Attributional Style in Schizotypy

as a Reflection of Paranoia and Grandiosity

by

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Thesis Summary

Introduction

Paranoia can be defined as the unrealistic mistrust of other people, and encompasses beliefs about being disliked, criticised, deceived, betrayed, conspired against and harmed by others. Paranoid beliefs that become clinically distressing or disruptive are known as persecutory delusions, and are a common symptom of schizophrenia. Grandiose beliefs, in which one overestimates one's importance, abilities, and achievements, can also become delusional in schizophrenia.

Some researchers think that an excessive tendency to blame other people for their negative events can protect self-esteem but lead to paranoia. In support of this, studies have shown that patients with persecutory delusions have heightened tendencies (1) to take more responsibility for positive than negative events (the 'self-serving bias') and (2) to blame other people, rather than chance or circumstance, for negative events (the 'personalising bias'). However, it is unclear whether these biases of attributional style are associated with paranoia in the general population.

The thesis addressed this issue in two ways. Firstly, it examined whether existing studies supported a relationship between attributional biases and non-clinical paranoia. Secondly, it presented an original experimental study of whether attributional biases are associated with high levels of schizophrenia-like features ('schizotypy') in the general population, and with non-clinical persecutory and grandiose beliefs.

Literature Review

The literature review found that existing studies were generally unable to find a significant association between attributional biases and paranoia in the general population. Problems were noted with the way attributional biases were measured in most studies that did find relationships with non-clinical paranoia. Only one study showed good evidence that non-clinical individuals with a very high level of paranoia have a heightened tendency to blame other people, rather than oneself, for negative events (the 'other-person blaming bias').

Existing studies consistently showed that paranoia in the general population is linked with a tendency to interpret other people's ambiguous actions as being hostile. However, it was argued that this tendency is not a type of attributional bias, despite being referred to as such by some researchers.

Experimental Study

Self-serving, personalising and other-person blaming biases were measured in 80 university students. 38 had high schizotypy and 42 had low schizotypy, and they scored in the top and bottom 15% (respectively) of 369 students who were screened for schizotypy. The groups were similar in age, gender, nationality, cultural background, education and intelligence, but the high schizotypy group had higher depression, anxiety and stress.

The high schizotypy group had a significantly *lower* (rather than higher) self-serving bias than the low schizotypy group, a difference that became nearly-significant when level of depression was taken into account. There were no significant differences in personalising and other-person blaming biases between the two groups.

Higher personalising bias was significantly related to higher levels of suspiciousness, paranoia, persecutory belief and grandiose belief in the high schizotypy group only. There was mixed evidence that these relationships were related to lower consideration of situational factors in general when making external attributions.

The majority of participants with persecutory beliefs (88%) had co-occurring grandiose beliefs, indicating that persecutory beliefs in the general population tend to be held alongside grandiose beliefs, rather than in isolation. Participants were divided into three groups: 21 ‘dual beliefs’ participants holding both persecutory and grandiose beliefs; 25 participants holding just grandiose beliefs; and 29 participants with neither belief.

The groups were similar for age, gender, nationality, cultural background, education and intelligence. The grandiose belief group and neither belief group had similar levels of depression, anxiety and stress, which were all significantly lower than the dual beliefs group. The dual beliefs group were highest, the neither belief group lowest, and the grandiose belief group intermediate, for levels of schizotypy and paranoia.

Self-serving and other-person blaming biases were heightened in the grandiose belief group compared to the dual beliefs group (significant difference) and the neither belief group (near-significant difference). Personalising bias was near-significantly heightened in the grandiose belief group and significantly heightened in the dual belief group, compared to the neither belief group. Self-serving and other-person blaming biases were not significantly heightened in the dual beliefs group.

Conclusions

The thesis concluded that self-esteem-protecting attributional biases are not related to schizotypy and non-clinical paranoia, and that paranoia is therefore unlikely to develop from a need to protect one’s self-esteem. Whilst there was evidence from the experimental study that personalising bias is related to non-clinical paranoia in high schizotypy, this bias by itself does not appear to have a self-esteem-protecting function. Personalising bias in high paranoia may instead reflect an increased perception of other people as being harmful or powerful, perhaps derived from previous adverse interpersonal experiences.

The present findings tentatively suggest that people with grandiose beliefs have heightened self-esteem-protecting attributional biases, including a heightened tendency to blame other people, rather than oneself, for negative events. These

biases may result from the holding of a very positive self-concept, and a very negative concept of other people. It was concluded that grandiosity in the general population may develop from a need to protect or enhance one's self-esteem, which may then cause attributional biases.

It was suggested that future studies are required to show that co-occurring grandiosity is not responsible for the heightened attributional biases that have been demonstrated in people with persecutory delusions. Greater consideration of alternative possible causes of paranoia, rather than biased attributional style, is advocated for future research and therapeutic treatments. These causes may include the roles played by previous experiences of harm and powerlessness from other people in creating a heightened perception of others as being harmful and powerful.[1]

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‘Success has many fathers, but failure is an orphan.’ – *John F. Kennedy*

‘To find fault is easy; to do better may be difficult.’ – *Plutarch*

‘How to tell if you are paranoid: if you cannot think of anything that is your fault, you’ve got it.’– *Robert Hutchins*

‘Let me never fall into the vulgar mistake of dreaming that I am persecuted whenever I am contradicted.’ – *Ralph Waldo Emerson*

‘Don't imagine that most people give enough thought to you to have any special desire to persecute you.’ – *Bertrand Russell*

‘Neither blame nor praise yourself.’ – *Plutarch*

‘Ask yourself, if there was to be no blame, and if there was to be no praise, who would I be then?’ – *Quentin Crisp*

1 General Introduction

This thesis investigates whether biases in judgments about the causes of events ('attributional style') are related to paranoid and grandiose ideation in people with schizophrenia-like features ('schizotypy'). It presents a literature review (Chapter 2) and empirical study (Chapter 3) of attributional style and schizotypal ideation, before reflecting on their findings in a general discussion (Chapter 4). The present chapter serves to introduce the concepts of schizophrenia, schizotypy, paranoia and grandiosity that are investigated by the thesis.

1.1 – Schizophrenia and Schizotypal Personality Disorder

Schizophrenia is a severe mental illness that is diagnosed in an estimated seven out of 1000 people around the world at some point in their lives (McGrath et al, 2008). It is one of several schizophrenia-spectrum disorders (SSDs) characterised by varying combinations of hallucinations and delusions ('positive features'), disorganised speech and behaviour ('disorganised features'), and reduced emotion, speech, motivation, interest and sociability ('negative features'), which cause clinical distress and functional impairment to the individual (American Psychiatric Association, 2013).

With the exception of the milder schizotypal personality disorder, the other SSDs share symptomatology of similar intensity as schizophrenia, but either have a shorter illness duration (brief psychotic disorder, schizophreniform disorder), a comorbid mood disturbance (schizoaffective disorder), just one schizophrenia feature (delusional disorder, catatonia), or a pharmacological cause (substance / medication-induced psychotic disorder) (Wing & Agrawal, 2004). Studies of schizophrenia often examine patients with a variety of SSD diagnoses, rather than just schizophrenia, with the symptoms and signs of the severe SSDs treated as analogous.

Schizophrenia Features Cause distress and functional impairment	**Schizotypal Features** Cause distress and interpersonal impairment
Hallucinations: realistic perceptions of non-existent sensory stimuli, such as hearing voices in conversation, or seeing a person, which may or may not be appraised as being veridical.	**Unusual perceptions:** realistic perceptions of misperceived sensory stimuli, such as hearing one's thoughts loudly, or seeing one's face change in the mirror, which may or may not be appraised as being veridical.
Delusions: unrealistic beliefs that are incorrectly but firmly regarded by the individual as being realistic. They commonly have a persecutory or grandiose theme, and can include beliefs that events have a special significance for the individual ('ideas of reference').	**Unusual beliefs:** unrealistic beliefs, including ideas of reference, suspiciousness and paranoia about others, and 'magical beliefs' in clairvoyance, telepathy and the supernatural. The latter can appear grandiose if the individual believes that they possess magical abilities. 21 types of schizotypal belief are listed in Table 3.5.
Disorganised speech: derailed, tangential or incoherent speech that is difficult for others to understand.	**Unusual speech:** loose, digressive, vague, overly-concrete or overly-abstract speech that remains understandable to others.
Disorganised behaviour: bizarre behaviours, such as wearing unusual clothes, or displaying inappropriate emotions. Can include **catatonia**, a condition characterised by reduced or peculiar motor activity, such as odd postures, mannerisms and agitation.	**Unusual behaviours**: odd behaviours, such as wearing unusual clothes, or displaying inappropriate emotions.
Negative features: reductions in any of the domains of (1) emotional expression ('athymia'), (2) speech ('alogia'), (3) motivation ('apathy'), (4) interest in pleasurable activities ('anhedonia'), and (5) social behaviour ('asociality').	**Negative features:** the *DSM-5* lists difficulties with athymia and asociality, but not difficulties with alogia, apathy and anhedonia, as being diagnostic of SPD.
	Social anxiety: a fear of social situations caused by paranoid ideas, rather than a fear of negative evaluation by others. N.B., it is not a diagnostic feature of schizophrenia.

Table 1.1: *DSM-5* diagnostic features of schizophrenia and schizotypal personality disorder (SPD)

Schizotypal personality disorder (SPD) is a SSD diagnosed in an estimated 39 out of 1000 people in the USA at some point in their lives (Pulay et al., 2009). It is characterised by different combinations of 'attenuated' schizophrenia features, which cause distress and impairment in interpersonal functioning to

the individual (American Psychiatric Association, 2013), and will be referred to as ‘schizotypal features’.

A comparison of the features of schizophrenia and SPD is presented in Table 1.1, based on descriptions by the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*, American Psychiatric Association, 2013). As can be seen from the table, the diagnostic features of schizophrenia and SPD are phenomenologically similar, but milder in the latter.

1.2 – Schizotypy

There is evidence that schizophrenia-spectrum features are present in non-clinical as well as clinical individuals. For example, van Os et al. (2000) found that 10 to 15% of the general population in The Netherlands, who did not meet criteria for a psychiatric diagnosis, reported having hallucinations or delusions of a similar intensity to those of psychiatric patients. At the other end of the spectrum, experiences akin to mild schizotypal features (Table 1.1) were found to be highly prevalent in the general population, with an Australian study finding the paranoia-related belief that “some people are not what they seem to be” in 77% of its sample, and a French study finding that 47% of its sample believed in telepathy (Verdoux et al., 1998).

‘Schizotypy’ is a term used to describe the extent to which a non-clinical individual displays schizotypal features. Meehl (1962) suggested that schizotypal features were only found in individuals with a genetic predisposition to developing schizophrenia, and made up around 10% of the general population. This categorical view of schizotypal features has received support from the majority of taxometric analyses that examined its latent structure (Rawlings et al., 2008).

On the other hand, Claridge & Beech (1995) posited a ‘fully dimensional’ view of schizophrenia features, in which they varied in intensity throughout clinical and non-clinical individuals. Levels of schizotypy were seen as being present throughout the general population, rather than in just the top 10%. In support of this, a taxometric analysis that corrected for the methodological shortcomings of

previous analyses showed support for schizotypy as a dimensional rather than categorical construct (Rawlings et al., 2008).

There are several lines of evidence that schizotypal features in the general community are related to schizophrenia features in clinical individuals. Factor analyses of schizotypal features in the general community showed that they formed positive, disorganised and negative clusters in the same way as schizophrenia features did in patients (e.g., Mason & Claridge, 2006). Furthermore, twin studies and family studies showed that schizotypal features had a heightened likelihood of occurring in the relatives of people with schizophrenia (Kety et al., 1976; Mata et al., 2003) and were heritable (Kendler et al., 1991; Hanssen et al., 2006), although these findings have not always been replicated (e.g., Kendler et al., 1996). Non-clinical individuals with high schizotypy were also shown to share similar neurocognitive deficits, such as reduced verbal fluency and negative priming, as people with schizophrenia (Cochrane et al., 2012), albeit with smaller effect sizes (Bora et al., 2010).

Several studies showed that people with high schizotypy were at greater risk of developing a SSD than people with low schizotypy (e.g., Chapman et al., 1994; Poulton et al., 2000). These studies support the notion that level of schizotypy may indicate a theoretical level of vulnerability towards developing a SSD. Research into schizotypy can potentially inform theories about what causes and what protects against the emergence of schizophrenia features. It also avoids the confounds of antipsychotic medication, institutionalisation, apathy and cognitive difficulties that impact research into schizophrenia features with SSD patients.

1.3 – Persecutory and Grandiose Delusions

Delusions have been estimated as being present in over 90% of SSD patients, and are the most prevalent feature of schizophrenia (Cutting, 2003). A delusion can be defined as an unrealistic belief that is firmly regarded as realistic and is clinically distressing and disruptive. Delusions can vary across several dimensions, including how bizarre, firmly held, resistant to change, preoccupying, distressing, interpersonally disruptive, and personally-specific they are (Freeman, 2007).

Two of the most common types of delusion in schizophrenia are persecutory and grandiose delusions. In a large North American survey of inpatients with first-episode schizophrenia, persecutory delusions (present in 84%) and grandiose delusions (present in 49%) were the first and third most common type of delusion, respectively (Appelbaum et al., 1999).

People with persecutory delusions typically believe that other people are intentionally harming or conspiring to harm them (Freeman & Garety, 2000). The emphasis on there being a fear of *intentional* harm distinguishes persecutory delusions from the fears of unintentional harm that characterise anxiety disorders.

As well as being prevalent in schizophrenia, persecutory delusions occur in a significant minority of people diagnosed with unipolar depression (Johnson et al., 1991), bipolar depression (Goodwin & Jamison, 1990), post-traumatic stress disorder (Butler et al., 1996) and Alzheimer's disease (Rubin et al., 1988).

People with grandiose delusions typically believe that they are superior to others in some way, for example, by virtue of having special abilities, knowledge, self-worth, destiny, fame, or connection to important others (American Psychiatric Association, 2013). As well as being common in schizophrenia, grandiose delusions occur in the majority of people diagnosed with bipolar depression, and in a significant minority of people diagnosed with unipolar depression (Appelbaum et al., 1999), substance abuse disorders (Appelbaum et al., 1999), and mania secondary to neurological illness, such as Alzheimer's disease (Hirono et al., 1998), Huntington's disease (McHugh & Folstein, 1975) and Parkinson's disease (Bromberg, 1930).

Grandiose delusions can occur alongside persecutory delusions. Raune et al. (2006) found both types were present in 33% of first-episode psychiatric patients with delusions (compared to 54% who had just persecutory delusions and 10% with just grandiose delusions). A factor analysis of a large sample of psychiatric patients showed that grandiose and persecutory delusions were distinct entities that were nevertheless moderately and positively correlated with each other (Bedford & Deary, 2006).

As with other schizotypal features, paranoia and grandiosity in the general population can be seen as milder versions of the persecutory and grandiose delusions observed in clinical individuals. Therefore, the factors contributing to the development, maintenance and amelioration of non-clinical paranoia and grandiosity may also be of relevance to persecutory and grandiose delusions.

1.4 – Paranoia

1.4.1 – The Paranoia Spectrum

Freeman et al. (2005) proposed that paranoid ideation encompasses a wide spectrum of beliefs, from the individual being referred to and scrutinised by others (ideas of reference), to general mistrust and suspiciousness of others, to others intending to cause the individual harm, to others actually causing the individual harm. They argued that these beliefs had the potential to become delusions in SSDs, for example, ideas of reference could become delusions of reference.

Attenuated persecutory delusions can be seen in schizotypy in the forms of ideas of reference, suspiciousness and paranoia, which are *DSM-5* diagnostic features of SPD (Table 1.1). Paranoid ideation is also a core feature of paranoid personality disorder, a personality style characterised by a pervasive mistrust and suspiciousness of others (American Psychiatric Association, 2013).

The thesis will loosely define paranoia as the unrealistic mistrust of other people, encompassing beliefs about being disliked, criticised, deceived, betrayed, conspired against and harmed by others. Adopting a broad dimensional approach to paranoia, the thesis's empirical study (Chapter 3) investigates the paranoia-related experiences of public self-consciousness, suspiciousness of others, and beliefs about being persecuted and conspired against by others.

1.4.2 – Prevalence of Paranoia

Freeman (2007) reviewed studies of paranoia and estimated that 10 to 15% of non-clinical individuals regularly experienced paranoid thoughts. One large

survey of non-clinical individuals in the UK found that, over a one-year period, 20% had thoughts that other people were against them; 10% had thoughts that other people had intentionally tried to harm them; and 1.5% had thoughts that there was a conspiracy against them (Johns et al., 2004). However, it is unclear what proportion of these thoughts were realistic and thus not paranoid. Indeed, a general problem with the measurement of paranoia by self-report measures alone is that they are unable to differentiate between realistic and unrealistic beliefs, potentially leading to artificially higher measurements of paranoia.

1.4.3 – Psychological Theories of Paranoia

Psychological theories propose that adverse interpersonal experiences, general anxiety, unusual perceptual experiences, difficulties inferring the beliefs and intentions of other people, reasoning biases, low mood and self-esteem protection may contribute to the development of paranoia.

1.4.3.1 – Adverse Interpersonal Experiences

People with a history of sexual and physical abuse were found to be 15 times more likely to develop schizophrenia (Bebbington et al., 2004), suggesting a link between these experiences and persecutory delusions. Also, individuals from ethnic minority groups, who were likely to experience greater discrimination and harassment from others, were up to eight times more likely to be diagnosed with schizophrenia than individuals from ethnic majority groups (Harrison et al., 1988; Fearon et al., 2006). Studies also showed that an insecure attachment style with one's parents was particularly associated with non-clinical paranoia (Pickering et al., 2008; Meins et al., 2008) and schizophrenia (Dozier et al., 1991). Adverse interpersonal experiences may contribute to the creation of a mental schema of other people as being potentially harmful towards the individual, and thus paranoia.

1.4.3.2 – General Anxiety

Several studies have shown an association between higher levels of generalised anxiety and paranoia, both in non-clinical individuals (e.g., Martin &

Penn, 2001) and people with persecutory delusions (Freeman & Garety, 1999). Freeman et al. (2003, 2005) also showed that higher levels of pre-existing generalised anxiety and interpersonal sensitivity in non-clinical individuals predicted higher levels of social anxiety and paranoid thoughts about computer-generated people in a virtual reality environment.

1.4.3.3 – Unusual Perceptual Experiences

Persecutory delusions could be seen as reasonable attempts to explain unusual perceptual experiences, such as hallucinations of people commenting on the individual (Maher, 1974). Supporting this explanation, higher levels of pre-existing unusual perceptions in non-clinical individuals were shown to be predictive of higher paranoid thoughts about computer-generated people in a virtual reality environment (Freeman et al., 2003, 2005). On the other hand, studies have found that people with high schizotypy can report having unusual perceptions without holding unusual beliefs, and vice versa (e.g., Chapman & Chapman, 1988).

1.4.3.4 – Theory of Mind Difficulties

Studies have shown that patients with persecutory delusions have difficulties understanding the beliefs and intentions of other people (e.g., Corcoran et al., 1997), although these 'theory of mind' deficits may be more related to comorbid disorganised speech and negative features than to persecutory beliefs (e.g., Grieg et al., 2004). People with high schizotypy were also shown to have theory of mind difficulties, but they did not relate to their levels of paranoia (Langdon & Coltheart, 2004). It could be speculated that interpersonal difficulties in schizotypy and schizophrenia could lead some individuals to form schemas of other people as being potentially threatening, a schema that then impacts on their theory of mind ability.

1.4.3.5 – Reasoning Biases

Several studies have shown that people with clinical delusions required fewer pieces of information to inform their decision-making about events of neutral

valence than non-clinical individuals (e.g., Garety & Freeman, 1999). This 'jumping to conclusions' bias was associated with delusions in general, rather than specifically those of persecutory content. Non-clinical individuals with high schizotypy and odd beliefs were found to jump to conclusions (van Dael et al., 2006), as were people with remitted delusions (Moritz & Woodward, 2005), indicating that this bias might be a trait factor that precedes the development of clinical delusions.

1.4.3.6 – Negative Mood and Self-Esteem Protection

Paranoia may result from the individual holding negative self-related beliefs. Studies have consistently shown significant relationships between higher paranoia and (1) higher depression, (2) lower explicit self-esteem, and (3) higher negative self-beliefs, both in non-clinical individuals (e.g., Ellett et al., 2003; Chadwick et al., 2005; Fowler et al., 2006) and patients with persecutory delusions (e.g., Drake et al., 2004; Fowler et al., 2006). An individual with negative self-related beliefs may assume that other people also hold those negative beliefs about the individual, perhaps due to the false consensus effect (a bias towards believing that others share one's personal beliefs; Bauman & Geher, 2002). An individual who believes they are held in low regard by others may then feel at higher risk of harm from them.

