Level of subject resistance/compliance • Subject armed, or believed to be armed with a weapon
10	Gau, Mosher and Pratt (2010)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. In total, 1,209 cases were included.	• Frequency of TASER use • Sequential position of TASER use during incident	• Time of day and/or lighting • Level of subject resistance/compliance • Subject ethnicity • Officer ethnicity • Officer gender • Officer age
11	Hine, Porter, Westera, Alpert, and Allen (2018)	Australia	**Mixed:** Quasi-experimental design with quantitative observational and qualitative interview data.	**Qualitative Studies** *Overall score:* ++	Data were collected from 91 newly recruited police officers.	• Frequency of TASER use • Sequential position of TASER use during incident • Reason for using TASER	• Type of call/offence/incident • Number of officers present • Number of subjects and/or bystanders • Location • Level of subject resistance/compliance • Subject gender

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
12	Kuzik (2019)	USA	**Design:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. In total, 3,820 cases were included.	• Frequency of TASER use	• Type of call/offence/incident • Time of day and/or lighting • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Subject age • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Officer ethnicity • Officer gender • Officer age • Officer role • Officer length of service
13	Lin and Jones (2010).	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were collected from official use of force forms/data collection processes. In total, 1,188 cases were included.	• Frequency of TASER use • Sequential position of TASER use during incident	• Level of subject resistance/compliance • Subject ethnicity • Subject gender • Subject armed, or believed to be armed with a weapon • Officer ethnicity • Officer gender • Officer length of service
14	Mesloh, Henych,	USA	**Quantitative:** Descriptive	**Quantitative Studies**	Data were collected from official use of	• Frequency of TASER use	• Level of subject resistance/compliance

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Reference	Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
Hougland and Thompson (2008)			*EV Score:* - *IV Score:* +	force forms/data collection processes. In total, 400 cases were included.		
15 Quinton, Dymond, Boyd & Teers (2020)	England	**Design:** Complex correlational design.	**Correlational Studies** *EV Score:* ++ *IV Score:* ++	Data were collected from official use of force forms/data collection processes. In total, 45,661 cases were included.	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge)	• Number of officers present • Number of subjects and/or bystanders • Location • Level of subject resistance/compliance • Subject ethnicity • Subject gender • Subject age • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Officer gender • Officer role • Officer length of service
16 Ready and White (2011)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score:* + *IV Score:* +	Data were gathered via surveying police officers with regular access to TASER. In total, 580 responses were received.	• Frequency of TASER use	• Local TASER and use of force policies • Level of subject resistance/compliance • Officer ethnicity • Officer gender • Officer age • Officer role

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Reference	Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
						• Officer length of service
17 Sierra-Arévalo (2018)	USA	**Qualitative:** Ethnographic field design	**Qualitative Studies** *Overall score: -*	Data were gathered through 1,020 hours of qualitative observation across three police sites. Data were also gathered via unstructured ethnographic interviews with 108 police officers.	• Reason for using TASER	• Level of subject resistance/compliance • Officer length of service
18 Sousa, Ready and Ault (2010)	USA	**Quantitative:** Randomised control field-training trials	**Quantitative Studies** *EV Score: -* *IV Score: +*	Data were gathered from 64 police officers.	• Frequency of TASER use	• Level of subject resistance/compliance
19 Thomas, Collins and Lovrich (2010)	USA	**Quantitative:** Complex correlational design	**Correlational Studies** *EV Score: +* *IV Score: +*	Data were gathered via surveying municipal police departments. In total, 210 responses were received.	• Frequency of TASER use • Type of TASER use (e.g., discharge vs non-discharge)	• Local TASER and use of force policies

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Reference		Country	Overall design	Overall quality assessment score*	Data collection method and sample size	Key outcome variables of interest	Key emergent or related variables of interest[1]
20	White and Ready (2007)	USA	**Quantitative:** Descriptive	**Quantitative Studies** *EV Score: ++* *IV Score: +*	Data were collected from official use of force forms/data collection processes. In total, 243 cases were included.	• Frequency of TASER use	• Number of officers present • Local TASER and use of force policies • Location • Subject age • Perceived mental illness and mental or emotional 'disturbance' of subject • Perceived intoxication of subject • Subject armed, or believed to be armed with a weapon • Officer role

* Each quantitative study is awarded an overall study quality grading for internal validity (IV) and a separate one for external validity (EV), and qualitative studies receive a single overall grade using the groups below:
++ All or most of the quality assessment checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.
+ Some of the quality assessment checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.
– Few or no quality assessment checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

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Table IV: Theme Table for Factors Effecting TASER Use

Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
1. Situational, contextual, and interactional elements	a) Level of subject resistance/compliance	Potentially influencing factor	**15 Studies in total** **2 x Descriptive Studies** (DeLone & Thompson, 2009; Mesloh et al., 2005) **3 x Qualitative Studies** (Escalante, 2020; Hine et al., 2018; Sierra- Arévalo, 2019) **2 x Bivariate Studies** 2 x *studies found association(s)* (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)
	b) Local TASER and use of force policies	Potentially influencing factor	**8 Studies in total** **1 x Descriptive Study** (White & Ready, 2007) **1 x Bivariate study** 1 x *study found no association(s)*

[1] 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 analysis, they will be listed under 'Bivariate Study' only.