Bentall et al. (1994, 2001) suggested that a heightened tendency to hold other people responsible for negative events, borne from a need to protect one's self-esteem, could lead to the formation of persecutory beliefs. The existing empirical support for this theory is reviewed in Chapter 2. Chapter 3 also tests this theory by investigating whether biases in attributional style are related to paranoid ideation in people with high schizotypy.

1.5 – Grandiosity

1.5.1 – Grandiosity in Mental Disorders

Grandiosity is defined by the *DSM-5* as an overestimation of one's own importance, abilities and achievements (American Psychiatric Association,

2013). It can occur in mania and hypomania, and is a diagnostic feature of narcissistic personality disorder, a condition that is prevalent in up to 6% of community samples (American Psychiatric Association, 2013). In narcissistic personality disorder, it is typically accompanied by grandiose fantasies of one's own success, power, brilliance, beauty, or relationships with others (American Psychiatric Association, 2013), but these fantasies are not regarded as becoming delusional in this condition.

As noted in Section 1.3, there is evidence that grandiose delusions are common in first-episode schizophrenia. However, grandiose beliefs are not explicitly included in *DSM-5* diagnostic criteria for SPD, nor are they measured by popular self-report measures of schizotypy such as the *Schizotypal Personality Questionnaire* (Raine, 1991), the *Oxford – Liverpool Inventory of Feelings and Experiences* (Mason et al., 1995), or the *Community Assessment of Psychic Experience* (Stefanis et al., 2002). Grandiosity may therefore be one of the few features of the severe SSDs that do not exist in attenuated form in SPD or schizotypy, or that is not more prevalent in people with high schizotypy than in the general population. Alternatively, grandiosity may have been overlooked by existing measurements of SPD and schizotypy; for example, the belief that one possess magical abilities, a feature of both SPD and schizotypy, is typically classified as a 'magical belief' but could potentially be classified as a grandiose belief.

Despite not constituting a discrete diagnostic feature of SPD, the thesis will regard non-clinical grandiose beliefs and grandiose delusions as occupying a common spectrum of grandiosity.

1.5.2 – Prevalence of Grandiosity

The measurement of grandiosity in the general population focuses on beliefs about being very important, special (e.g., having special powers or abilities) or unusual; having an important destiny; and having a special mission or purpose (the *Peters et al. Delusions Inventory*; Peters et al. 1999). The prevalence of grandiose thoughts in the general population has been found to vary from 8% in France (Verdoux et al., 1998) to 43% in the UK (Peters et al., 1999), but was as high as 75% in high school and university students in Australia and Italy

(Armando et al., 2010). As with the measurement of paranoia, it would seem important to distinguish unrealistic from realistic beliefs when measuring grandiose ideation, which may be difficult to achieve in practice.

1.5.3 – Psychological Theories of Grandiosity

Psychological theories propose that positive mood and self-esteem protection may contribute to the development of grandiosity. Higher levels of grandiose beliefs were significantly associated with higher self-esteem (Cicero & Kerns 2011) and positive self-schemas (Fowler et al., 2006) in university students, and significantly correlated with higher explicit self-esteem and lower depression in patients with delusions (Smith et al., 2006; Moritz et al., 2010).

It is not clear whether positive mood and positive self-schemas lead to or result from the development of grandiosity. Positive mood and positive self-schemas are arguably characteristic of the majority of the general population who do not develop grandiosity, and so they would not appear to be sufficient for the development of grandiosity. Other factors are therefore likely to contribute to grandiosity.

It is possible that grandiosity is driven by a need to enhance or maintain positive mood and self-esteem, for example, when the individual is under stress. By extension, people with high levels of grandiosity might have relatively low levels of implicit self-esteem that drive their grandiosity. However, supporting evidence for this theory is lacking: studies have failed to find evidence for low implicit self-esteem in patients with grandiose delusions (Smith et al., 2005), and implicit self-esteem was not significantly correlated with grandiosity in a group of university students (Cicero & Kerns, 2011).

1.6 – Chapter Summary

The present chapter introduced the concepts of schizophrenia, schizotypy, paranoia and grandiosity that are investigated by the thesis.

(1) Schizophrenia is part of a group of SSDs that are characterised by varying combinations of positive, disorganised and negative features. Attenuated

schizophrenia features of varying intensity can be found in people with schizotypal personality disorder and in the general population, and will be referred to as schizotypal features.

(2) Schizotypy describes the extent to which a non-clinical individual displays schizotypal features, with higher levels indicating higher theoretical risk of developing a SSD. Schizotypy research can increase understanding about risk factors and protective factors in the emergence of schizophrenia features, whilst avoiding the confounds that impact research with SSD patients.

(3) Persecutory delusions are highly prevalent in schizophrenia. They can be seen to occupy the extreme end of a paranoia spectrum that starts in the general population, and which includes ideas of reference, self-consciousness, suspiciousness of others, and beliefs that others are causing or intend to cause harm to the individual.

(4) Researchers have speculated that adverse interpersonal experiences, general anxiety, unusual perceptual experiences, theory of mind difficulties, reasoning biases low mood and self-esteem protection may contribute to paranoia and persecutory delusions.

(5) Grandiose delusions are common in schizophrenia, and can be seen to occupy the extreme end of a spectrum of grandiosity that is present in the general population. Researchers have speculated that positive mood and self-esteem protection may contribute to the development of grandiosity and grandiose delusions.

2 Studies of Attributional Style in Paranoia

This chapter examines the evidence for the 'defence model' of paranoia, which holds that paranoia is caused by the use of heightened attributional biases that protect against low self-esteem. It introduces the concept of attributional style, evaluates its measurement, discusses existing reviews and meta-analyses of attributional style in paranoia and schizotypy, and presents a systematic review of studies of attributional biases in non-clinical paranoia.

2.1 – The Defence Model of Paranoia

2.1.1 – Paranoia as a Consequence of Self-Esteem Protection

The original defence model of paranoia proposed that a tendency to hold other people responsible for one's failures serves to protect against low self-esteem, but can lead to paranoia (Bentall et al., 1994). However, as noted in Section 1.4, studies have consistently shown significant relationships between higher paranoia and *lower* explicit self-esteem in clinical and non-clinical individuals (e.g., Fowler et al., 2006), indicating that attributional biases in paranoia are not successful at protecting against low self-esteem.

Bentall et al. (2001) revised the defence model to propose that paranoia is driven by attempts to prevent low *implicit* self-esteem from reaching consciousness and affecting explicit self-esteem. The revised model predicted that people with paranoia would show a high discrepancy between a low level of implicit self-esteem and a higher level of explicit self-esteem, with large fluctuations over time in the latter indicative of greater self-esteem disturbances.

Several studies have since tested these predictions. Murphy et al.'s (2018) meta-analysis of these studies showed that patients with persecutory delusions had a similar level of implicit self-esteem, but a significantly higher implicit-

explicit self-esteem discrepancy, compared with patients with depression (over seven studies). Their implicit self-esteem was significantly lower than in non-clinical individuals (over 11 studies), and there was a small, significant correlation between higher paranoia and higher self-esteem instability in patients with SSDs (over four studies). From these findings, the authors concluded that patients with persecutory delusions are successful at preventing a low level of implicit self-esteem from reaching consciousness, supporting a defensive role for paranoia.

However, contrary to the defence model's predictions, the meta-analysis did not find significant differences in implicit self-esteem or self-esteem discrepancy between SSD patients with and without persecutory delusions (over four studies), or significant correlations between paranoia, implicit self-esteem and self-esteem discrepancy in SSD patients (over four studies). Also, the meta-analysis did not show that its significant findings were specific to delusions of a persecutory content, rather than applicable to delusions in general.

In conclusion, there is mixed meta-analytical support for there being an association between clinical paranoia and the self-esteem disturbances that theoretically drive self-esteem protection.

2.2 – Attributional Style and its Measurement

2.2.1 – Introduction to Attributional Style

Attributional style refers to the way a person assigns causality to the events they are involved in. Heider (1958) speculated that, rather than explaining events in an even-handed way, people have a tendency to attribute their successes to themselves and their failures to external factors. According to this view, a race car driver is more likely to attribute their victories, and less likely to attribute their losses, to their own driving skill or hard work ('internal' attributions) than to their team, car or luck ('external' attributions). This combination of 'internalising' for positive events and 'externalising' for negative events is referred to as the 'self-serving bias', and has been shown to be prevalent in the general population (Mezulis et al., 2004). Externalising of

negative events is often referred to as just ‘externalising’ in the research literature, and is sometimes used as a synonym for self-serving bias, although this is potentially misleading given that self-serving bias should also take into account internalising for positive events.

Attributional style can be seen to reflect the way people perceive themselves. In euthymic individuals, the self-serving bias may reflect a positive schema in which the self is seen as more likely to be successful than unsuccessful. By contrast, people with depression tend to externalise positive events and internalise negative events in an attributional style known as the ‘self-blaming bias’, which may reflect a negative schema in which the self is seen as more likely to be unsuccessful than successful (Abramson, Seligman & Teasdale, 1978). In support of this, studies have widely shown that self-serving and self-blaming biases are positively and negatively related to self-esteem, respectively (e.g., Sweeney et al., 1986).

2.2.2 – The Attributional Style Questionnaire

The *ASQ* (Peterson et al., 1982) is a measure of attributional style that requires the participant to imagine briefly-described events that have either positive or negative outcomes for the participant. The participant decides on the main cause for each event, before rating the extent to which this cause is due to the participant or external factors.

Six events have an interpersonal theme (e.g., “Your partner has been treating you more lovingly” (positive event); “You go out on a date and it goes badly” (negative event)), and six events have achievement-related themes (e.g., “You become very rich” (positive event); “You can’t get all the work done that others expect of you” (negative event)). Internalising and externalising are measured as two opposing poles on a single seven-point scale ranging from high internalising to high externalising.

In the *ASQ* validation study, internalising and externalising were significantly correlated with attributions made for actual events, such as performance on a laboratory task, indicating good construct validity (Peterson et al., 1982). There is mixed evidence for internal reliability, with some studies finding low internal

reliability (Reivich, 1995; Haeffel et al., 2008), and others reporting satisfactory internal reliability of the internalising / externalising scale (e.g., Coleman et al., 2022).

One limitation of the *ASQ* is that, as it does not distinguish between different types of external attributions, it cannot test whether participants excessively attribute negative events to other people in particular (as opposed to external causes in general), a key prediction of the defence model of paranoia.

2.2.3 – The Cognitive Style Questionnaire – Short Form

The *CSQ-SF* is a version of the *ASQ* that presents eight different scenarios with negative outcomes for the participant (Meins et al., 2012). The *CSQ-SF* differs from the *ASQ* by measuring internalising and externalising on separate five-point scales. The *CSQ-SF* was shown to have good internal reliability, test-retest reliability and construct validity (Meins et al., 2012). However, as it only measures externalising for negative events, it cannot measure self-serving or self-blaming attributional biases (n.b., a tendency to externalise negative events may reflect a tendency to externalise events in general, rather than a self-serving bias).

2.2.4 – The Internal, Personal and Situational Attributions Questionnaire

The *IPSAQ* (Kinderman & Bentall, 1996) is a measure of attributional style that requires the participant to imagine briefly-described positive (e.g., “a friend bought you a present”) and negative (e.g., “a friend said that you are boring”) behaviours that are made by a friend in relation to the participant. The participant decides on the main cause of each behaviour and whether this cause is primarily due to the participant (an ‘internal’ cause), another person such as the friend (an ‘other-person’ cause), or circumstances / chance factors (a ‘situational’ cause). It differs from the *ASQ* in four main ways:

(1) The *IPSAQ* requires participants to categorise the main cause of events, rather than rate the extent to which causes are internal and external. The self-

serving bias on the *IPSAQ* is calculated as the number of times positive events are internalised, relative to negative events.

(2) The *ISPAQ* also measures the extent to which other people are held responsible for externalised negative events ('personalising'), which the *ASQ* cannot do. The *IPSAQ* calculates personalising as the proportion of negative events that are attributed to other people rather than situational factors (Kinderman et al., 1996).

(3) There are almost three times as many different items to consider on the *IPSAQ* as the *ASQ*, with 16 positive and 16 negative events.

(4) The *IPSAQ*'s items portray specific interpersonal behaviours, whilst the *ASQ* portrays more general interpersonal and achievement-related events.

In the *IPSAQ*'s validation study (Kinderman & Bentall, 1996), its six subscales and its measure of self-serving bias had acceptable levels of internal reliability. Externalising for positive and negative events were moderately and significantly correlated with their *ASQ* equivalents, supporting the *IPSAQ*'s convergent validity.

The *IPSAQ* is able to capture personalising in a way that the *ASQ* and *CSQ* cannot. Its personalising score was designed for use in conjunction with the self-serving bias score, to show that a tendency to externalise negative events is biased towards other-person attributions. The *IPSAQ*'s personalising score had an acceptable reliability, and there was evidence of good divergent validity from the self-serving bias score, with a small, non-significant, inverse relationship found between the two (Kinderman & Bentall, 1996).

However, *IPSAQ* personalising does not appear to have been validated against other measures of personalising. Also, the personalising score does not by itself measure the tendency to attribute negative events to other people relative to internal factors or positive events, and so needs to be used in conjunction with a measure of self-serving bias to show that it is part of a self-serving attributional style.

The *IPSAQ* may be a more representative measure of interpersonal attributional style than the *ASQ* because of its higher number of interpersonal items. Whilst

this is at the expense of measuring achievement-related attributional style, studies have not reported significant differences in attributions for interpersonal and achievement-related events (e.g., Fornells-Ambrojo, 2009a), so this may not be an important drawback.

The *IPSAQ* may have less face validity than the *ASQ* because it promotes a mono-causal attributional style that does not allow combinations of factors to be implicated in the same way as the *ASQ*'s rating scale does, which may be at odds with participants' actual attributional style. Some participants report having difficulty completing the *IPSAQ* (Freeman, 2007), with SSD patients sometimes reporting problems with generating and categorising causes (Janssen et al., 2006). The *IPSAQ* may be more demanding to complete than the *ASQ*, with increased likelihood of fatigue and response sets affecting its measurement, and its measurement may be more affected than the *ASQ* by participants' imaginative ability, motivation and breadth of interpersonal experiences.

2.2.5 – The Achievement and Relationships Attributions Task

The *ARAT* (Fornells-Ambrojo & Garety., 2009a) is a measure of attributional style that requires the participant to imagine a series of events that have either positive or negative outcomes for the participant, and write down the main causes for each. One negative interpersonal *ARAT* item reads:

> "You arrange to go to the cinema with someone you just met last week. You let the other person choose the film that turns out to be quite boring. After the cinema you go for a coffee. You don't talk much because you are feeling tired. When the evening is over, this person tells you that she / he didn't have a good time.
>
> *Why does the date go badly?*"

The *ARAT* differs from the *IPSAQ* in four main ways:

(1) The *ARAT* has almost three times fewer items to consider as the *IPSAQ*, with six positive and six negative events.

(2) The *ARAT*'s items are divided between interpersonal and achievement-related events, whilst the *IPSAQ*'s items are all interpersonal.

(3) The *ARAT*'s scenarios all describe a mixture of internal, other-personal and situational factors that could lead to the outcome being explained, whilst the *IPSAQ*'s scenarios do not provide a background context. The participant is therefore less reliant on their own imagination for generating and deciding on causes on the *ARAT*.

(4) On the *ARAT*, the researcher rather than the participant categorises the cause given by the participant as being either internal, other-personal or situational.

The *ARAT*'s validation study (Fornells-Ambrojo & Garety, 2009a) showed good inter-rater reliability for its scores. Higher *ARAT* self-serving bias scores near-significantly correlated with higher *IPSAQ* self-serving bias scores, indicating adequate convergent validity, and significantly correlated with lower depression scores, indicating good criterion validity.

With its richly-described scenarios, the *ARAT* may have higher face validity than the *IPSAQ* for measuring attributional style. Also, with arguably less demand made on the participant's imaginative resources, and fewer items to consider, the *ARAT* may be less fatiguing and vulnerable to response-set biases than the *IPSAQ*.

A limitation of the *ARAT* is that attributions are researcher-categorised rather than participant-categorised, making it faster and less effortful to complete, but arguably more prone to interpretive errors than the *IPSAQ*. For example, participants may not always write clear descriptions of causes, making it more difficult for a researcher to infer attributional locus.

2.2.6 – The Ambiguous Intentions Hostility Questionnaire

The *AIHQ* (Combs et al., 2007b) measures perception of hostile intent in other people's actions. The *AIHQ* requires participants to imagine briefly-described imaginary scenarios of other people's potentially adverse actions towards the participant. Five scenarios present intentionally adverse actions (e.g., "Someone jumps in front of you on the grocery line and says, 'I'm in a rush'."), five scenarios present non-intentionally adverse actions (e.g., "A friend of yours slips on the ice, knocking you onto the ground"), and five scenarios present

adverse actions of ambiguous intent (e.g., ‘‘You walk past a bunch of teenagers at a mall and you hear them start to laugh’’). The participant writes down the main cause of each action, and then rates how intentional it is on a 14-point scale. The researcher retrospectively rates how hostile the participant perceived the action to be on a five-point scale.

The *AIHQ*’s validation study found good internal reliability and good inter-rater reliability for the intentionality scores and hostility scores, respectively. Higher scores on the *Hostility* subscale of the *Paranoia and Suspiciousness Questionnaire* (*PSQ-H*; Rawlings & Freeman, 1997) significantly correlated with higher intentionality scores, but not hostility scores, indicating good convergent validity for the former (Combs et al., 2007b).

It should be noted that, in practice, studies of paranoia tend to just use scores of perceptions of hostile intent for ambiguous actions (e.g., An et al., 2010).

Whilst perception of hostile intent is often referred to as a type of attributional bias (e.g., Lee et al., 2015), it is arguably distinct from attributional tendencies (internalising and externalising for positive and negative events) and biases (self-serving, self-blaming and personalising) that measure perceptions of causal locus. This is supported by the validation study’s finding that *AIHQ* intentionality scores and *IPSAQ* personalising scores were not significantly correlated (Combs et al., 2007b). However, given its historical association with attributional style (e.g, De Rossi & Georgiades; 2022), studies that have examined perception of hostile intent are included in the present chapter’s review of attributional style in non-clinical paranoia (Section 2.5).

2.2.7 – The Adult Nowicki-Strickland Internal-External Control Scale

The *ANSIE+* (Nowicki & Duke, 1974) is a questionnaire measure of locus of control – the extent to which people believe they can control the events in their lives – and has sometimes been used in studies seeking to investigate attributional style and paranoia (e.g., Thompson et al., 2013).

Participants are required to either endorse or reject statements relating to their beliefs about their ability to control their lives, with an ‘internalising’ score calculated from the number of times a participant responds in an internalising

manner, and an 'externalising' score calculated as the inverse of their internalising score. Questions can either refer to beliefs about positive events (e.g., "Do you feel that when good things happen they happen because of hard work?"), beliefs about negative events (e.g., "Do you feel that when someone doesn't like you there's little you can do about it?") or general beliefs (e.g., "Do you think it's better to be smart than to be lucky?"), but scores are not calculated separately for each type of belief.

The *ANSIE* does not appear to have been validated against traditional measures of attributional style, and is not designed to measure attributional tendencies and biases in a way that can be used to test the specific predictions of the defence model of paranoia. For these reasons, studies that used the *ANSIE* to measure attributional style were not included in the present chapter's review of attributional style in non-clinical paranoia (Section 2.5).

2.2.8 – The Davos Assessment of Cognitive Biases Scale

The *DACOBS* (van der Gaag et al., 2013) is a questionnaire with a subscale that measures "external attribution bias" and has sometimes been used in studies seeking to investigate attributional style and paranoia (e.g., Gaweda et al., 2015).

Participants are required to indicate the extent to which they agree or disagree with each of six statements using a seven-point scale, with these statements chosen because they loaded onto a common factor in a factor analysis of *DACOBS* items. The statements are as follows:

(1) "People don't give me a chance to do well."

(2) "People treat me badly for no reason."

(3) "It's NOT my fault when things go wrong in my life."

(4) "People make my life miserable."

(5) "Things went wrong in my life because of other people."

(6) "I don't change my way of thinking easily."

Whilst three of these items (1, 3 and 5) appear to measure externalising of one's failures, the majority (1, 2, 4, 5) can be seen to measure beliefs about having been harmed by other people, and one item appears conceptually unrelated to attributional externalising (6). Therefore, the *DACOBS'* externalising subscale may not be a valid measure of externalising for negative events, and it was not validated against other established measures of externalising in the validation study (van der Gaag et al., 2013). Furthermore, the validation study found that higher scores on the subscale strongly and significantly correlated with higher scores of paranoid ideation, indicating a lack of divergent validity from the concept of paranoia. For these reasons, studies using the *DACOBS* to measure attributional style are not included in the present chapter's review of attributional style in non-clinical paranoia (Section 2.5).

2.2.9 – Conclusions

Several instruments have been developed that measure different aspects of attributional perceptions of social behaviour, such as attributional style, perception of hostile intent, and locus of control. It would seem important not to treat these as similar measures of attributional style.

Attributional style is typically measured using self-report instruments in which the participant is required to imagine themselves in various scenarios, before making a decision about the cause of the scenario's outcome. Other instruments take the form of questionnaires that require the participant to reflect on how they tend to explain self-related events.

A common limitation of these instruments is that they depend on the imaginative and reflective capacities of the participant, and present abstract scenarios that are unlikely to involve the same affective processes as real life events. By presenting richly-described, contextualised scenarios, instruments such as the *ARAT* and *AIHQ* have sought to minimise these limitations and may be particularly suitable for the measurement of attributional style and perception of hostile intent, respectively.

A limitation of instruments such as the *IPSAQ* and *ARAT* is their reliance on categorical measurement that promotes a mono-causal way of explaining

events, which may lack face validity. Instruments that use rating scales to measure degree of causality (e.g., the *ASQ*, *CSQ-SF* and *AIHQ*) may be more sensitive measures of attributional style and perception of hostile intent.

A limitation of instruments such as the *ARAT* and *AIHQ* is that some of their measures are researcher-rated based on initial participant responses, making these ratings more prone to interpretive errors. Indeed, Kinderman et al. (1992) showed that independent judges' ratings of attributional statements were often discrepant from participants' self-ratings on the *ASQ*. This limitation also relates to those studies that choose to use researcher ratings rather than participant ratings on the *ASQ* and *IPSAQ*.

Following the review of attributional style instruments, it was decided that the present chapter's review of studies of attributional style in non-clinical paranoia (Section 2.5) would focus on studies that clearly measured internalising and externalising for positive and negative events, self-serving and personalising biases, and perception of hostile intent.

2.3 – Attributional Style in Clinical Paranoia

This section discusses existing reviews and meta-analyses of studies that examined whether attributional biases are associated with clinical paranoia.

2.3.1 – Murphy et al. (2018)

Murphy et al. (2018) reviewed empirical studies that either used the *ASQ* or *IPSAQ* to measure attributional biases in clinical individuals. Over 21 studies, they found a small, significant relationship between higher externalising for negative events and higher paranoia in SSD patients. They also found that this attributional tendency was moderately and significantly higher in SSD patients with persecutory delusions compared to (1) SSD patients without persecutory delusions (over 11 studies) and (2) non-clinical controls (over 27 studies). The authors concluded that these findings supported the defence model of paranoia's prediction that an externalising bias for negative events is related to clinical paranoia.

One important issue with this meta-analysis is its measurement of attributional style. Murphy et al. (2018) included four different types of attribution scores in their meta-analysis, and combined them into a single score of what they termed "externalising attributional bias". However, this score was a composite of two types of externalising score and two types of personalising score, measuring distinct aspects of attributional style. The authors reported significant heterogeneity in analyses involving these composite externalising scores, which may have reflected important differences between the constituent attribution scores, or the influence of uncontrolled moderating variables. Their externalising attributional bias score may therefore have been invalid.

2.3.2 – Müller et al. (2021)

Müller et al. (2021) performed a meta-analysis to test the prediction that persecutory delusions are specifically associated with the self-serving bias, and also looked at potential moderators of this association. They calculated self-serving bias as the extent to which the individual internalised positive events, relative to negative events, from studies that used either the *ASQ* and the *IPSAQ*.

Over eight studies, Müller et al. (2021) found a small, significant relationship between higher self-serving bias and higher paranoia in SSD patients. They also found that SSD patients with persecutory delusions had a significantly higher self-serving bias than (1) SSD patients without persecutory delusions (over nine studies; moderate-sized difference) and (2) non-clinical controls (over 25 studies; small-sized difference), and a near-significantly higher self-serving bias than (3) SSD patients with remitted persecutory delusions (over five studies; small-sized difference). Furthermore, the latter group showed a significantly lower self-serving bias than non-clinical individuals (over five studies; small-sized difference).

Müller et al. (2021) found moderate, significant relationships between higher self-serving bias and (1) lower depression (over 15 studies) and (2) higher self-esteem (over 11 studies) in SSD patients, indicating the moderating role of depression and self-esteem on relationships between self-serving bias and paranoia. They also found evidence that the measure of self-serving bias used,

and participants' cultural background, moderated the association between self-serving bias and persecutory delusions. Firstly, whilst SSD patients had a moderately and significantly higher *ASQ* self-serving bias than non-clinical individuals (over 13 studies), there was a negligible, non-significant difference between the two groups on *IPSAQ* self-serving bias (over 29 studies). Secondly, this group difference was only significant in studies conducted in Asian countries (over 11 studies; small difference), and not in studies conducted in Western countries (over 46 studies; very small difference).

The authors suggested that the *ASQ* was more successful than the *IPSAQ* at detecting a group difference because the *ASQ*'s use of a rating scale to measure internalising / externalising may have encouraged more automatic and authentic attributional decision-making than the IPSAQ's mono-causal categorical measurement. They also suggested that, in the general community, the self-serving bias may be smaller in Asian countries than in European and North American countries, giving more scope for it to become exaggerated in patients in the former.

2.3.3 – Conclusions

Two reviews / meta-analyses examined whether attributional biases are related to paranoia in SSD patients. Murphy et al. (2018) concluded that patients with persecutory delusions had higher externalising of negative events than patients without persecutory delusions and non-clinical controls, an attributional bias that correlated with level of paranoia. However, they used a composite measure of attributional bias that may have been invalid.

Müller et al. (2021) extended this work by showing that patients with persecutory delusions had a higher self-serving bias than SSD patients without persecutory delusions and other control groups, an attributional bias that correlated with level of paranoia and was absent in SSD patients with remitted persecutory delusions. They concluded that self-serving bias may be a state-dependent rather than trait-like associate of persecutory delusions. They also found that depression, self-esteem, cultural background and measurement instrument were significant moderating factors of the relationship between attributional style and paranoia.

Müller et al. (2021) provided partial support for the defence model of paranoia, with evidence that people with persecutory delusions in Asian countries show a self-serving bias on the *ASQ*. However, they did not test the other component of the defence model, that attributing negative events to other people in particular is related to persecutory delusions. They also did not show that their findings were specific to delusions of a persecutory nature, rather than applicable to delusions in general.

In conclusion, there is some meta-analytical support for a relationship between self-serving attributional bias and clinical paranoia, but more meta-analytic evidence is needed to show that clinical paranoia is also related to a bias towards blaming other people for negative events.

2.4 – Attributional Style in Schizotypy

This section discusses existing reviews and meta-analyses of attributional style and paranoia in individuals with a high theoretical risk of developing a SSD (high schizotypy; Section 1.2).

2.4.1 – Lee et al. (2015)

Lee et al. (2015) conducted a meta-analysis of attributional style in individuals with high schizotypy. Their composite measure of attributional bias was moderately and significantly higher in individuals with high schizotypy than controls (over five studies). However, their composite measure was arguably an invalid measure of attributional bias. Only one of the five studies reviewed measured self-serving and personalising biases (DeVylder et al., 2013, using the *IPSAQ*). The four other studies reviewed instead measured perception of hostile intent (An et al., 2010, using the *AIHQ*), locus of control (Thompson et al., 2013, using the *ANSIE*), sense of agency for internally and externally produced sounds (using an experimental task; Hauser et al., 2011), and positive and negative schemas about the self and others (Stowkowy & Addington, 2012). As these measures differ from each other in important ways, and only one study measured attributional style, it is unclear what conclusions the meta-analysis could make about attributional style in high schizotypy.

2.4.2 – Livet et al. (2020)

Livet et al. (2020) conducted a systematic review and meta-analysis of psychological biases and schizotypal features in the general population, including individuals with high schizotypy. In contrast to the previous review, they sought to analyse self-serving and personalising biases separately.

The authors did not list the different measures that contributed attribution scores across the different studies reviewed. Inspection of the source studies reveals that most of them used the *DACOBS* externalising subscale, which may not be a valid measure of attributional style (Section 2.2.8).

To create a composite score of self-serving bias, Livet et al. (2020) combined the *DACOBS* scores with *IPSAQ* self-serving bias scores from four studies, and *ANSIE* locus of control scores from one study. As these scores measure three different constructs, this composite measure of self-serving bias may not have been valid. Livet et al. (2020) also calculated a composite score of personalising that combined *IPSAQ* personalising scores from two studies and *AIHQ* perception of hostile intent scores from three studies. However, these measures have previously been shown to be poorly correlated (Combs et al., 2007b; Section 2.2.6), undermining the rationale for combining them.

Livet et al. (2020) found moderate, significant relationships between higher composite scores of positive schizotypal features (including paranoia) and higher scores of composite (1) self-serving and (2) personalising biases in individuals with high schizotypy (over four studies). They also found a moderate, significant relationship between higher composite scores of positive schizotypal features and higher composite self-serving bias (but not personalising, over two studies) in non-clinical individuals without high schizotypy (over nine studies).

The authors concluded that a tendency to externalise negative events to others is related to the formation of positive schizotypal features in high schizotypy. However, their creation of composite self-serving bias and personalising scores may not have been valid, undermining this conclusion.

2.4.3 – Conclusions

Both Lee et al. (2015) and Livet et al. (2020) concluded that higher attributional biases are associated with high schizotypy, but their conclusions were undermined by the use of low numbers of studies and potentially invalid measures of self-serving and personalising biases.

2.5 – Systematic Review of Attributional Style in Non-Clinical Paranoia

2.5.1 – Introduction

In order to test the defence model of paranoia, the present section systematically reviews studies that examined whether attributional biases are associated with paranoia in non-clinical individuals, as predicted by the defence model. It also reviews studies that examined whether perception of hostile intent in the ambiguous actions of others (Section 2.2.6) is associated with non-clinical paranoia.

2.5.2 – Study Selection Process

The present review was conducted in line with *PRISMA-P* guidelines (Moher et al., 2015). *PubMed* and *PsycINFO* databases were searched for studies published up to April 2022 that examined associations between attributional style and paranoia in non-clinical individuals and SSD-prone individuals. The search also included studies of self-consciousness, suspiciousness and ideas of reference that are considered as occupying the paranoia spectrum (Section 1.4.1).

The following search string was used to conduct the search of relevant articles in the electronic databases:

((("high risk" OR "at risk mental state" OR prodrom* OR subclinical OR Prone*) AND (schiz* OR psychosis)) OR (paranoi* OR persecut* OR suspicious* OR "ideas of reference" OR psychotic-like OR self-consciousness)) AND attribution*

In addition, the reference sections of relevant reviews and meta-analyses were hand-searched for relevant articles.

A study was eligible for inclusion in the review according to the following criteria:

(1) Study published in a peer-reviewed journal or book.

(2) Study written in the English language.

(3) Study used original data that did not feature in another study used in the present review.

(4) Study was not a review or meta-analysis of other studies.

(5) Study used samples of non-clinical participants, including those deemed to be at high theoretical risk of developing a first episode of SSD.

(6) Study used a validated measure of attributional style, including externalising and personalising for positive and negative events, the self-serving bias, and perception of hostile intent. The *ASQ*, *CSQ-SF*, *IPSAQ*, *ARAT* and *AIHQ* were included, but not the *ANSIE* and *DACOBS*, for the reasons described in Section 2.2.

(7) Study used a validated measure of paranoia.

(8) Study used a quantitative experimental design.

Studies were initially screened for eligibility by reviewing their titles and abstracts. Short-listed studies were then checked for eligibility according to the inclusion criteria. Study selection was made by the present author only.

2.5.3 – Quality Assessment Tool

The *Quality Assessment Tool for Quantitative Studie*s (*QATQS*; Thomas et al., 2004) was used to assess the methodological quality of the selected studies. It was chosen because (1) it was felt to be the best existing tool for measuring domains of relevance to psychological studies with quantitative experimental designs; (2) it has been shown to have good content validity, construct validity and intra-rater reliability (Thomas et al., 2004); and (3) it has been used in

several published systematic reviews of related topics (e.g., De Rossi & Georgiades, 2022).

The *QATQS* assesses the following eight methodological domains: participant selection; design-type; control of confounding factors; blinding of assessors and participants to the research question; measures used; participant withdrawals; appropriateness of analyses; and the extent to which participants received an intervention ('intervention integrity'). Each domain is rated on a three-point scale, ranging from 'weak' to 'moderate' to 'strong', and a study's overall quality is determined by how many 'weak' ratings it receives over the first six domains: no 'weak' ratings results in a 'strong' overall rating; one 'weak' rating results in a 'moderate' overall rating; and more than one 'weak' rating results in a 'weak' overall rating. Section A.1 of Appendix A contains descriptions of these domains and the criteria for rating them.

Quality assessment ratings for the reviewed studies were made by the present author. Ratings were made for a study's investigation of attributional style and non-clinical paranoia, rather than for the overall study. For the domains of study blinding and intervention integrity, all studies received ratings of 'not relevant'.

To test the inter-rater reliability of the *QATQS*, a random sample of the selected studies (n = 5; 33% of the total) was independently rated by a colleague with a master's degree in psychology. The level of agreement between the two raters' ratings for the six relevant methodological domains of these studies (not including the overall quality ratings) was calculated as being 'substantial' (k = .66, weighted k = .71; Cohen, 1960), supporting the tool's reliability. Section A.2 of Appendix A discusses the areas of agreement and disagreement between the two raters. For the areas of disagreement, consensus ratings were reached following discussion by the two raters, with the present author's ratings typically adopted. The present author's ratings were used for all of the reviewed studies to maintain the intra-rater consistency of the ratings.

2.5.4 – Study Selection Results

Figure 2.1 illustrates the study selection process. A total of 907 different studies were identified from the *PubMed* and *PsychInfo* databases. Three further

studies that did not appear in the databases searches were identified from hand-searching the reference lists of relevant reviews and meta-analyses. These studies may not have been found by the database searches because their examination of attributional style and non-clinical paranoia was not their main focus.

Following a review of the abstracts of the 910 studies, 42 studies were found to be potentially eligible for inclusion and were assessed for eligibility based on full-text review. 27 studies were subsequently excluded for the following reasons:

(1) 20 studies were excluded for not examining associations or relationships between attributional style and paranoia in non-clinical individuals.

(2) Seven studies were excluded for only using the *ANSIE* or *DACOBS* measures.

The 15 remaining studies were included in the review.

2.5.5 – Characteristics of the Selected Studies

An overview of the studies, their characteristics and their relevant findings is presented in Table 2.1 (for the eight studies that used the *IPSAQ* as their main measure of attributional style) and Table 2.2 (for the seven studies that used a different main measure of attributional style).

2.5.6 – Quality Assessment of the Studies

The results of the quality assessment are presented in Table 2.3 (for the eight studies that used the *IPSAQ* as their main measure of attributional style) and Table 2.4 (for the seven studies that used a different main measure of attributional style). Discussion of the quality assessment ratings given for each study is provided in the respective discussion of each study, below.

2.5.7 – Kinderman & Bentall (1996)

Kinderman & Bentall (1996) examined attributional style and paranoia in 64 undergraduate students in the UK. They used the *IPSAQ* (Secton 2.2.4) to calculate self-serving and personalising biases, and the *Paranoia Scale* (*PS*; Fenigstein & Vanable, 1992) to measure paranoia. They divided their participants into three groups based on their attributional style scores: (1) one group with low self-serving bias (n = 27; below the 30th percentile of their sample), and two groups with higher self-serving bias (above the 29th percentile of their sample) who showed either (2) higher (n = 33) or (3) lower (n = 22) personalising of externalised negative events.

After controlling for the effect of depression on the paranoia scores, they found that, in the higher self-serving bias groups, the group with higher personalising had significantly higher paranoia scores than the group with lower personalising. They also found that the low self-serving bias group had (1) significantly lower paranoia scores than the high personalising group, but (2) significantly higher paranoia scores than the low personalising group. The authors concluded that higher personalising of negative events is associated with higher paranoia in people with a higher self-serving bias.

However, it is unclear whether there were confounding variables between the groups, such as differing age or gender, as the groups' demographic details were not reported. Also, the authors did not report differences between high and low paranoia groups in terms of their attributional tendencies, or correlations between paranoia and attributional biases across the whole sample, which would have investigated the association between attributional style and paranoia. Finally, the groups with higher self-serving bias may not have had a particularly high self-serving bias; it was only stated as being above the 29th percentile, and group means were not stated.

In the quality assessment (Table 2.3), the study received one 'weak' rating for its control of confounders and therefore a 'moderate' rating for its overall quality. Whilst it also received a 'weak' rating for the quality of its analysis, which used small groups, ratings for this domain do not contribute to the overall rating.

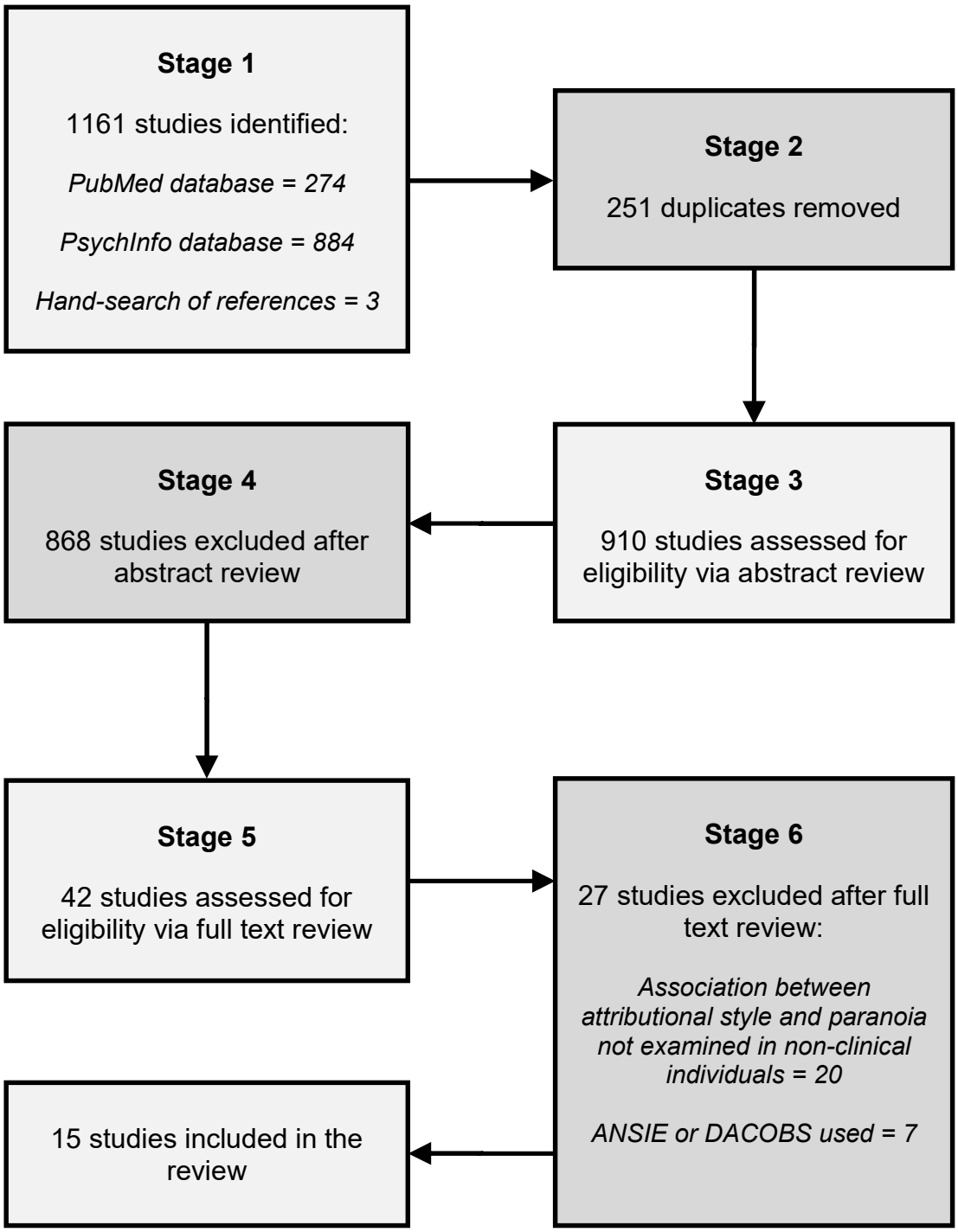

Figure 2.1: Number of studies at each stage of the systematic review's selection process

Study	Sample size	Attributional style measure	Paranoia measure	Main findings	Attributional bias linked to paranoia?	Hostile intent bias linked to paranoia?
Kinderman & Bentall (1996)	64 NC	*IPSAQ*	*PS*	Higher paranoia significantly associated with higher personalising bias in participants with higher self-serving bias.	**Yes**	~
Martin & Penn (2001)	193 NC	*IPSAQ*	*PS; SCID-II-P*	Very small, non-significant correlations between paranoia and (1) self-serving and (2) personalising biases.	No	~
Combs & Penn (2004)	29 NC high paranoia, 32 NC low paranoia	*IPSAQ*	*PS*	No significant difference between the high and low paranoia groups in self-serving and personalising biases.	No	~
McKay et al. (2005)	40 NC	*IPSAQ*	*PPDQ*	No significant correlations between paranoia and (1) self-serving bias, (2) personalising bias, and (3) other-person attributions for negative events.	No	~
Combs et al. (2007a)	114 NC high paranoia, 609 NC lower paranoia	*IPSAQ*	*PS; SCID-II-p*	No significant correlations between higher paranoia and higher (1) self-serving and (2) personalising biases. No significant differences in attributional biases between high and lower paranoia groups.	No	~
Langdon et al. (2008)	34 NC	*IPSAQ*	*PS*	No significant correlations between paranoia and (1) self-serving and (2) personalising biases.	No	~
Lincoln et al. (2010)	25 NC higher paranoia, 25 NC lower paranoia	*IPSAQ*	*PC*	No significant differences between higher and lower paranoia groups on numbers of (1) internal or (2) other-person attributions for positive or negative events.	No	~
DeVylder et al. (2013)	33 CHR	*IPSAQ*	*SIPS-S*	No significant correlations between suspiciousness and (1) self-serving and (2) personalising biases.	No	~

Table 2.1: Characteristics of the reviewed studies that used the *IPSAQ* measure of attributional style

Key: CHR = individuals at clinical high risk of SSD; *IPSAQ = Internal, Personal and Situational Attributions Questionnaire*; NC = non-clinical individuals; *PC = Paranoia Checklist*; *PPDQ = Paranoid, Persecutory and Delusion-Proneness Questionnaire*; *PS = Paranoia Scale*; *SCID-II-p = Structured Clinical Interview for DSM-IV Axis II Personality Disorders*, *Paranoid Personality Subscale*; *SIPS-S = Structured Interview for Prodromal Syndromes, Suspiciousness Subscale*.