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			(Ready & White, 2011) **6 x Multivariate Studies** 6 x *studies found association(s)* (Bishopp et al., 2015; Boehme et al., 2021; Crow & Adrion, 2011; Dymond, 2016, 2018; Thomas et al., 2010)
	c) Number of subjects and/or bystanders	Potentially influencing factor	**5 Studies in total** **1 x Descriptive Study** (DeLone & Thompson, 2009) **1 x Qualitative Study** (Hine et al., 2018) **3 x Multivariate Studies** 3 x *studies found association(s)* (Brandl & Stroshine, 2017; Dymond, 2016; Quinton et al., 2020)
	d) Location	Potentially influencing factor	**5 Studies in total** **3x Descriptive Study** (DeLone & Thompson, 2009; den Heyer, 2020; White & Ready, 2007) **1 x Qualitative Study** (Hine et al., 2018) **1 x Multivariate Study** *1 x study found association(s)* (Quinton et al., 2020)
	e) Type of call/offence/incident	Factor of an uncertain influence due to conflicting evidence	**5 Studies in total** **1 x Descriptive Study** (DeLone & Thompson, 2009) **1 x Qualitative Study** (Hine et al., 2018)

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			3 x Multivariate Studies *1 x study found no association(s)* (Crow & Adrion, 2011) *2 x studies found association(s)* (Dymond, 2016; Kuzik, 2019)
	f) Number of officers present	Factor of an uncertain influence due to conflicting evidence	**7 Studies in total** **2 x Descriptive Studies** (DeLone & Thompson, 2009; White & Ready, 2007) **1 x Qualitative Study** (Hine et al., 2018) **4 x Multivariate Studies** *2 x studies found no association(s)* (Dymond, 2016, 2018) *2 x studies found association(s)* (Brandl & Stroshine, 2017; Quinton et al., 2020)
	g) Time of day and/or lighting	Factor of an uncertain influence due to conflicting evidence	**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)
2. Subject characteristics	a) Gender	Potentially influencing factor	**10 Studies in total** **2 x Descriptive Studies** (DeLone & Thompson, 2009; den Heyer, 2020) **1 x Qualitative Study** (Hine et al., 2018) **7 x Multivariate Studies**

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			1 x study found no association(s) (Brandl & Stroshine, 2017) *6 x studies found association(s)* (Crow & Adrion, 2011; Dymond, 2016, 2018; Kuzik, 2019; Lin & Jones, 2010; Quinton et al., 2020)
	b) Perceived mental health status	Potentially influencing factor	**7 Studies in total** **2 x Descriptive Studies** (den Heyer, 2020; White & Ready, 2007) **5 x Multivariate Studies** *5 x studies found association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)
	c) Ethnicity	Factor of an uncertain influence due to conflicting evidence	**10 Studies in total** **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)* (Crow & Adrion, 2011; Gau et al., 2010; Lin & Jones, 2010; Quinton et al., 2020)
	d) Intoxication	Factor of an uncertain influence due to conflicting evidence	**8 Studies in total** **3 x Descriptive Studies** (DeLone & Thompson, 2009; den Heyer, 2020; White & Ready, 2007)

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			5 x Multivariate Studies[2] *4 x studies found no association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Kuzik, 2019) *3 x studies found association(s)* (Dymond, 2016, 2018; Quinton et al., 2020)
	e) Subject armed, or believed to be armed with a weapon	Factor of an uncertain influence due to conflicting evidence	**7 Studies in total** **2 x Descriptive Studies** (den Heyer, 2020; White & Ready, 2007) **1 x Qualitative Study** (Escalante, 2020) **4 x Multivariate Studies[3]** *1 x study found no association(s)* (Brandl & Stroshine, 2017) *4 x studies found association(s)* (Brandl & Stroshine, 2017; Dymond, 2016, 2018; Lin & Jones, 2010)
	f) Age	Factor of an uncertain influence due to conflicting evidence	**6 Studies in total** **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)

[2] 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.
[3] Please note: the number of associations listed below will not equate the to the number of multivariate studies one of the studies had more than one analysis relating to a subject being armed, or believed to be armed.

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			1 x study found association(s) (Quinton et al., 2020)
3. Officer factors	a) Ethnicity	Potentially influencing factor	**<u>6 Studies in total</u>** **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)* (Bishopp et al., 2015; Gau et al., 2010; Kuzik, 2019; Lin & Jones, 2010)
	b) Role	Potentially influencing factor	**<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)* (Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)
	c) Length of Service	Potentially influencing factor	**<u>7 studies in total</u>** **1 x Qualitative Study** (Sierra-Arévalo, 2019) **1 x Bivariate Study** *1 x study found association(s)*

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Global factor theme	Factor subthemes	Overall factor evaluation	Summary of evidence[1]
			(Ready & White, 2011) **5 x Multivariate Studies** *1 x study found no association(s)* (Lin & Jones, 2010) *4 x studies found association(s)* (Dymond, 2016, 2018; Kuzik, 2019; Quinton et al., 2020)
	d) Gender	Factor of an uncertain influence due to conflicting evidence	**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) *2 x studies found association(s)* (Kuzik, 2019; Quinton et al., 2020)
	e) Age	Factor of an uncertain influence due to conflicting evidence	**4 Studies in total** **1 x Bivariate Studies** *1 x study found an association* (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)

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