Study	Sample size	Attributional style measure	Paranoia measure	Main findings	Attributional bias linked to paranoia?	Hostile intent bias linked to paranoia?
Combs et al. (2003)	22 NC high paranoia, 28 NC low paranoia	*ASQ* (expanded)	*PS*	No significant difference between high and low paranoia groups on externalising for negative events.	No	~
Cicero & Kerns (2011)	186 NC	*ASQ*	Composite measure	Small, significant correlations between higher paranoia and *lower* (1) externalising for negative events and (2) self-serving bias.	No	~
Coleman et al. (2022)	434 NC, 153 MHD	*ASQ*	*GPTS*	High paranoia not significantly associated with higher internalising for positive events, higher externalising for negative events, or self-serving bias.	No	~
Sullivan et al. (2013)	2694 community sample	*CSQ-SF*	*PLIKSi-pd*	No significant association between externalising for negative events and persecutory ideation.	No	
Fornells-Ambrojo (2009a)	315 NC 30 NC high paranoia, 32 NC low paranoia	*ARAT*	*PS; PDI*	Very small, non-significant correlations between paranoia and other-person attributions for negative events across entire sample, but significantly higher other-person attributions for negative events made by the high paranoia group than the low paranoia group.	**Yes**	~
Combs et al. (2007b)	322 NC	*AIHQ; IPSAQ*	Composite measure	Higher perceptions of (1) intent and (2) hostility in other people's ambiguous actions, but not (3) higher personalising bias, significantly predicted higher paranoia.	No	**Yes**
An et al. (2010)	24 UHR	*AIHQ*	*PS*	Moderate, significant correlations between higher paranoia and higher perceptions of (1) intent and (2) hostility in the ambiguous actions of others.	~	**Yes**

Table 2.2: Characteristics of the reviewed studies that used non-*IPSAQ* measures of attributional style

Key: *AIHQ = Ambiguous Intentions Hostility Questionnaire*; *ARAT = Achievement and Relationships Attributions Task*; *ASQ = Attributional Style Questionnaire*; CB = conspiracy belief; *CSQ-SF = Cognitive Styles Questionnaire, Short Form*; *GPTS = Green et al. Paranoid Thoughts Scale*; *IPSAQ = Internal, Personal and Situational Attributions Questionnaire*; MHD: individuals with non-psychotic mental health disorders; NCI = non-clinical individuals; *PDI = Peters et al. Delusions Inventory*; *PLIKSi-pd = Psychosis-Like Symptom Interview*, persecutory delusions item; *PS = Paranoia Scale*; UHR = individuals at ultra-high risk of SSD.

Study	Participant Selection	Design	Confounders	Blinding	Measures	Withdrawals	Analysis	Overall Quality
Kinderman & Bentall (1996)	Moderate	Moderate	Weak	Not relevant	Moderate	Strong	Weak	Moderate
Martin & Penn (2001)	Strong	Moderate	Strong	Not relevant	Moderate	Strong	Strong	Strong
Combs & Penn (2004)	Moderate	Moderate	Weak	Not relevant	Moderate	Strong	Moderate	Moderate
McKay et al. (2005)	Weak	Moderate	Moderate	Not relevant	Moderate	Strong	Moderate	Moderate
Combs et al. (2007a)	Strong	Moderate	Strong	Not relevant	Moderate	Strong	Strong	Strong
Langdon et al. (2008)	Moderate	Moderate	Strong	Not relevant	Moderate	Strong	Moderate	Strong
Lincoln et al. (2010)	Moderate	Moderate	Moderate	Not relevant	Moderate	Strong	Weak	Strong
DeVylder et al. (2013)	Weak	Moderate	Weak	Not relevant	Moderate	Strong	Weak	Weak

Table 2.3: Quality assessment ratings for the reviewed studies that used the *IPSAQ* measure of attributional style

Assessment scale for the nine domains ranges from ‘weak’ to ‘moderate’ to ‘strong’, based on criteria set by Thomas et al. (2004; Appendix A)

Study	Participant Selection	Design	Confounders	Blinding	Measures	Withdrawals	Analysis	Overall Quality
Combs et al. (2003)	Moderate	Moderate	Moderate	Not relevant	Moderate	Strong	Weak	Strong
Cicero & Kerns (2011)	Strong	Moderate	Weak	Not relevant	Strong	Strong	Moderate	Moderate
Coleman et al. (2022)	Strong	Moderate	Moderate	Not relevant	Strong	Strong	Strong	Strong
Sullivan et al. (2013)	Moderate	Moderate	Moderate	Not relevant	Weak	Strong	Weak	Moderate
Fornells-Ambrojo (2009a)	Strong	Moderate	Moderate	Not relevant	Strong	Strong	Strong	Strong
Combs et al. (2007b)	Strong	Moderate	Strong	Not relevant	Strong	Strong	Strong	Strong
An et al. (2010)	Moderate	Moderate	Strong	Not relevant	Strong	Strong	Moderate	Strong

Table 2.4: Quality assessment ratings for the reviewed studies that used non-*IPSAQ* measures of attributional style

Assessment scale for the nine domains ranges from ‘weak’ to ‘moderate’ to ‘strong’, based on criteria set by Thomas et al. (2004; Appendix A).

2.5.8 – Martin & Penn (2001)

Martin & Penn (2001) examined attributional style and paranoia in 193 undergraduate students in the USA. They calculated self-serving and personalising biases using the *IPSAQ*, and measured paranoia using the *PS* and the Structured Clinical Interview for *DSM-IV Axis II Personality Disorders* (*SCID-II*) measure of paranoid personality disorder (Spitzer et al., 1990).

Very small, non-significant correlations were found between paranoia and (1) self-serving and (2) personalising biases, for both measures of paranoia used. These findings were also replicated using a version of the *PS* that only used items with clear persecutory content. In a regression analysis, higher paranoia was significantly predicted by higher depression, higher social anxiety and higher fear of negative evaluation by others, but not by self-serving or personalising biases. The authors concluded that attributional biases are not related to non-clinical paranoia.

In the quality assessment (Table 2.3), the study received no 'weak' ratings, and therefore a 'strong' rating for its overall quality.

2.5.9 – Combs & Penn (2004)

Combs & Penn (2004) examined attributional style and paranoia in 60 undergraduate students in the USA. Attributional style was measured using the *IPSAQ*. 29 students had high paranoia (above the 83rd percentile on the *PS* measure of paranoia, based on normative data from the measure's validation study), and 31 students had low paranoia (below the 17th percentile). The two groups did not differ for age, education, gender or ethnicity, but the high paranoia group had higher depression, higher social anxiety and lower self-esteem than the low paranoia group.

There were no significant differences between the two groups for self-serving or personalising biases, although between-group differences in depression and self-esteem, which are known to relate to self-serving bias, were not controlled

for in the analysis. The authors concluded that attributional biases are not present in non-clinical individuals with high paranoia.

In the quality assessment (Table 2.3), the study received a 'weak' rating for its control of confounders and covariates, and therefore a 'moderate' rating for its overall quality.

2.5.10 – McKay et al. (2005)

McKay et al. (2005) examined attributional style and paranoia in 40 undergraduate students in Australia. Attributional style was measured using the *IPSAQ* and paranoia was measured using an unpublished measure that was reported as having good internal reliability and validity.

Non-significant correlations were found between paranoia and (1) self-serving and (2) personalising biases, both before and after controlling for depression. In addition, no significant correlations were found between paranoia and numbers of internal, other-personal or situational attributions made for positive or negative events on the *IPSAQ,* including other-person attributions for negative events. The authors concluded that attributional biases are not related to non-clinical paranoia.

The authors failed to find significant relationships between depression (which was measured by a reliable and valid instrument) and attributional style, when higher depression is normally related to either higher internalising for negative events or lower internalising for positive events (e.g., Sweeney et al., 1986). This could suggest that the *IPSAQ* may not have been measuring attributional style accurately in the study, or that the study was underpowered. Furthermore, the study's small sample size may have led to inadequate statistical power.

In the quality assessment (Table 2.3), the study received one 'weak' rating for its selection of participants, with only their age and gender reported, and therefore a 'moderate' rating for its overall quality.

2.5.11 – Combs et al. (2007a)

Combs et al. (2007a) noted that studies had so far been inconsistent in finding a relationship between attributional style and paranoia in people with persecutory delusions, and had generally failed to find a relationship in non-clinical individuals. They noted Trower & Chadwick's (1995) theory that people with persecutory delusions differed in terms of their perception of deservedness for being persecuted, with some feeling it was undeserved ('poor-me' paranoia) and others feeling it was deserved ('bad-me' paranoia). Combs et al. (2007a) speculated that attributional biases might be associated with 'poor-me' paranoia, and tested this hypothesis in 723 undergraduate students in the USA.

Attributional style was measured using the *IPSAQ*. Small, significant correlations were found between higher self-serving bias and (1) lower depression but (2) *lower* rather than higher paranoia, with a very small, negligible correlation found between paranoia and personalising bias.

Combs et al. (2007a) used cluster analysis to form three groups of students with high paranoia, characterised by: (1) moderate depression and low self-esteem (n = 43); (2) minimal depression and high self-esteem (n = 32); and (3) mild depression and intermediate self-esteem (n = 39). 609 students with lower paranoia scores formed a control group; they had a similar level of minimal depression, but significantly lower self-esteem, than the paranoid group with minimal depression. Crucially, self-serving and personalising biases were not found to be significantly higher in any of the three high paranoia groups compared with the lower paranoia controls. However, Combs et al. (2007a) did not test differences in attributional biases in the paranoia groups with a group with very low paranoia, which would have been a better test of the defence model of paranoia.

Attributional biases were found to vary depending on level of depression and self-esteem:

(1) The moderate depression paranoia group had very low self-serving bias scores, which were significantly lower than the minimal depression or mild depression paranoia groups, and non-significantly lower than the controls.

(2) The minimal depression paranoia group had high self-serving bias scores that were non-significantly higher than the mild depression paranoia group and the controls.

(3) The minimal depression paranoia group had high personalising bias scores that were significantly higher than the moderate depression paranoia group, and non-significantly higher than the mild depression paranoia group and the controls.

Higher self-serving and personalising biases were specifically associated with a profile of high paranoia, minimal depression and high self-esteem, but not with a profile of high paranoia, moderate depression and low self-esteem. It was speculated that these two profiles might represent non-clinical analogues of patients with 'poor me' and 'bad me' persecutory delusions, respectively.

It was concluded that attributional biases are not generally related to paranoia, and are not heightened at high levels of paranoia, in non-clinical individuals. However, in individuals with high levels of paranoia, higher attributional biases may be associated with higher self-esteem and lower depression.

Particular strengths of the study were its data-driven approach for guiding the formation of different paranoia groups, which contributed to their validity, and its very large sample size, which increased the likelihood of sampling very high levels of non-clinical paranoia. In the quality assessment (Table 2.3), the study received no weak ratings, and therefore a 'strong' rating for its overall quality.

2.5.12 – Langdon et al. (2008)

Langdon et al. (2008) examined attributional style and paranoia in 35 SSD patients and a non-clinical control group comprised of 34 people drawn from an Australian community. Attributional style was measured using the *IPSAQ*, and paranoia was measured using the *PS*.

In the non-clinical controls, non-significant correlations were found between paranoia and (1) self-serving and (2) personalising biases using partial correlations that controlled for depression.

In the quality assessment (Table 2.3), the study received no ‘weak’ ratings, and therefore a ‘strong’ rating for its overall quality.

2.5.13 – Lincoln et al. (2010)

Lincoln et al. (2010) examined attributional style and paranoia in 70 non-clinical individuals drawn from a German community to serve as a control group for SSD patients. Attributional style was measured using the *IPSAQ*. The 25 highest and 25 lowest scorers on the *Paranoia Checklist* measure of paranoia (*PC*; Freeman et al., 2005b) formed high and low paranoia groups, respectively, and did not significantly differ for age, gender or education.

No significant differences were found between the high and low paranoia groups on numbers of (1) internal or (2) other-person attributions made on the *IPSAQ*, with no significant interaction with event-type.

There were several limitations with the study’s investigation of attributional style in paranoia. Firstly, it based its analysis on raw scores, rather than on measures of self-serving and personalising biases. Secondly, it analysed scores for internal, other-person and situational attributions separately, rather than in a single group x attribution-type x event-type analysis of variance, and so missed potential interactions involving attribution-type. Thirdly, the sample size was relatively small, and so individuals with high paranoia scores may have been under-represented. Finally, it did not control for depression or self-esteem in the analysis.

In the quality assessment (Table 2.3), the study received a ‘weak’ rating for its analysis, which may have been underpowered to find a significant effect through its use of small groups. Otherwise, the study received no weak ratings, and therefore a ‘strong’ rating for its overall quality.

2.5.14 – DeVylder et al. (2013)

DeVylder et al. (2013) examined attributional style in 33 individuals deemed as being at ‘clinical high risk’ of developing a first episode of SSD. They comprised help-seeking young adults who were referred to a psychosis-risk clinical

research programme in the USA, and who met at least one of three SSD prodromal syndromes: (1) attenuated positive symptoms syndrome; (2) genetic risk and deterioration syndrome; or (3) brief intermittent psychotic syndrome. Psychopathology was assessed using the *Structured Interview for Prodromal Syndromes* (*SIPS*; Miller et al., 2002), which also measured paranoid ideation. Attributional style was measured using the *IPSAQ*.

Contrary to expectations, a small, non-significant correlation was found between higher paranoia and *lower* self-serving bias, and the correlation between paranoia and personalising was very small and non-significant (as with Combs et al., 2007a; Section 2.5.11). Depression was not used as a covariate in these analyses. No significant differences were found in self-serving or personalising biases between the SSD-prone individuals and a very small control group of 15 non-clinical individuals with significantly lower paranoia scores.

The authors concluded that self-serving and personalising biases are not heightened in SSD-prone individuals with high levels of paranoia. However, the control group had significantly lower depression, anxiety, positive and negative schizotypal features, and proportion of males, which may have confounded results as they were not controlled for.

In the quality assessment (Table 2.3), the study received one ‘weak’ rating for its small control group, which may not have been representative of the target population, and one ‘weak’ rating for its control of confounders and covariates. It therefore received a ‘weak’ rating for its overall quality. The study also received a ‘weak’ rating for its analysis, which may have been underpowered to find a significant effect through its use of small groups.

2.5.15 – Combs et al. (2003)

Combs et al. (2003) examined attributional style and paranoia in 50 undergraduate students in the USA. 22 students had high paranoia (above the 69th percentile on the *PS*, based on normative data from the paranoia measure’s validation study), and 28 students had low paranoia (below the 31st percentile). The two groups did not differ for age, education or gender, but there

was a significantly higher proportion of white participants in the low paranoia group.

An expanded version of the *ASQ* (Section 2.2.2) was used to measure attributional style (*EASQ*; Peterson & Villanova, 1988). The *EASQ* is comprised solely of negative events, divided between 12 interpersonal and 12 achievement-related items, and demonstrated adequate internal reliability in the Combs et al. (2003) study.

The high and low paranoia groups did not significantly differ on externalising scores for negative events, either for the interpersonal scenarios, the achievement-related scenarios, or overall, and group differences in mean scores were very small. There was no significant association between externalising scores and the confounding variable of ethnicity; depression was not measured or used as a covariate in the analysis.

In the quality assessment (Table 2.4), the study received a 'weak' rating for its analysis, which may have been underpowered to find a significant effect through its use of small groups. Otherwise, the study received no weak ratings, and therefore a 'strong' rating for its overall quality.

2.5.16 – Cicero & Kerns (2011)

Cicero & Kerns (2011) examined attributional style and paranoia in 186 undergraduate students in the USA. Attributional style was measured using the *ASQ*. Paranoia was measured by creating a composite paranoia score from the scores of four contributing questionnaires: the *Paranoid Personality Disorders Features Questionnaire* (Useda, 2002), the *Paranoia and Suspiciousness Questionnaire* (*PSQ*; Rawlings & Freeman, 1996), the suspiciousness subscale from the *Schizotypal Personality Questionnaire* (*SPQ*; Raine, 1991), and the suspiciousness subscale of the *Dimensional Assessment of Personality Pathology* (Livesley & Larstone, 2008).

Small, significant correlations were found between higher paranoia and *lower* rather than higher (1) externalising for negative events and (2) self-serving bias. There was a small, significant correlation between higher self-esteem and higher self-serving bias, and a moderate, significant correlation between higher

self-esteem and lower paranoia; however, self-esteem was not used as a covariate in the analysis of attributional style and paranoia.

In the quality assessment (Table 2.4), the study received one ‘weak’ rating for its control of confounders and covariates, and therefore a ‘moderate’ rating for its overall quality.

2.5.17 – Coleman et al. (2022)

Coleman et al. (2022) examined attributional style and paranoia in 587 undergraduate students in Australia. Attributional style was measured using the *ASQ* and paranoia was measured using the *Paranoid Thoughts Scale* (*GPTS*; Green et al., 2008). Just over a quarter of the participants (n = 153) were diagnosed with an affective disorder such as depression or anxiety.

Four groups of participants were formed based on a cluster analysis of scores on three different types of unusual beliefs (magical ideation, paranormal beliefs and paranoid beliefs): (1) 267 people scoring low for all beliefs; (2) 147 people scoring high mainly for paranormal beliefs; (3) 85 people scoring high mainly for paranoid beliefs; and (4) 60 people scoring moderately-high for all beliefs. There were no significant differences between the groups in terms of age or gender. However, the high paranoia group and generally-high unusual beliefs group had a significantly higher proportion of participants with affective disorders than the generally-low unusual beliefs group.

All groups showed similar levels of externalising for negative events, with the (non-significantly) lowest scores shown by the paranoia group. The generally-low unusual beliefs group showed significantly higher internalising for positive events than the high paranoia group and the generally-high unusual beliefs group. Furthermore, whilst all groups showed a self-serving bias, the high paranoia group had the lowest self-serving bias scores of the four groups, which were significantly lower than those of the high paranormal group.

Exploratory analysis found that, for each group, participants without affective disorders had a significantly higher self-serving bias than participants with affective disorders. Inspection of the means indicated that this difference was much larger for the groups with high paranoia and high unusual beliefs-in-

general than all other groups, although the significance of these differences was not tested. The subgroup with high paranoia and no affective disorder (n = 62) had the smallest self-serving bias of the four subgroups without affective disorders. The authors concluded that higher self-serving bias is not associated with higher paranoia.

A limitation of the study was that it did not measure or control for participants' current level of depression or self-esteem. In the quality assessment (Table 2.4), the study received no 'weak' ratings and therefore a 'strong' rating for its overall quality.

2.5.18 – Sulllivan et al. (2013)

Sullivan et al. (2013) examined the relationship between attributional style and paranoia in 2694 young adults drawn from a UK community. Attributional style was measured using the *CSQ-SF* (Section 2.2.3) and persecutory ideation was measured on a two-point scale as either absent or suspected / present using a semi-structured interview (the *Psychosis-Like Symptom Interview*; Horwood et al., 2008). 20 participants were rated as having persecutory ideation.

A logistic regression analysis found no significant association between higher externalising for negative events and paranoid ideation, either before or after controlling for level of depression.

A limitation of the study was that its binary measurement of persecutory ideation failed to capture degrees of paranoia over the entire sample. The lack of association between externalising for negative events and paranoia may have been due to the small size of the persecutory ideation group, resulting in insufficient statistical power to detect a genuine association. Also, as the study did not state the clinical status of the participants with and without persecutory ideation, it is difficult to draw conclusions about attributional style and non-clinical paranoia from its findings.

In the quality assessment (Table 2.4), the study received one 'weak' rating for its measures, and therefore a 'moderate' rating for its overall quality. The study also received a 'weak' rating for its analysis, which may have been underpowered to find a significant effect.

2.5.19 – Fornells-Ambrojo & Garety (2009a)

Fornells-Ambrojo & Garety (2009a) measured attributional style and paranoia in 315 university students and staff in the UK. The *ARAT* (Section 2.2.5) was used to measure attributional style and paranoia was measured using the *PS* and the *Peters et al. Delusions Inventory* (*PDI*; Peters et al., 1999). People scoring above the 89th percentile and below the 11th percentile on the *PS* formed high paranoia (n = 30) and low paranoia (n = 32) groups, respectively.

Very small, non-significant correlations were found between higher paranoia and higher other-person attributions for negative events, both (1) as raw scores and (2) as a proportion of the total number of internal and other-person attributions made for negative events (a measure termed the 'other-person blaming bias'), over the entire sample of 315 participants.

However, the high paranoia group had significantly higher (1) other-person attributions for negative events and (2) other-person blaming bias than the low paranoia group. Furthermore, a subgroup who endorsed the *PDI* persecutory belief that there was a conspiracy against them (n = 18) also had a significantly higher other-person blaming bias than the remainder of participants who did not endorse this belief (n = 250). In participants who endorsed persecutory beliefs, medium-to-strong, significant correlations were found between higher other-person blaming bias and higher (1) distress (2) preoccupation and (3) conviction concerning this belief.

The authors also found that membership of the high or low paranoia group was significantly predicted by the number of other-person attributions made for negative events on the *ARAT*, but not the *IPSAQ*.

The authors concluded that a tendency to blame other people, rather than oneself, for negative events is associated with a high level of paranoia and persecutory beliefs, supporting the defence model of paranoia.

A limitation of the study was its use of researcher-rated, rather than participant-rated attributions, which may have been prone to interpretive errors (Section 2.2.5). It also did not test whether the association between other-person blaming bias and paranoia was specific to negative events (in line with the

defence model) or extended to positive events as well (contrary to the defence model) In the quality assessment (Table 2.4), the study received no 'weak' ratings and therefore a 'strong' rating for its overall quality.

2.5.20 – Combs et al. (2007b)

Combs et al. (2007b) examined the relationship between perception of hostile intent, attributional style and paranoia in a sample of 322 undergraduate students in the USA. Perception of hostile intent was measured using the *AIHQ* (Section 2.2.6), attributional style was measured using the *IPSAQ*, and a composite measure of paranoia was created from the *PS* and the *SCID-II* measure of paranoid personality disorder.

Significant correlations were found between higher paranoia scores and higher ratings of (1) intentionality (moderate-size) and (2) hostility (small-size) in the ambiguous actions of others. Higher ratings of intentionality and hostility also significantly predicted higher paranoia scores in a multiple regression model, after the significant predictors of ethnicity and suspiciousness were taken into account. *IPSAQ* personalising bias was not found to predict paranoia.

The authors concluded that higher paranoia is related to higher perception of hostile intent in the ambiguous actions of others but not personalising bias. A limitation of the study was that it did not examine the relationship between paranoia and self-serving bias. In the quality assessment (Table 2.4), the study received no 'weak' ratings and therefore a 'strong' rating for its overall quality.

2.5.21 – An et al. (2010)

An et al. (2010) examined perception of hostile intent in three groups of people in South Korea: 24 people deemed as being at 'ultra-high risk' of developing a SSD for the first time, 21 patients in their first episode of schizophrenia, and 39 non-clinical controls. The groups were matched for age, gender, education and employment status. Perception of hostile intent was measured using the *AIHQ*, and paranoia was measured using the *PS*.

The high risk group and patient group were found to share similarly high ratings of (1) intentionality and (2) hostility in the ambiguous actions of others, and these were significantly higher than in the control group. In the high risk group and patient group, moderate, significant correlations were found between higher paranoia scores and higher ratings of (1) intent and (2) hostility in other people's ambiguous actions, after controlling for depression and self-esteem.

The authors concluded that there is a heightened perception of hostile intent in the ambiguous actions of others in people at ultra-high risk of developing a SSD and in schizophrenia patients, and that this is related to higher levels of paranoia in both.

In the quality assessment (Table 2.4), the study received no 'weak' ratings and therefore a 'strong' rating for its overall quality.

2.5.22 – Discussion

The systematic review identified 15 studies that examined whether attributional style is associated with paranoia in non-clinical individuals. In terms of their overall quality, nine studies were rated as 'strong', five studies were rated as 'moderate', and only one study was rated as 'weak'. This indicates that the studies were of generally adequate methodological quality.

In terms of the studies' findings:

all ten studies that examined paranoia and self-serving bias failed to find a positive association between the two, with three studies finding small *negative* correlations between the two;

seven out of eight studies that examined paranoia and personalising bias failed to find a positive association between the two;

six out of seven studies that examined paranoia and various forms of externalising for negative events (not including self-serving bias) failed to find a positive association between the two;

none of the studies found linear relationships between paranoia and the aforementioned attributional tendencies across the full range of non-clinical paranoia scores sampled; and

two out of two studies that examined paranoia and perception of hostile intent in the ambiguous actions of others found a positive association between the two.

Only one of eight studies (Kinderman & Bentall, 1996) found an association between paranoia and personalising in participants with a self-serving bias above the 29th percentile. As these participants may not have had a particularly high self-serving bias, it was unclear whether personalising bias was playing a self-esteem protecting role. Seven subsequent studies (some with greater statistical power and methodological rigour) did not find an association between paranoia and personalising, although they did not specifically look for this association in participants with higher self-serving bias. Without replication, the findings from Kinderman & Bentall (1996), a study that was rated as having a 'weak' quality of analysis and control of confounders, remain tentative.

Combs et al. (2007a) found evidence that self-serving and personalising biases do not have linear relationships with the full range of non-clinical paranoia scores, but do have associations with lower depression and higher self-esteem in people with high paranoia. Coleman et al. (2022) also did not find an association between paranoia and attributional biases, but provided tentative evidence that the self-serving bias was associated with a lower likelihood of affective disorder in participants with high paranoia. These two studies, both with very large sample sizes (n = 587 and n = 723, respectively) and 'strong' overall quality, suggest that attributional biases may be associated with (1) reduced depression, (2) higher self-esteem and (3) lower likelihood of affective disorder in non-clinical individuals with high paranoia, but are not associated with paranoia *per se*.

Only one of seven studies (Fornells-Ambrojo & Garety, 2009a) found an association between paranoia and a form of externalising for negative events. Using a large sample size (n = 315), the study showed that attributing negative events away from oneself and towards other people was associated with very high paranoia (i.e., above the 89th percentile) and the persecutory belief of

being conspired against. Although the quality assessment indicated this study was of 'strong' overall quality, its findings remain tentative without replication and given the number of studies that did not make comparable findings. The following considerations should be made when reconciling these seemingly discrepant findings:

Firstly, of the remaining six studies to examine externalising of negative events and paranoia (all of which failed to find an association), four studies looked at externalising in general, i.e., without specifically examining other-person attributions for negative events. Only two studies (McKay et al., 2005, and Lincoln et al., 2010) did this, but their failure to find an association with paranoia may have been due to their lower methodological quality, particularly their use of smaller sample sizes (n = 40 and n = 50, respectively), compared with the Fornells-Ambrojo & Garety (2009a) study.

Secondly, Fornells-Ambrojo & Garety (2009a) was one of few studies to examine attributional style in very high paranoia scorers (above the 89th percentile), perhaps because it was one of the few studies that used a large enough sample to find them. More generally, it should be noted that a considerable number of the studies reviewed (7 out of 15) had low sample sizes that made it unlikely for them to sample very high paranoia scorers.

Thirdly, Fornells-Ambrojo & Garety (2009a) was the only study to use the *ARAT* measure of attributional style. This made it the only study to provide richly contextualised events for participants to make causal attributions about, and the only study that used researcher-rated (rather than participant-rated) categorisations of these attributions. Despite the potentially greater scope for interpretive errors when using researcher ratings, the *ARAT* may nevertheless have used a more valid method of measuring attributional style than all of the other studies reviewed (further reasons described in Sections 2.2.5 and 2.2.9).

Fourthly, Fornells-Ambrojo & Garety (2009a) did not examine associations between very high paranoia and (1) the self-serving bias and (2) the attribution of positive events to other people. Therefore, they did not demonstrate that people with very high paranoia attributed negative events to other people (1) as part of a broader self-serving bias, and (2) not as a result of a tendency to

attribute events in general to other people, limiting the conclusions that can be made about the defence model of paranoia.

In conclusion, the studies reviewed generally indicate that attributional biases do not appear to be related to paranoia in the general population. However, there is tentative evidence that people with very high levels of paranoia and persecutory beliefs may have a tendency to attribute negative events to other people, which requires replication and demonstration of its self-esteem protecting function.

Two out of two studies, both with 'strong' overall quality, found an association between paranoia and heightened perception of hostile intent in the ambiguous actions of others. Combs et al. (2007b) found a significant association across the full range of paranoia scores in a large non-clinical sample. An et al. (2010) found significant correlations between higher paranoia and higher perception of hostile intent in people with high schizotypy, as well as SSD patients, with both sharing a similarly heightened perception of hostile intent compared to controls. In conclusion, both studies support the notion that a high perception of hostile intent in the ambiguous actions of others is linked to non-clinical paranoia. However, as noted in Section 2.2.8, perception of hostile intent does not appear to be a type of attributional bias, despite being referred to as such by some researchers.

2.5.23 – Limitations

The systematic review had several limitations. Only one reviewer was involved in the selection of studies and the assessment of the quality of the studies, and so these were more prone to subjective biases than if multiple reviewers had been used. Also, only two electronic databases, and the references of relevant reviews, were searched for relevant articles; other databases and a search of unpublished theses and dissertations may have yielded more relevant articles. It is also possible that relevant studies examining non-clinical paranoia were missed because their main focus was on clinical paranoia.

Another limitation of the review was the use of the *QATQS* quality assessment tool. Some of the domains it measures (design-type; assessor and participant

blinding; participant withdrawal; and intervention integrity) were not felt to be particularly relevant to the selected studies, and the *QATQS* does not include consideration of analysis quality when assessing a study's overall quality. This is a limitation of quality assessment tools in general for the assessment of experimental quantitative studies, as these tools are generally designed to measure studies of intervention effectiveness. An assessment tool that measured only relevant domains for quantitative experimental designs, and that gave greater consideration to the appropriateness of a study's statistical power, the study's effectiveness in sampling a high level of paranoia, and the study's quality of analysis, may have yielded more valid ratings of overall study quality. Creating such tool for the purpose of the present review, which requires establishing its validity and reliability, was however beyond the scope of the thesis.

The review may also have benefitted from the inclusion of a meta-analysis of the selected studies' findings, but this too was beyond the scope of the thesis.

2.6 – Conclusions

The present chapter reviewed existing empirical findings to examine the defence model of paranoia, which holds that paranoia can result from a self-esteem-protecting tendency to attribute negative events to other people.

Regarding clinical paranoia, schizotypy, and the measurement of attributional style, there is mixed empirical support for an association between clinical paranoia and the self-esteem disturbances that drive self-esteem protection. There is some meta-analytical support for a relationship between clinical paranoia and self-serving attributional bias, but more meta-analytic evidence is needed to show that clinical paranoia is also related to a bias for blaming other people for negative events. There is poor meta-analytic evidence for an association between attributional biases and schizotypal features in non-clinical individuals. Finally, some measures of attributional style may have problems with their validity, although newer instruments such as the *ARAT* and *AIHQ* have addressed some of the limitations of their predecessors.

The chapter then presented a systematic review of attributional style in non-clinical paranoia. Attributional biases do not appear to be associated with paranoia in most non-clinical individuals, although a tendency to blame other people, rather than oneself, for negative events may be heightened in very high paranoia. There is good evidence for an association between perception of hostile intent in the ambiguous actions of others and non-clinical paranoia, although this should not be regarded as a type of attributional bias.

With regards to the defence model of paranoia, it is concluded that, in clinical individuals with persecutory delusions, there is currently mixed evidence for an association between self-esteem disturbances and paranoia, but some meta-analytic evidence for a relationship between self-serving attributional bias and paranoia, which offers mixed support for the defence model. However, in non-clinical individuals, the weight of the evidence suggests that self-serving attributional bias is not related to paranoia, contrary to the defence model. Whilst non-clinical individuals with very high levels of paranoia, and those with persecutory beliefs, may have a significant bias towards blaming other people, rather than themselves, for negative events, this finding has only been shown by a single study, which did not show that the bias had a self-esteem protecting function.

Finally, the investigation of attributional biases in paranoia needs to take into consideration the potential confounding factors of cultural background and level of depression / self-esteem of participants, as well as the type of instrument used to measure attributional style, as there is evidence that these may influence the relationship between attributional style and paranoia.

The implications of the present findings are further discussed in Chapter 4.

2.7 – Chapter Summary

(1) The present chapter examined the existing empirical support for the defence model of paranoia, which holds that paranoia results from self-esteem-protecting attributional biases. It evaluated the measurement of attributional style, discussed existing reviews and meta-analyses, and presented a systematic review of attributional style in non-clinical paranoia.

(2) Measurement instruments of attributional style may lack validity due to limitations in their abilities to simulate real-life events, and record and score participants' perceptions of causality. Newer instruments such as the *ARAT* and *AHIQ* have addressed some of these limitations.

(3) The various attributional biases, perception of hostile intent in other people's ambiguous actions, and locus of control, are each measured by different instruments purporting to measure attributional style. Several meta-analytical studies of attributional style and paranoia use composite scores from disparate measures, arguably reducing the validity of their conclusions.

(4) In clinical individuals with persecutory delusions, there is currently mixed evidence for an association between paranoia and self-esteem disturbances, but some meta-analytic evidence for a relationship between paranoia and self-serving bias, offering mixed support for the defence model's explanation of clinical paranoia. More meta-analytic evidence is needed to show that clinical paranoia is also related to a bias for blaming other people for negative events.

(5) Existing meta-analytical studies have concluded that attributional biases are associated with schizotypy, but methodological flaws in these studies undermine the validity of this conclusion.

(6) A systematic review of 15 studies was performed to examine whether attributional biases are related to non-clinical paranoia. It was concluded that self-serving attributional bias is not associated with non-clinical paranoia. A tendency to blame other people, rather than oneself, for negative events is possibly heightened in very high paranoia, but bias was not shown to have a self-esteem protecting function.

(7) There would appear to be a positive association between perception of hostile intent in the ambiguous actions of others and non-clinical paranoia, although this should not be regarded as a type of attributional bias.

(8) A participant's cultural background and level of depression / self-esteem, as well as the method of measuring attributional style, have been shown to influence the relationship between attributional style and paranoia. Future studies of this relationship should therefore take these factors into account.

3 Attributional Style in Schizotypy Paranoia and Grandiosity

This chapter presents an original empirical study of attributional style in schizotypy, paranoia-spectrum ideation and grandiosity in non-clinical individuals.

3.1 – Introduction

3.1.1 – Attributional Biases, Clinical Paranoia and Grandiosity

Chapter 2 introduced the defence model of paranoia, which posits that a self-esteem-protecting tendency to attribute negative events to other people can lead to paranoia. The chapter concluded that there was mixed meta-analytical evidence for a relationship between self-serving bias and clinical paranoia, and that clear meta-analytical support for a relationship with a bias towards attributing negative events to other people (e.g., personalising bias) had yet to be established.

Studies have found mixed relationships between personalising bias and persecutory delusions, with some finding an association (e.g., Kinderman & Bentall, 1997) that others were unable to replicate (e.g., Janssen et al. 2006). This inconsistent literature may be due to studies not controlling for factors that have been shown to affect the relationship between attributional biases and paranoia, such as depression (Combs et al., 2007a; Section 2.5.11).

One such factor might be grandiosity (Section 1.5). Jolley et al. (2006) found that the majority of their patients with persecutory delusions had comorbid depression and a self-blaming bias, with only a small group of patients with co-occurring persecutory and grandiose delusions showing a self-serving bias. Cicero & Kerns (2011) found small, significant correlations in non-clinical individuals between higher scores for narcissistic personality style (which has

features of grandiosity) and higher (1) externalising for negative events and (2) self-serving bias. Therefore, grandiosity may be an important moderator of a relationship between attributional biases and paranoia that is not typically taken into account by existing empirical studies. To address this, the present study investigated whether attributional biases are related to grandiose beliefs in non-clinical individuals.

3.1.2 – Attributional Biases and Schizotypy

Some studies have examined whether attributional biases are present in non-clinical individuals with high levels of schizotypy. These studies tested the hypothesis that heightened attributional biases precede the development of persecutory delusions in SSDs, based on the assumption that higher schizotypy indicates a higher risk of developing a SSD (Section 1.2). As noted in Section 2.4, there is currently poor meta-analytic evidence for an association between attributional biases and schizotypy in non-clinical individuals. Only three studies have examined whether attributional biases are heightened in people with high schizotypy, with mixed findings:

(1) In the Netherlands, Janssen et al. (2006) examined attributional style in SSD patients and in non-clinical individuals recruited from the general community who scored either high (above the 75th percentile) or mid-range (40th – 60th percentile) for combined positive schizotypal features (unusual perceptions and beliefs, including ideas of reference, paranoia and grandiosity) on the *Community Assessment of Psychic Experience* questionnaire (*CAPE*; Stefanis et al., 2002). The SSD patients had significantly higher *IPSAQ* self-serving bias than the mid-range schizotypy group, with the high schizotypy group scoring at an intermediate level that was not significantly different from either comparison group. There were no significant difference between the three groups for *IPSAQ* personalising bias. The authors concluded that attributional biases are not heightened in high schizotypy.

(2) In the USA, DeVylder et al. (2013) examined attributional style in help-seeking individuals deemed as being at “clinical high risk” of developing a first episode of SSD. They showed significantly higher levels of positive and negative schizotypal features, but also significantly higher depression, than a

comparison group of non-clinical individuals. No significant differences in *IPSAQ* self-serving or personalising biases were found between the two groups. The authors concluded that attributional biases are not heightened in high schizotypy.

(3) In Hong Kong, So et al. (2015) examined attributional style in first-episode SSD patients and in non-clinical individuals from the general community scoring either very high (above the 98th percentile) or less high (below the 99th percentile) for positive schizotypy on the *CAPE*. Both the patient group and the high schizotypy group scored significantly higher than the lower schizotypy group for *IPSAQ* self-serving bias. The patient group, but not the high schizotypy group, scored significantly higher than the lower schizotypy group for *IPSAQ* personalising bias. The patient group and high schizotypy group scored similarly high for *IPSAQ* self-serving and personalising biases. The authors concluded that people with very high schizotypy have heightened self-serving but not personalising biases.

These conflicting findings may be due to inter-study differences in the size of the control groups' self-serving bias, with the low schizotypy scorers in the Asian study by So et al. (2015) displaying a much lower mean score for self-serving bias than the low schizotypy groups in the Western studies by Janssen et al (2006) and DeVylder et al. (2013). As noted in Chapter 2, the self-serving bias in the general community may be smaller in Asian countries than in Western countries, leading to more scope for exaggeration in SSD patients and individuals with high schizotypy (Müller et al., 2021; Section 2.3.2). Alternatively, the results from So et al. (2015) could indicate that self-serving bias is only heightened in non-clinical individuals with a very high level of schizotypy (e.g., above the 98th percentile).

These studies also did not investigate whether there is a particular tendency towards attributing negative events to other people, rather than oneself, in high schizotypy (the 'other-person blaming bias'; Section 2.5.19). To address this, the present study investigated whether this bias is heightened in people with high schizotypy.

3.1.3 – Attributional Biases and Non-Clinical Paranoia

As noted in Section 2.5, studies have generally failed to find associations between attributional biases and paranoia in non-clinical individuals. However, one study with particularly strong methodological characteristics showed that individuals with very high paranoia (above the 89th percentile) and persecutory beliefs had an other-person blaming bias (Fornells-Ambrojo & Garety, 2009a; Section 2.5.19).

Studies of non-clinical individuals tend to look at attributional style in relation to paranoia and persecutory ideation. However, paranoia can be seen as a spectrum of ideation extending to milder phenomena, such as feelings of self-consciousness when in public and suspiciousness of others (Section 1.4.1). Attributional biases do not appear to have been examined in relation to these milder aspects of the paranoia spectrum, which may be more prevalent than persecutory beliefs in non-clinical individuals. The present study therefore investigated whether self-consciousness and suspiciousness of others are related to attributional biases in non-clinical individuals.

3.1.4 – Present Study's Hypotheses

The following hypotheses were examined:

(1) If attributional biases are heightened prior to the development of persecutory delusions in SSDs, then young adults with high schizotypy will show significantly higher scores of (a) self-serving bias, (b) personalising bias and (c) other-person blaming bias than young adults with low schizotypy.

(2) If the defence model of paranoia is applicable to paranoia-spectrum ideation in high schizotypy, higher scores of (a) self-serving bias, (b) personalising bias and (c) other-person blaming bias will significantly correlate with higher scores of self-consciousness, suspiciousness, paranoia and persecutory beliefs in people with high schizotypy.

(3) If attributional biases are associated with non-clinical persecutory beliefs and grandiose beliefs, people with (a) persecutory beliefs and (b) grandiose beliefs will show significantly higher scores of (i) self-serving bias, (ii)

personalising bias and (iii) other-person blaming bias than people without these beliefs.

3.2 – Methodology

3.2.1 – Participants

The present study was powered to find between-group differences and correlational relationships of medium-sized effect. This was based on the previous finding of a medium-sized difference in other-person blaming bias between high and low paranoia scorers (r = 0.32; Fornells-Ambrojo & Garety, 2009a), and previous findings of medium-sized correlations between self-serving bias and (1) persecutory delusions (r = .39; Janssen et al., 2006) and (2) grandiose delusions (r = .38; Jolley et al., 2006) in SSD patients.

Power analyses indicated that, with 80% power:

(1) two groups of 34 participants were required to detect a significant medium-sized (r = 0.32) difference in attributional bias between groups with high and low schizotypy, and groups with and without (a) persecutory and (b) grandiose beliefs, using two-tailed independent-samples t-tests;

(2) 51 participants were required to detect significant medium-sized (r = .38) relationships between attributional biases and paranoia-spectrum ideation using two-tailed tests of correlation.

In line with these calculations, the study aimed to recruit 51 people with high schizotypy and 51 people with low schizotypy. It was anticipated that, amongst these 102 participants, three groups of 34 participants would be formed, comprising participants with either persecutory beliefs, grandiose beliefs, or neither belief.

Eligible participants were undergraduate and postgraduate students aged between 18 and 35 years, with no history of previous SSD, and proficient English language speakers.

3.2.2 – Measures

The following measures were administered to the participants:

(1) The *Schizotypal Questionnaire* (*STA*; Claridge & Brocks, 1984) is a self-report measure of overall schizotypy, comprised of positive, negative and disorganised schizotypal features. The *STA* has high internal consistency (Cronbach's alpha = 0.86) and yields significantly higher scores for remitted schizophrenia patients than controls (Jackson & Claridge, 1991), indicating good criterion validity. *STA* scores were primarily used to identify high and low schizotypy scorers for participation in the study.

(2) The *Schizotypal Personality Questionnaire* (*SPQ*; Raine, 1991) is a self-report measure of nine types of schizotypal features (unusual perceptions, ideas of reference, excessive social anxiety, suspiciousness, odd / magical beliefs, odd speech, odd / eccentric behaviour, constricted affect, and no close friends), and yields an overall schizotypy score. The authors reported high internal consistency (Cronbach's alpha ranging from 0.77 to 0.89) and good construct validity for its subscales and total score. *SPQ* scores were used to describe levels of schizotypal features of the groups, and the *SPQ* suspiciousness scale was used to test hypothesis 2.

(3) The *National Adult Reading Test* (*NART*; Nelson, 1982) is a commonly used word-reading test that was used to estimate *WAIS-IV* verbal intelligence using normative data by Bright et al. (2016). Nelson (1982) reported excellent test-retest reliability. Lezak et al. (2004) reported large correlations between the *NART* and other measures of intelligence (Pearson's *r* ranging from .72 to .81), indicating good construct validity. *NART* scores were used to allow comparison of the two groups for verbal intelligence, which was deemed to be a potentially confounding variable given the *IPSAQ*'s reliance on verbal comprehension and expression skills.

(4) The *Internal, Personal and Situational Attribution Questionnaire* (*IPSAQ*; Kinderman & Bentall, 1996; described in Section 2.2.4) is a commonly used self-report measure of attributional style. The authors reported acceptable-to-good internal consistency for its six subscales (Cronbach's alphas ranging from 0.61 to 0.76), the self-serving bias score (Cronbach's alpha of 0.72) and the

personalising score (Cronbach's alpha of 0.76), and acceptable construct validity for the self-serving bias score. The personalising score does not appear to have been validated. *IPSAQ* scores were used to test hypotheses 1, 2 and 3.

(5) The *Peters et al. Delusions Inventory* (*PDI-21*; Peters et al. 2004) is a self-report measure of 21 unusual beliefs, including persecutory and grandiose beliefs. Participants indicate whether they currently hold each belief, and rate how distressing it is for them, how frequently they think about it, and how true they think it is. The authors reported high internal consistency (Cronbach's alpha of 0.82), good construct validity, and good criterion validity for the *PDI*'s total score. *PDI* scores were used to describe levels of unusual beliefs of the groups, and to test hypotheses 2 and 3.

(6) The *Depression, Anxiety and Stress Scales* (*DASS-21*; Henry & Crawford, 2005) is a commonly used self-report measure of current levels of depression, anxiety and stress. The authors reported high internal consistency (Cronbach's alphas ranging from 0.90 to 0.95) and adequate construct validity for its subscales. *DASS* scores were used to allow comparison of the two groups on the potentially confounding variables of depression, anxiety and stress.

(7) The *Self-Consciousness Scale* (*SCS*; Fenigstein et al., 1975) is a self-report measure of self-consciousness comprising items of private self-consciousness (i.e., awareness of one's thoughts, feelings and internal states), public self-consciousness (i.e., awareness of how one is presenting oneself when in public) and social anxiety (i.e., anxiety relating to social situations). The authors reported good test-retest reliability for it its subscales and total score. *SCS* scores were used to test hypothesis 2.

(8) The *Paranoia Scale* (*PS*; Fenigstein & Vanable, 1992) is a self-report measure of paranoia. The authors reported high internal consistency (Cronbach's alpha of 0.84) and good construct validity for its total score. *PS* scores were used to describe levels of paranoia of the groups, and to test hypothesis 2.

3.2.3 – Procedure

All participants were recruited by the present author. Invitations to take part in the study were circulated by post to undergraduate and postgraduate students living in a University of London halls of residence. To ensure a good response rate, invitations were followed up with a personal approach. Participants were also recruited via advertisements placed on the noticeboards of several University of London halls of residence.

All participants provided informed, written consent to take part in the study, but were not informed about the research questions until after the study was completed. At the screening stage, interested respondents were required to complete and return the *STA,* with only those scoring high or low for schizotypy invited to take part in the main study. High and low schizotypy were defined as *STA* scores of between 24 and 37, and between 0 and 10, respectively. These cut-off scores were the same as those used by some previous studies of high and low schizotypy (e.g., Morgan et al., 2009), and equated to the top and bottom 15th percentile, respectively, of all respondents in the present study.

Participants of the main study completed the study's questionnaires remotely, and were able to contact the researcher if they had any queries about how to complete them. The researcher checked completed questionnaires for omitted answers, and asked participants to complete any omissions. On completion of the study, participants were provided with information about the study's aims, given an opportunity to discuss the study with the researcher, and paid £10 for their participation. The study was approved by Royal Holloway's Research Ethics Committee.

3.2.4 – Analyses

Calculation of a questionnaire score with omitted items was made from the pro-rated mean score of the completed items, unless more than 10% of the score's items were omitted, in which case the score was not calculated.

The *IPSAQ* self-serving bias was calculated as the proportion of internal attributions for positive and negative events that were for positive events. This was felt to be a better way of calculating self-serving bias at an interval-level

scale than the traditional method of subtracting internal attributions for negative events from internal attributions for positive events (e.g., Kinderman & Bentall, 1996), and is in line with the method of calculating personalising and other-person blaming biases that have been reported in the literature.

The *IPSAQ* personalising bias was calculated as the proportion of other-person and situational attributions for negative events that were other-personal (Kinderman & Bentall, 1996).

The *IPSAQ* other-person blaming bias was calculated as the proportion of other-person and internal attributions for negative events that were other-personal (as proposed by Fornells-Ambrojo & Garety, 2009a for the *ARAT*).

Non-parametric tests were used because some of the data were skewed and did not meet parametric testing assumptions. Chi-Square (χ^2) and Mann-Whitney (U) tests were used to examine differences in proportions and scores, respectively, between two participant groups. Kruskal-Wallis (H) tests were used to examine differences in scores between three participant groups. Spearman's (r_s) tests were used to examine correlations between scores. All tests used a two-tailed significance level of $p < 0.05$, unless otherwise mentioned. Pearson's r effect sizes were reported for between-groups differences that were hypotheses-related.

3.3 – Results

3.3.1 – Recruitment and Formation of the Schizotypy Groups

385 students were invited to take part in the initial schizotypy group selection stage of the study, with 369 residents (96%) returning completed *STA* questionnaires. 39 of the 55 high scorers (71%) and 35 of the 55 low scorers (63%) subsequently agreed to take part in the main study. A Chi-Square test found no significant difference between the proportions of high and low scoring participants who agreed to take part.

In addition, one high scorer and seven low scorers were recruited in response to the noticeboard advertisements. One participant from the high schizotypy

group was retrospectively excluded from the study because they did not complete the *IPSAQ*. In total, there were 80 participants: 38 in the high schizotypy group and 42 in the low schizotypy group. 55 participants were tested in a 2006 pilot study, and 25 participants were tested between 2020 and 2022.

3.3.2 – Demographic Details of the Schizotypy Groups

The high schizotypy group comprised 33 British, 1 North American, 2 Malaysian, 2 Singaporean, and 1 South Korean, whilst the low schizotypy group comprised 29 British, 3 North American, 4 Malaysian, 4 Singaporean, 1 South Korean and 1 Mauritian.

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 42)	**Group Comparisons**
Mean age (in years)	21.0 ±3.45	21.3 ±3.38	HS ≈ LS
Gender (male / female)	45% / 55% 17 / 21	45% / 55% 19 / 23	HS ≈ LS
Nationality (British / Non-British)	84% / 16% 32 / 6	69% / 31% 29 / 13	HS ≈ LS
Country of origin (Western / Eastern)	87% / 13% 33 / 5	76% / 24% 32 / 10	HS ≈ LS
Mean duration of education (in years)	15.1 ±1.59	15.2 ±1.92	HS ≈ LS
Mean *WAIS-IV* Verbal IQ (estimated from *NART*)	105.6 ±7.23	107.0 ±6.48	HS ≈ LS

Table 3.1: Demographic details of the schizotypy groups

(± = standard deviation)

All participants spoke English as their first or joint-first language, with estimated *WAIS-IV* verbal intelligence scores ranging from the 6th to 92nd percentiles. The

two groups were not significantly different in terms of age, gender, nationality, country of origin, years educated or *WAIS-IV* verbal intelligence scores (Table 3.1).

3.3.3 – Depression, Anxiety and Stress in the Schizotypy Groups

The high schizotypy group had significantly higher scores for *DASS* depression, anxiety, stress and overall than the low schizotypy group (all *ps* < 0.001; Table 3.2).

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 42)	**Group Comparisons**
Depression (0 – 21)	7.74 ±4.39	2.40 ±2.39	HS > LS *U* = 231, *p* < 0.001
Anxiety (0 – 21)	6.66 ±3.63	1.76 ±2.38	HS > LS *U* = 183, *p* < 0.001
Stress (0 – 21)	9.97 ±4.23	4.38 ±3.22	HS > LS *U* = 221, *p* < 0.001
***DASS* Total** (0 – 63)	24.37 ±10.37	8.55 ±6.60	HS > LS *U* = 160, *p* < 0.001

Table 3.2: Mean *DASS* scores of the schizotypy groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.

3.3.4 – Schizotypal Features in the Schizotypy Groups

The high schizotypy group had significantly higher scores for *SPQ* and *STA* overall schizotypy, and for all *SPQ* schizotypal features, than the low schizotypy group (all *ps* < 0.01), indicating that the schizotypy groups were valid. (Table 3.3; Figure 3.1).

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 42)	**Group Comparisons**
Unusual perceptions (0 – 9)	4.87 ±2.19	0.78 ±1.31	HS > LS $U = 92$, $p < 0.001$
Ideas of reference (0 – 9)	5.67 ±2.20	1.49 ±1.25	HS > LS $U = 98$, $p < 0.001$
Excessive social anxiety (0 – 8)	4.79 ±2.9	2.22 ±2.32	HS > LS $U = 347$, $p < 0.001$
Suspiciousness (0 – 8)	4.10 ±2.51	0.88 ±1.10	HS > LS $U = 199$, $p < 0.001$
Odd / magical beliefs (0 – 7)	3.51 ±2.18	0.29 ±0.60	HS > LS $U = 117$, $p < 0.001$
Odd speech (0 – 9)	6.49 ±2.26	2.32 ±1.96	HS > LS $U = 165$, $p < 0.001$
Odd / eccentric behaviour (0 – 7)	4.62 ±1.65	1.29 ±1.90	HS > LS $U = 168$, $p < 0.001$
Constricted affect (0 – 8)	3.08 ±2.01	0.98 ±1.13	HS > LS $U = 285$, $p < 0.001$
No close friends (0 – 9)	2.72 ±2.55	1.07 ±1.65	HS > LS $U = 475$, $p < 0.01$
***SPQ* Overall schizotypy** (0 – 74)	39.85 ±11.66	11.32 ±8.11	HS > LS $U = 44$, $p < 0.001$
***STA* Overall schizotypy** (0 – 37)	27.05 (±2.67)	7.12 (±2.45)	HS > LS $U = 0$, $p < 0.001$

Table 3.3: Mean *SPQ* and *STA* scores for the schizotypy groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.

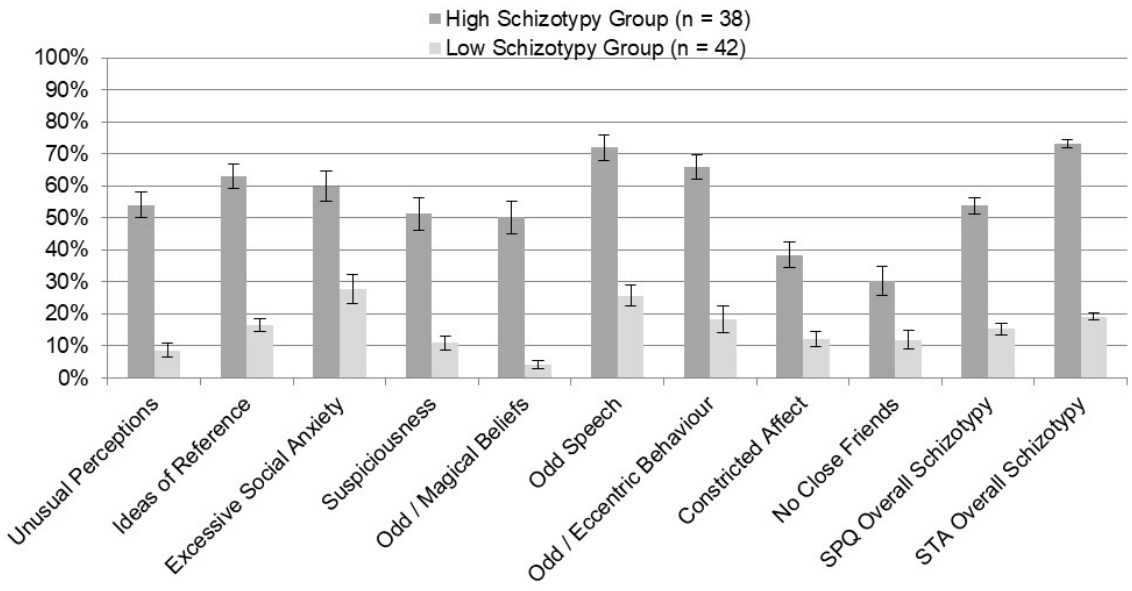

Figure 3.1: Mean *SPQ* and *STA* schizotypy scores for the schizotypy groups

Scores are shown as percentages of their respective scale totals, with error bars showing standard errors of means.

3.3.5 – Paranoia and Self-Consciousness in the Schizotypy Groups

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 42)	**Group Comparisons**
***PS* Paranoia** (0 – 80)	34.87 ±11.91	16.29 ±10.46	HS > LS $U = 198$, $p < 0.001$
***SCS* Private self-consciousness** (0 – 44)	28.79 ±6.77	20.17 ±6.14	HS > LS $U = 265$, $p < 0.001$
***SCS* Public self-consciousness** (0 – 24)	16.32 ±3.99	10.90 ±4.71	HS > LS $U = 296$, $p < 0.001$
***SCS* Social anxiety** (0 – 24)	13.55 ±4.81	8.00 ±4.89	HS > LS $U = 341$, $p < 0.001$
***SCS* Total self-consciousness** (0 – 92)	58.66 ±11.80	39.07 ±10.57	HS > LS $U = 170$, $p < 0.001$

Table 3.4: Mean *PS* and *SCS* scores of the schizotypy groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.

The high schizotypy group had significantly higher scores than the low schizotypy group for *PS* paranoia, *SCS* private self-consciousness, *SCS* public self-consciousness, *SCS* social anxiety and *SCS* total self-consciousness (all *ps* < 0.001; Table 3.4). This indicates that the schizotypy groups were distinct in terms of paranoia-spectrum ideation.

3.3.6 – Unusual Beliefs in the Schizotypy Groups

Two low schizotypy participants did not complete the *PDI-21*, and so were not included in *PDI-21* analyses. The majority of unusual beliefs (18 of the 21), including all paranoia-spectrum beliefs (ideas of reference, suspiciousness of others, thoughts of being persecuted, thoughts of being conspired against) and grandiose beliefs (thoughts of having an important destiny, thoughts of being very special), were held by a significantly higher proportion of the high schizotypy group than the low schizotypy group (all *ps* < 0.05; Table 3.5). This indicated that the majority of *PDI-21* unusual beliefs were schizotypal beliefs.

Similar proportions of participants in each group endorsed having thoughts of being very close to God, thoughts of having been chosen by God, and the experience of not having any thoughts in their head. This indicates that these beliefs may not be characteristic of high schizotypy.

A composite measure of persecutory belief was created by taking the mean 0 – 4 distress, preoccupation and conviction ratings for *PDI-21* items 4 and 5, which measure thoughts about being persecuted and thoughts of being conspired against, respectively. A composite measure of grandiose belief was created by taking the mean 0 – 4 distress, preoccupation and conviction ratings for *PDI-21* items 6 and 7, which measure thoughts about being very important, and thoughts about being very special or unusual, respectively. Composite scores have been used in previous studies with the *PDI* (e.g., Peters et al., 1999, 2004).

In the high schizotypy group, 17 participants (45%) reported not having either of the two *PDI-21* persecutory beliefs, 8 participants (21%) reported not having either of the two *PDI-21* grandiose beliefs, and 6 participants (16%) reported not having any of the *PDI-21* persecutory or grandiose beliefs.

	High Schizotypy (HS; n = 38) Yes / No	**Low Schizotypy** (LS; n = 40) Yes / No	**Group Comparisons**
1. Ideas of being referenced by others	87% / 13% 33 / 5	30% / 70% 12 / 28	HS > LS χ^2 (1) = 25.8, p < 0.001
2. Ideas of being referenced in media	34% / 66% 13 / 25	13% / 88% 5 / 35	HS > LS χ^2 (1) = 5.17, p < 0.05
3. Thoughts of some people not being what they seem	100% / 0% 39 / 0	75% / 25% 30 / 10	HS > LS χ^2 (1) = 9.50, p < 0.01
4. Thoughts of being persecuted	50% / 50% 19 / 19	8% / 93% 3 / 37	HS > LS χ^2 (1) = 17.4, p < 0.001
5. Thoughts of being conspired against	39% / 61% 15 / 23	0% / 100% 0 / 40	HS > LS χ^2 (1) = 17.8, p < 0.001
6. Thoughts of being very important or having an important destiny	58% / 42% 22 / 16	25% / 75% 10 / 30	HS > LS χ^2 (1) = 8.71, p < 0.01
7. Thoughts of being very special or unusual	71% / 29% 27 / 11	35% / 65% 14 / 26	HS > LS χ^2 (1) = .10.2, p < 0.01
8. Thoughts of being very close to God	34% / 66% 13 / 25	18% / 83% 7 / 33	HS ≈ LS
11. Thoughts of having been chosen by God	21% / 79% 8 / 30	10% / 90% 4 / 36	HS ≈ LS
9. Thoughts that people can communicate telepathically	58% / 42% 22 / 16	8% / 93% 3 / 37	HS > LS χ^2 (1) = 22.7, p < 0.001
12. Belief in witchcraft, voodoo, or the occult	53% / 47% 20 / 18	15% / 85% 6 / 34	HS > LS χ^2 (1) = 12.4, p < 0.01
10. Thoughts of electrical devices influencing one's thoughts	42% / 58% 16 / 22	20% / 80% 8 / 32	HS > LS χ^2 (1) = 4.47, p < 0.05

Table 3.5: Proportions of each schizotypy group holding each type of *PDI-21* belief

Table continued on next page.

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 40)	**Group Comparisons**
13. Worry about one's partner being unfaithful	61% / 39% 23 / 15	28% / 73% 11 / 29	HS > LS χ^2 (1) = 8.64, p < 0.05
17. Thoughts that world is about to end	32% / 68% 12 / 26	3% / 98% 1 / 39	HS > LS χ^2 (1) = 11.9, p < 0.001
14. Thoughts of having sinned more than average	39% / 61% 15 / 23	15% / 85% 6 / 34	HS > LS χ^2 (1) = 5.93, p < 0.05
15. Thoughts of odd looks from others due to one's appearance	63% / 37% 24 / 14	10% / 90% 4 / 36	HS > LS χ^2 (1) = 23.9, p < 0.001
16. Experience of not having any thoughts in one's head	45% / 55% 17 / 21	28% / 73% 11 / 29	HS ≈ LS
18. Experience of one's thoughts feeling alien	53% / 47% 20 / 18	13% / 88% 5 / 35	HS > LS χ^2 (1) = 14.4, p < 0.001
19. Worry that one's vivid thoughts could be heard by others	47% / 53% 18 / 20	3% / 98% 1 / 39	HS > LS χ^2 (1) = 21.3, p < 0.001
20. Experience of one's thoughts being echoed back	61% / 39% 23 / 15	8% / 93% 3 / 37	HS > LS χ^2 (1) = 24.7, p < 0.001
21. Experience of feeling like a robot without will	26% / 74% 10 / 28	0% / 100% 0 / 40	HS > LS χ^2 (1) = 10.4, p < 0.001

Table 3.5: Proportions of each schizotypy group holding each type of *PDI-21* belief

Table continued from previous page.

The high schizotypy group had significantly higher numbers of *PDI-21* beliefs, significantly higher *PDI-21* scores for distress, preoccupation, and conviction relating to the beliefs that they endorsed, and significantly higher composite *PDI-21* scores for combined persecutory beliefs and combined grandiose beliefs, than the low schizotypy group (all *ps* < 0.05; Table 3.6). This indicates

that the schizotypy groups were distinct in terms of the different dimensions of the unusual beliefs that they held.

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 40)	**Group Comparisons**
Number of unusual beliefs (0 – 21)	10.74 ±3.84	3.60 ±2.36	HS > LS *U* = 75, *p* < 0.001
Mean distress related to endorsed beliefs (0 – 4)	2.62 ±0.63	1.42 ±0.73	HS > LS *U* = 168, *p* < 0.001
Mean preoccupation with endorsed beliefs (0 – 4)	2.46 ±0.62	1.50 ±0.62	HS > LS *U* = 202, *p* < 0.001
Mean conviction in endorsed beliefs (0 – 4)	2.60 ±0.57	2.19 ±0.73	HS > LS *U* = 516, *p* < 0.05
Mean level of combined persecutory beliefs (0 – 4)	0.89 ±0.96	0.08 ±0.29	HS > LS *U* = 397, *p* < 0.001
Mean level of combined grandiose beliefs (0 – 4)	1.14 ±1.12	0.37 ±0.57	HS > LS *U* = 395, *p* < 0.001

Table 3.6: *PDI-21* scores of the schizotypy groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses. Level of (1) combined persecutory beliefs and (2) combined grandiose beliefs was calculated from mean distress, preoccupation and conviction scores for (1) *PDI-21* items 4 and 5, and (2) *PDI-21* items 5 and 6, respectively.

3.3.7 – Attributional Biases in the Schizotypy Groups

There was a moderate, significant correlation between higher *IPSAQ* self-serving bias and higher *DASS* depression scores (r_s = .33, p < 0.01), supporting the construct validity of the former.

There was a very small, non-significant correlation between self-serving bias and personalising scores, supporting their divergent validities. There was a moderate, significant correlation between higher personalising and higher other-person blaming scores (r_s = .33, p < 0.01), indicating that they were partially divergent measures. There was a very large, significant correlation between

higher self-serving bias and higher other-person blaming scores (r_s = .73, p < 0.001), indicating that they were not divergent measures.

The high schizotypy group had significantly *lower* rather than higher *IPSAQ* self-serving bias scores than the low schizotypy group (p < 0.01, r = .29), and the two groups did not significantly differ on personalising scores or other-person blaming scores (Table 3.7). Therefore, Hypotheses 1a, 1b and 1c were not supported.

	High Schizotypy (HS; n = 38)	**Low Schizotypy** (LS; n = 42)	**Group Comparisons**
Self-serving bias (0 – 1)	0.51 ±0.15	0.61 ±0.13	HS < LS U = 507, p < 0.01
Personalising bias (0 – 1)	0.64 ±0.22	0.58 ±0.26	HS ≈ LS
Other-person blaming bias (0 – 1)	0.47 ±0.19	0.51 ±0.22	HS ≈ LS

Table 3.7: Mean *IPSAQ* attributional bias scores of the schizotypy groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.

For exploratory purposes, differences in *IPSAQ* scores between the schizotypy groups were examined using analysis of covariance (ANCOVA) that included *DASS* depression scores as a covariate. The high schizotypy group had near-significantly lower self-serving bias scores than the low schizotypy group (F (1, 78) = 3.19, p = 0.078), with no significant differences found in personalising scores and other-person blaming scores between the two groups. *DASS* depression score was not a significant covariate in these ANCOVAs. However, the statistical power of the ANCOVA may have been compromised because some of the data had skewed distributions.

The numbers of internal, other-personal and situational attributions made for positive and negative events are presented for each schizotypy group in Figure 3.2. Differences were not tested statistically. Inspection of the means indicated that the high schizotypy group appeared to be even-handed in their attributions

for positive and negative events, whilst the low schizotypy group appeared to show the self-serving bias pattern of higher internal attributions for positive events than negative events. The high schizotypy group also appeared to show a higher number of other-person attributions for positive events, and a lower number of situational attributions for both positive and negative events, than the low schizotypy group.

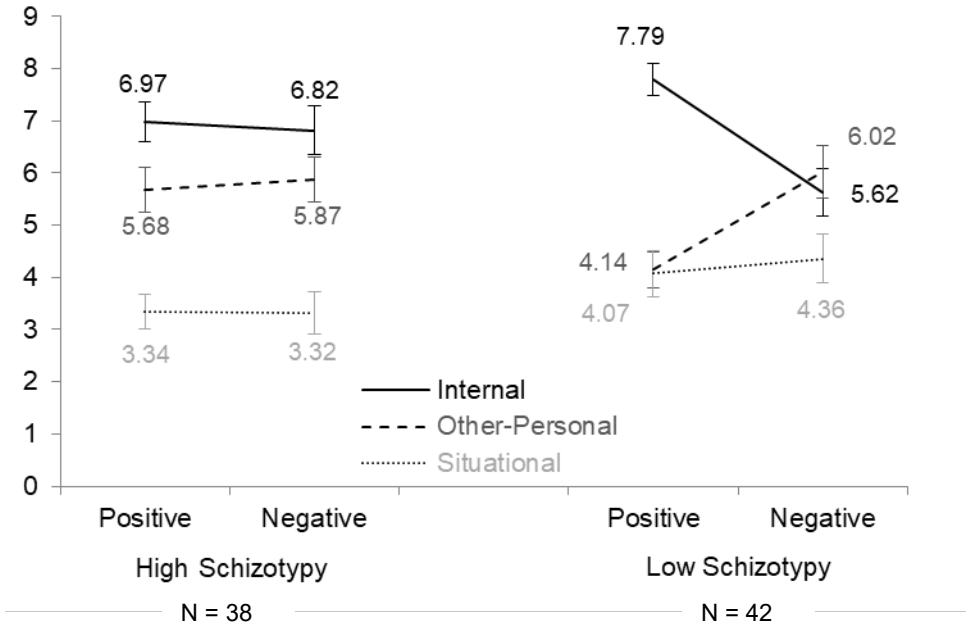

Figure 3.2: Mean numbers of *IPSAQ* internal, other-person and situational attributions made for positive and negative interpersonal events by the schizotypy groups (with standard errors of means)

3.3.8 – Correlations

3.3.8.1 – Self-serving bias

In the high schizotypy group, inverse correlations that were generally non-significant and of small magnitude were found between *IPSAQ* self-serving bias scores and scores for *SCS* self-consciousness, *SPQ* suspiciousness, *PS* paranoia, *PDI-21* combined persecutory beliefs and *PDI-21* combined grandiose beliefs. This pattern of results was not supportive of Hypothesis 2a. The corresponding correlations in the low schizotypy group were all non-significant and of very small or small magnitude.

3.3.8.2 – Personalising bias

In the high schizotypy group, higher *IPSAQ* personalising scores significantly correlated with higher scores of *SPQ* suspiciousness (r_s = .44, p < 0.01), *PS* paranoia (r_s = .37, p < 0.05), *PDI-21* combined persecutory beliefs (r_s = .32, p < 0.05) and *PDI-21* combined grandiose beliefs (r_s = .43, p < 0.05), but not *SCS* self-consciousness (r_s = .18, p > 0.05). This pattern of results was generally supportive of Hypothesis 2b. The corresponding correlations in the low schizotypy group were all non-significant and of small or very small magnitude.

For exploratory purposes, Spearman's correlations were conducted between *IPSAQ* personalising scores for positive events and scores of paranoia-spectrum and grandiose ideation in the high schizotypy group. Higher *IPSAQ* personalising scores for positive events significantly or near-significantly correlated with higher scores of *SCS* self-consciousness (r_s = .31, p = 0.06), *PDI-21* combined persecutory beliefs (r_s = .30, p = 0.07) and *PDI-21* combined grandiose beliefs (r_s = .36, p < 0.05), but not with *PS* paranoia (r_s = .02, p > 0.05) or *SPQ* suspiciousness (r_s = -.09, p > 0.05). This indicates that the significant correlations between paranoia-spectrum ideation and personalising for negative events generally did not extend to personalising for positive events.

3.3.8.3 – Other-person blaming bias

In the high schizotypy group, non-significant correlations of small magnitude were found between higher *IPSAQ* other-person blaming bias scores and higher scores of *SPQ* suspiciousness (r_s = .22, p > 0.05) and *PS* paranoia (r_s = .17, p > 0.05). Inverse, non-significant correlations of small or very small magnitude were found between *IPSAQ* self-serving bias scores and scores for *SCS* self-consciousness, *PDI-21* combined persecutory beliefs and *PDI-21* combined grandiose beliefs. This pattern of results was not supportive of Hypothesis 2c. The corresponding correlations in the low schizotypy group were all non-significant and of small or very small magnitude.

3.3.9 – Formation of the Unusual Belief Groups

The 38 participants from the high schizotypy group and 40 participants from the low schizotypy group who completed the *PDI* were divided into four groups based on whether or not they endorsed having persecutory beliefs on the *PDI-21* (*PDI-21* items 4 and 5) and grandiose beliefs (*PDI-21* items 6 and 7), as follows:

Group 1: Participants who did not endorse having any persecutory or grandiose beliefs (the 'neither belief' group; n = 29).

Group 2: Participants who endorsed having at least one persecutory belief and at least one grandiose belief (the 'dual beliefs' group; n = 21).

Group 3: Participants who endorsed having at least one grandiose belief but not any persecutory beliefs (the 'grandiose beliefs' group; n = 25).

Group 4: Participants who endorsed having at least one persecutory belief, but not any grandiose beliefs (the 'persecutory beliefs group'; n = 3).

Of the 38 high schizotypy participants, 21 (55%) had at least one persecutory belief and 30 (79%) had at least one grandiose belief. Of the 40 low schizotypy participants, 3 (8%) had at least one persecutory belief and 16 (40%) had at least one grandiose belief. A significantly higher proportion of the high schizotypy group displayed at least one persecutory belief (χ^2 (1) = 20.9, p < 0.001) and at least one grandiose belief (χ^2 (1) = 19.1, p < 0.001) than the low schizotypy group. Also, there was a significantly higher proportion of grandiose-to-persecutory beliefs in the low schizotypy group than in the high schizotypy group (χ^2 (1) = 3.96, p < 0.05).

Of the 24 participants with persecutory beliefs, only 3 (13%) did not have a grandiose belief as well, and of the 46 participants with grandiose beliefs, 25 (54%) did not have a persecutory belief as well. Over the whole sample (n = 78), a significantly higher proportion of participants held grandiose beliefs without persecutory beliefs (32%) than persecutory beliefs without grandiose beliefs (4%; χ^2 (1) = 11.5, p < 0.001).

As the persecutory beliefs group was very small (n = 3; 4% of the total sample), it was not included in analyses involving the unusual belief groups.

3.3.10 – Demographic Details of the Unusual Belief Groups

The three unusual belief groups were not significantly different in terms of age, gender, nationality, country of origin, years educated or *WAIS-IV* verbal intelligence scores (Table 3.8).

	Dual Beliefs (DB; n = 21)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
Mean Age (in years)	21.8 ±3.95	20.8 ±2.89	21.3 ±3.53	DB ≈ GB ≈ NB
Gender (male / female)	57% / 43% 12 / 9	36% / 64% 9 / 16	48% / 52% 14 / 15	DB ≈ GB ≈ NB
Nationality (British / Non-British)	76% / 24% 16 / 5	76% / 24% 19 / 6	72% / 28% 21 / 8	DB ≈ GB ≈ NB
Country of origin (Western / Eastern)	81% / 19% 17 / 4	80% / 20% 20 / 5	79% / 21% 23 / 6	DB ≈ GB ≈ NB
Mean duration of education (in years)	15.2 ±1.79	15.1 ±1.48	15.0 ±2.03	DB ≈ GB ≈ NB
Mean *WAIS-IV* verbal IQ (estimated from *NART*)	103.8 ±8.27	107.2 ±5.53	107.2 ±6.66	DB ≈ GB ≈ NB

Table 3.8: Demographic details of the unusual belief groups

(± = standard deviation)

3.3.11 – Depression, Anxiety and Stress in the Unusual Belief Groups

The dual beliefs group had significantly higher scores for *DASS* depression, anxiety, stress and overall than the grandiose beliefs and neither belief groups (all *ps* < 0.05; Table 3.9). The grandiose beliefs group had non-significantly

higher scores for all *DASS* dimensions than the neither belief group, with the exception of *DASS* stress scores, which were non-significantly lower (all *ps* < 0.10).

	Dual Beliefs (DB; n = 21)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
Depression (0 – 21)	8.48 ±4.73	4.32 ±3.77	3.31 ±3.25	DB > GB ≈ NB $U = 118$, $p < 0.001$[1] $U = 130$, $p < 0.01$[3]
Anxiety (0 – 21)	6.57 ±3.94	4.20 ±4.11	2.48 ±2.65	DB > GB ≈ NB $U = 117$, $p < 0.001$[1] $U = 164$, $p < 0.05$[3]
Stress (0 – 21)	10.52 ±4.17	5.68 ±3.85	6.00 ±4.47	DB > GB ≈ NB $U = 130$, $p < 0.001$[1] $U = 97$, $p < 0.001$[3]
***DASS* Total** (0 – 63)	26.57 ±10.90	14.20 ±11.04	11.79 ±8.84	DB > GB ≈ NB $U = 100$, $p < 0.001$[1] $U = 112$, $p < 0.01$[3]

Table 3.9: Mean *DASS* scores of the unusual belief groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.
[1] DB versus NB; [2] GB versus NB; [3] DB versus GB.

3.3.12 – Schizotypal Features in the Unusual Belief Groups

The dual beliefs group consisted mainly of participants from the high schizotypy group, the neither belief group consisted mainly of participants from the low schizotypy group, and the grandiose beliefs group consisted of roughly equal numbers of participants from both schizotypy groups (Table 3.10).

The dual beliefs group had a significantly higher proportion of participants from the high schizotypy group, and significantly higher scores for *STA* and *SPQ* overall schizotypy and all *SPQ* schizotypal features, than the grandiose beliefs and neither belief groups (all *ps* < 0.05).

	Dual Beliefs (DB; n = 21)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
Schizotypy group (High / Low)	90% / 10% 19 / 2	44% / 56% 11 / 14	21% / 79% 6 / 23	DB > GB ≈ NB χ^2 (1) = 23.7, p < 0.001[1] χ^2 (1) = 3.38, p = 0.066[2] χ^2 (1) = 10.9, p < 0.001[3]
***STA* Overall schizotypy** (0 – 37)	25.67 ±6.48	15.32 ±9.81	11.36 ±9.04	DB > GB ≈ NB U = 106, p < 0.001[1] U = 101, p < 0.001[3]
***SPQ* Overall schizotypy** (0 – 74)	42.05 ±12.19	24.00 ±14.46	14.00 ±12.38	DB > GB > NB U = 35, p < 0.001[1] U = 196, p < 0.01[2] U = 88, p < 0.001[3]
Unusual perceptions (0 – 9)	5.00 ±2.19	2.80 ±2.87	1.11 ±1.66	DB > GB > NB U = 49, p < 0.001[1] U = 221, p < 0.05[2] U = 140, p < 0.01[3]
Ideas of reference (0 – 9)	6.00 ±2.35	3.36 ±2.43	1.93 ±2.02	DB > GB > NB U = 67, p < 0.001[1] U = 218, p < 0.05[2] U = 109, p < 0.01[3]
Excessive social anxiety (0 – 8)	4.86 ±2.18	3.20 ±2.38	2.68 ±2.72	DB > GB ≈ NB U = 163, p < 0.01[1] U = 156, p < 0.01[3]
Suspiciousness (0 – 8)	4.14 ±2.61	2.28 ±2.01	1.21 ±1.85	DB > GB > NB U = 109, p < 0.001[1] U = 217, p < 0.05[2] U = 150, p < 0.05[3]
Odd / magical beliefs (0 – 7)	3.71 ±2.24	1.60 ±2.20	0.82 ±1.44	DB > GB ≈ NB U = 83, p < 0.001[1] U = 125, p < 0.01[3]
Odd speech (0 – 9)	7.14 ±2.06	4.16 ±2.54	2.46 ±2.08	DB > GB > NB U = 43, p < 0.001[1] U = 217, p < 0.05[2] U = 90, p < 0.001[3]
Odd / eccentric behaviour (0 – 7)	4.52 ±1.91	2.88 ±2.56	1.86 ±2.16	DB > GB > NB U = 107, p < 0.001[1] U = 254, p < 0.05[2] U = 162, p < 0.05[3]
Constricted affect (0 – 8)	3.38 ±2.18	1.96 ±1.65	0.96 ±1.11	DB > GB > NB U = 92, p < 0.001[1] U = 221, p < 0.05[2] U = 161, p < 0.05[3]
No close friends (0 – 9)	3.29 ±2.26	1.76 ±2.37	0.96 ±1.75	DB > GB ≈ NB U = 106, p < 0.001[1] U = 149, p < 0.05[3]

Table 3.10: Mean *SPQ* and *STA* scores of the unusual belief groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.
[1] DB versus NB; [2] GB versus NB; [3] DB versus GB.

The grandiose beliefs group had a near-significantly higher proportion of participants from the high schizotypy group than the neither belief group (p = 0.07). It had non-significantly higher *STA* overall schizotypy scores, but significantly higher *SPQ* overall schizotypy scores (p < 0.01) than the neither belief group. It had significantly higher scores than the neither belief group for six of the nine *SPQ* features, including suspiciousness (all ps < 0.05).

In summary, the dual beliefs group had the highest level of schizotypy, the neither belief group had the lowest level of schizotypy, and the grandiose beliefs group had an intermediate level of schizotypy by virtue of consisting of similar numbers of high and low schizotypy scorers.

3.3.13 – Paranoia and Self-Consciousness in the Unusual Belief Groups

The dual beliefs group had significantly higher scores for *PS* paranoia, *SCS* private self-consciousness, *SCS* social anxiety and *SCS* overall self-consciousness (all ps < 0.05*)* than the grandiose beliefs and neither belief groups (p < 0.05; Table 3.11). The dual beliefs group had significantly higher *SCS* public self-consciousness scores than the neither belief group (p < 0.001) but not the grandiose beliefs group.

The grandiose beliefs group had significantly higher scores for *PS* paranoia, *SCS* private self-consciousness, *SCS* public self-consciousness, and *SCS* overall self-consciousness than the neither belief group (all ps < 0.05), but similar *SCS* social anxiety scores.

These findings supported the validity of the groups, with the dual beliefs group showing the highest levels of self-consciousness and paranoia, the neither belief group showing the lowest levels of self-consciousness and paranoia, and the grandiose beliefs group showing an intermediate level of self-consciousness and paranoia.

	Dual Beliefs (DB; n = 21)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
***PS* Paranoia** (0 – 80)	36.10 ±13.13	24.60 ±11.43	18.55 ±13.79	DB > GB > NB $U = 106$, $p < 0.001$[1] $U = 246$, $p < 0.05$[2] $U = 133$, $p < 0.01$[3]
***SCS* Private self-consciousness** (0 – 44)	30.57 ±8.18	24.16 ±5.57	21.03 ±6.06	DB > GB ≈ NB $U = 106$, $p < 0.001$[1] $U = 258$, $p < 0.05$[2] $U = 126$, $p < 0.01$[3]
***SCS* Public self-consciousness** (0 – 24)	16.33 ±4.37	13.88 ±5.26	11.00 ±4.49	DB ≈ GB > NB $U = 118$, $p < 0.001$[1] $U = 249$, $p < 0.05$[2]
***SCS* Social anxiety** (0 – 24)	13.19 ±5.48	10.00 ±5.58	9.41 ±5.18	DB > GB ≈ NB $U = 191$, $p < 0.05$[1]
***SCS* Total self-consciousness** (0 – 92)	60.10 ±14.28	48.04 ±13.70	41.45 ±10.97	DB > GB > NB $U = 93$, $p < 0.001$[1] $U = 248$, $p < 0.05$[2] $U = 139$, $p < 0.01$[3]

Table 3.11: Mean *PS* and *SCS* scores of the unusual belief groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.
[1] DB versus NB; [2] GB versus NB; [3] DB versus GB.

3.3.14 –Unusual Beliefs in the Unusual Belief Groups

The dual beliefs group had significantly higher numbers of *PDI-21* beliefs, significantly higher *PDI-21* scores for distress and preoccupation relating to the beliefs that they endorsed, and significantly higher *PDI-21* composite scores for combined persecutory beliefs, than the grandiose beliefs and neither belief groups (all *ps* < 0.05; Table 3.12). The dual beliefs and grandiose beliefs groups had similar *PDI-21* conviction scores relating to the beliefs that they endorsed, and similar *PDI-21* scores for combined grandiose beliefs.

The grandiose beliefs group had a significantly higher number of *PDI-21* beliefs, significantly higher *PDI-21* scores for distress, preoccupation and conviction relating to the beliefs that they endorsed, and significantly higher composite *PDI-21* scores for combined grandiose beliefs, than the neither belief group (with neither of these groups endorsing *PDI-21* persecutory beliefs).

These findings support the validity of the groups, with the dual beliefs group showing higher levels of persecutory beliefs, but similar levels of grandiose beliefs, compared to the grandiose beliefs group.

	Dual Beliefs (DB; n = 22)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
Number of unusual beliefs (0 – 21)	12.43 ±3.82	6.84 ±3.20	3.31 ±2.67	DB > GB > NB $U = 17$, $p < 0.001$[1] $U = 141$, $p < 0.001$[2] $U = 72$, $p < 0.001$[3]
Mean distress related to endorsed beliefs (0 – 4)	2.73 ±0.74	1.93 ±0.71	1.51 ±0.88	DB > GB ≈ NB $U = 92$, $p < 0.001$[1] $U = 256$, $p < 0.05$[2] $U = 108$, $p < 0.01$[3]
Mean preoccupation with endorsed beliefs (0 – 4)	2.55 ±0.74	2.01 ±0.59	1.47 ±0.69	DB > GB > NB $U = 81$, $p < 0.001$[1] $U = 184$, $p < 0.01$[2] $U = 158$, $p < 0.05$[3]
Mean conviction in endorsed beliefs (0 – 4)	2.72 ±0.63	2.48 ±0.56	2.08 ±0.74	DB ≈ GB > NB $U = 145$, $p < 0.01$[1] $U = 216$, $p < 0.05$[2]
Mean level of combined persecutory beliefs (0 – 4)	1.60 ±0.70	0.00 ±0.00	0.00 ±0.00	DB > GB ≈ NB $U = 15$, $p < 0.001$[1] $U = 13$, $p < 0.001$[3]
Mean level of combined grandiose beliefs (0 – 4)	1.56 ±1.23	1.01 ±0.54	0.00 ±0.00	DB ≈ GB > NB $U = 0$, $p < 0.001$[1] $U = 0$, $p < 0.001$[2]

Table 3.12: *PDI-21* scores of the unusual belief groups

Level of (1) combined persecutory beliefs and (2) combined grandiose beliefs was calculated from the distress, preoccupation and conviction scores for (1) *PDI-21* items 4 and 5, and (2) *PDI-21* items 5 and 6, respectively. Means and standard deviations (±) presented; absolute scale ranges in parentheses. [1] DB versus NB; [2] GB versus NB; [3] DB versus GB.

3.3.15 – Attributional Biases in the Unusual Belief Groups

3.3.15.1 – Self-Serving Bias

There was a significant difference between the three groups for *IPSAQ* self-serving bias scores ($H_{(2)} = 6.13$, $p < 0.05$; Table 3.13). Inspection of the means indicated that this was due to the grandiose beliefs group having higher self-serving bias scores than the dual beliefs and neither belief groups (who appeared to have similar scores).

Two Mann-Whitney tests showed that the grandiose beliefs group had significantly higher self-serving bias scores than the dual beliefs group (p = 0.021, r = .34) and near-significantly higher self-serving bias scores than the neither belief group (p = 0.098, r = .22). The former difference remained significant after a Bonferroni-adjusted significance level of $p < 0.025$ (0.05 / 2) was applied (to account for multiple testing with the same group).

These findings support the hypothesis that a heightened self-serving attributional style is associated with grandiose, but not persecutory, ideation (Hypotheses 3ai and 3bi).

	Dual Beliefs (DB; n = 21)	**Grandiose Beliefs** (GB; n = 25)	**Neither Belief** (NB; n = 29)	**Group Comparisons**
Self-serving bias (0 – 1)	0.51 ±0.18	0.62 ±0.14	0.55 ±0.12	GB > DB ≈ NB U = 270, p = 0.098[2]* U = 158, p = 0.021[3]**
Personalising bias (0 – 1)	0.68 ±0.23	0.66 ±0.25	0.54 ±0.24	DB ≈ GB > NB U = 190, p = 0.024[1]** U = 249, p = 0.048[2]*
Other-person blaming bias (0 – 1)	0.44 ±0.57	0.57 ±0.22	0.46 ±0.20	GB > NB ≈ DB U = 244, p = 0.040[2]* U = 172, p = 0.045[3]*

Table 3.13: *IPSAQ* attributional bias scores of the unusual belief groups

Means and standard deviations (±) presented; absolute scale ranges in parentheses.
[1] DB versus NB; [2] GB versus NB; [3] DB versus GB;
* significant at $p < 0.05$; ** significant at $p < 0.025$.

3.3.15.2 – Personalising Bias

There was a significant difference between the three groups for *IPSAQ* personalising scores ($H(2)$ = 6.34, $p < 0.05$; Table 3.13). Inspection of the means indicated that this was due to the neither belief group having lower personalising scores than the two unusual beliefs groups (who appeared to have similar scores).

Two Mann-Whitney tests showed that the neither belief group had significantly lower personalising scores than the dual beliefs group (p = 0.024, r = .32) and the grandiose beliefs group (p = 0.048, r = .29). The former difference remained

significant after a Bonferroni-adjusted significance level of $p < 0.025$ (0.05 / 2) was applied, with the latter difference becoming near-significant.

These findings support the hypothesis that a heightened tendency to attribute negative events to other people, rather than to situational factors, is associated with persecutory and grandiose ideation (Hypotheses 3aii and 3bii).

For exploratory purposes, differences in *IPSAQ* personalising scores for positive events between the unusual beliefs groups were examined using Mann-Whitney tests. The dual beliefs group ($U = 228$, $p = 0.13$, $r = .21$) and the grandiose beliefs group ($U = 337$, $p > 0.10$, $r = .06$) had higher personalising scores for positive events than the neither belief group, but these differences were not significant. This indicates that the heightened personalising for negative events in the dual beliefs group and grandiose beliefs group did not extend to their personalising for positive events.

3.3.15.3 – Other-Person Blaming Bias

There was a near-significant difference between the three groups for other-person bias for negative events ($H(2) = 5.56$, $p = 0.06$). Inspection of the means indicated that this was due to the grandiose beliefs group having higher other-person blaming scores than the dual beliefs and neither belief groups (who appeared to have similar scores). Two Mann-Whitney tests showed that the grandiose beliefs group had significantly higher other-person blaming scores than the dual beliefs group ($p = 0.045$, $r = .30$) and the neither belief group ($p = 0.04$, $r = .28$), with these differences becoming near-significant after a Bonferroni-adjusted significance level of $p < 0.025$ (0.05 / 2) was applied.

These findings provide tentative support for the hypothesis that a heightened tendency to attribute negative events to other people, rather than to internal factors, is associated with grandiose, but not persecutory, ideation (Hypotheses 3aiii and 3biii).

For exploratory purposes, differences in *IPSAQ* other-person blaming scores for positive events between the unusual beliefs groups were examined using Mann-Whitney tests. The grandiose beliefs group had lower other-person blaming scores for positive events than the dual beliefs group ($U = 201$, $p >$

0.10, r = .20) and neither belief group (U = 324, p > 0.10, r = .09), but these differences were not significant. This indicates that the other-person blaming bias for negative events in the grandiose beliefs group did not extend to their attributions for positive events.

The numbers of internal, other-person and situational attributions made for positive and negative events are presented for each unusual belief group in Figure 3.3. Differences were not tested statistically. Inspection of the means indicated that the dual beliefs group appeared to be even-handed in their attributions for positive and negative events, and also showed the lowest number of situational attributions of the three groups. The grandiose beliefs and neither belief groups showed the self-serving bias pattern of higher internal attributions for positive events than negative events, but this appeared to be exaggerated in the grandiose beliefs group, who were the only group to attribute more negative events to other people than to themselves.

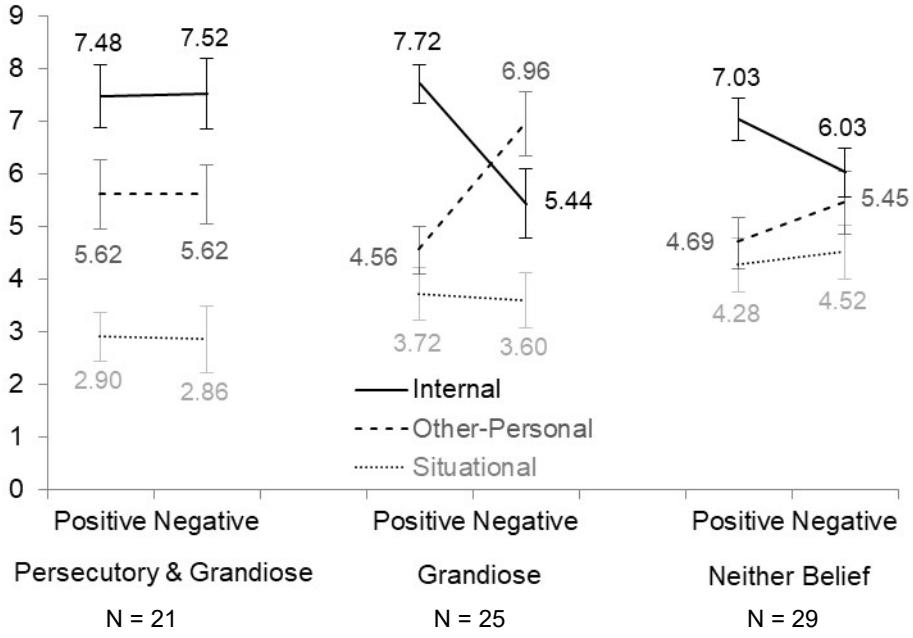

Figure 3.3: Mean numbers of *IPSAQ* internal, other-personal and situational attributions made for positive and negative interpersonal events by the unusual belief groups (with standard errors of means).

3.4 – Discussion

3.4.1 – Attributional Biases in Schizotypy

The high schizotypy group had significantly lower self-serving bias scores than the low schizotypy group, and the two groups did not significantly differ on personalising scores or other-person blaming scores. These results indicate that non-clinical individuals with a high level of schizotypy (above the 84th percentile for young adults attending a British university) do not have a self-serving attributional style when making decisions about interpersonal events, and are not biased in attributing negative events to other people.

These results are in line with the findings of two other studies from Western countries that examined self-serving and personalising biases in high schizotypy (Janssen et al., 2006; DeVylder et al., 2013), studies which did not however control for the effect of depression on self-serving bias. By including depression as a covariate, the present results indicate that the high schizotypy group's higher level of depression was not suppressing a heightened self-serving bias.

The present results contrast with the finding by So et al. (2015) of a heightened self-serving bias in people with very high schizotypy (above the 98th percentile) with an East Asian cultural background. This may be because the present study's high schizotypy group was mainly composed of people with a Western cultural background. As noted in Section 3.1.2, there may be differences between Asian and Western studies in the size of the self-serving bias, and significant associations between attributional bias and clinical paranoia are more typically reported in Asian than Western studies (Muller et al., 2021; Section 2.3).

3.4.2 – Attributional Biases, Paranoia and Grandiosity

Self-serving and other-person blaming biases did not significantly correlate with different types of paranoia-spectrum or grandiose ideation in non-clinical individuals with high or low schizotypy. This is in line studies that have generally

been unable to find significant correlations between self-serving bias and non-clinical paranoia (e.g., Combs et al., 2007a; Section 2.5).

However, higher personalising was significantly related to higher suspiciousness, paranoia, persecutory beliefs and grandiose beliefs in the high schizotypy group only. These findings have not been shown by previous studies, perhaps because they have tended to investigate relationships across the full range of schizotypy and non-clinical paranoia scores, rather than in just people with high schizotypy (Section 2.4) and high paranoia (Section 2.5). The present results suggest that relationships with personalising may only emerge at the higher levels of paranoia-spectrum and grandiose ideation that are more common in high schizotypy.

The finding of relationships between personalising and paranoia-spectrum ideation in high schizotypy does not by itself support the defence model of paranoia, as corresponding relationships between self-serving bias and paranoia-spectrum ideation were not found, and the correlation between personalising and self-serving bias in the total sample was very small (Section 3.3.7). There was mixed evidence that relationships between personalising and paranoia-spectrum ideation extended to positive events and a lower consideration of situational factors in general, although this exploratory analysis may have been under-powered to find significant effects.

3.4.3 – Attributional Biases, Persecutory Beliefs and Grandiose Beliefs

The dual beliefs group, who held a combination of persecutory and grandiose beliefs, had similar self-serving and other-person blaming scores with the group with neither of these beliefs, but significantly higher personalising scores. These findings are in line with the aforementioned correlational analyses, which found that personalising bias was the only attributional bias that significantly correlated with paranoia-spectrum ideation. However, as noted above, the presence of heightened personalising in people with persecutory beliefs, without an accompanying self-serving bias, does not support the defence model of paranoia. Whilst there was tentative evidence that this bias extended to

personalising for positive events (r = .21) the analysis may have been under-powered for this effect to reach significance.

The grandiose beliefs group had near-significantly higher self-serving, personalising and other-person blaming biases than the neither beliefs group, and significantly higher self-serving and other-person blaming biases than the dual beliefs group. As some of these results are trends, they need to be interpreted cautiously, but the overall pattern tentatively suggests that attributional biases are heightened in a self-esteem-protecting way in people with grandiose beliefs.

Heightened attributional biases in individuals with grandiose beliefs may serve to enhance or protect their self-esteem. These individuals may have a particularly negative schema of other people, facilitating feelings of superiority over them.

The present results are in line with three studies that showed an association between self-serving bias and grandiosity. Sharp et al. (1997) found that a group of patients with either persecutory or grandiose delusions showed a self-serving bias. Jolley et al. (2006) found that patients with persecutory delusions did not show a self-serving bias, but those with persecutory as well as grandiose delusions did. Cicero & Kerns (2011) found relationships between self-serving bias and narcissistic personality in non-clinical individuals.

There may be a close relationship between persecutory and grandiose ideation. As noted in Section 1.3, persecutory delusions and grandiose delusions were found to be moderately and positively correlated with each other in psychiatric patients (Bedford & Deary, 2006), and co-occurring persecutory and grandiose delusions were found in 33% of first-episode psychiatric patients with delusions (Raune et al., 2006). It would therefore seem important that grandiosity is taken into account when investigating paranoia, especially as most studies that have found heightened attributional biases in persecutory delusions did not control for grandiose beliefs.

3.4.4 – The Co-occurrence of Persecutory and Grandiose Beliefs

In the present study, similar proportions of participants with grandiose beliefs held them with (46%) or without (54%) persecutory beliefs. This equated to 27% of the total sample holding grandiose beliefs with persecutory beliefs, and 32% of the total sample holding grandiose beliefs without persecutory beliefs.

By contrast, a much higher proportion of participants with persecutory beliefs held them with (87.5%) than without (12.5%) grandiose beliefs. This equated to 27% of the total sample holding persecutory beliefs with grandiose beliefs, and just 4% of the total sample holding persecutory beliefs without grandiose beliefs.

These results suggest that persecutory beliefs are rarely held without co-occurring grandiose beliefs, but not vice-versa. As these results are novel and based on exploratory findings, they require replication.

3.4.5 – Grandiose Beliefs as a Feature of Schizotypy

The present study showed that grandiose beliefs were significantly more prevalent in the high schizotypy than low schizotypy group (Section 3.3.6). Grandiose beliefs are not explicitly included in diagnostic criteria for schizotypal personality disorder, and do not generally feature in measures of schizotypy (Section 1.5.1). Although exploratory, the present results indicate that grandiose beliefs may be a schizotypal feature that requires inclusion in schizotypy assessment tools. Recognition of grandiose beliefs as a schizotypal feature would support the notion of schizophrenia features as each having attenuated forms that are associated with each other in schizotypy (Section 1.1). Further study is required to determine whether grandiosity should be included as a diagnostic feature of schizotypal personality disorder.

3.4.6 – Limitations

The present study had several limitations. The attributional style of individuals with persecutory but not grandiose beliefs could not be investigated as these individuals were rare, making up just 4% of the total sample. This may be akin

to the theoretical subtype of 'bad-me paranoia', in which the individual feels that their persecution by others is deserved (Trower & Chadwck, 1995; Section 2.5.11), but which has also been shown to be relatively rare in first-episode SSD patients (Fornells-Ambrojo & Garety, 2005).

The grandiose beliefs group (and to a lesser extent, the dual beliefs and neither belief groups) included a mixture of individuals with high and low schizotypy. As there may be important differences in the grandiose beliefs held by people with high and low schizotypy (e.g., associated levels of preoccupation, conviction and distress), a future study may wish to show that the association between attributional biases and grandiose beliefs does not differ between people with high and low schizotypy.

Some of the differences in attributional biases between the three unusual belief groups became near-significant after correcting for multiple testing. It was felt that these differences were likely to have remained significant if larger numbers of participants had been employed, as the effect sizes were of promising magnitudes. Unfortunately, the study was unable to recruit the full number of participants that were needed to detect significant associations.

Other-person blaming bias scores on the *IPSAQ* do not appear to have been validated in the research literature, although *ARAT* other-person blaming bias scores are calculated in the same way and have been validated (Fornells-Ambrojo & Garety, 2009a).

In the present study, other-person blaming bias was very strongly correlated with self-serving bias and moderately correlated with personalising bias. Conducting tests with the other-blaming bias may have raised the likelihood of finding a significant association by chance, as its constituent scores also featured in tests involving the other biases. Future studies of the defence model of paranoia may wish to use just the other-blaming bias instead of self-serving and personalising biases, given that it more precisely and efficiently tests the predictions of this model, and avoids multiple testing.

The use of university students as participants limits the generalisabilty of the present findings to the general population, a widespread limitation of research in this area (Section 2.5).

Finally, it was unclear what proportion of paranoid and grandiose beliefs held by participants were realistic (and thus not paranoid and grandiose). This is a general problem with the measurement of paranoia and grandiosity by self-report measures alone, as they may be unable to differentiate between realistic and unrealistic beliefs, potentially leading to artificially higher measurements of paranoia and grandiosity.

3.4.7 – Conclusions

The present study examined whether attributional biases are linked to schizotypy, paranoia-spectrum ideation and grandiosity in non-clinical individuals.

There was tentative evidence that holding grandiose beliefs is associated with heightened tendencies towards attributing (1) more positive than negative events to oneself (self-serving bias), and (2) more negative events to other people than to oneself (other-person blaming bias).

However, there was no evidence that these biases are associated with persecutory beliefs or high schizotypy. Indeed, holding persecutory beliefs together with grandiose beliefs may be related to the diminishment of the heightened biases normally associated with grandiose beliefs.

There was evidence that holding persecutory beliefs and / or grandiose beliefs is associated with a heightened tendency towards attributing more negative events to other people than to situational factors (personalising bias). However, there was no evidence that this bias is associated with high schizotypy.

There was evidence that paranoia-spectrum and grandiose ideation is related to personalising bias in people with high schizotypy, with these relationships diminished in people with low schizotypy. Personalising bias by itself would not appear to protect self-esteem.

The study provided exploratory evidence that persecutory beliefs are rarely held by non-clinical individuals without co-occurring grandiose beliefs. Given the association between grandiosity and attributional biases, it would seem

important that grandiosity is taken into account when investigating attributional style in paranoia.

There was exploratory evidence that grandiose beliefs may be a schizotypal feature that requires inclusion in assessment tools of schizotypy.

In conclusion, the study's findings do not support the hypothesis that paranoia is caused by a self-esteem-protecting tendency to attribute negative events to other people, nor the hypothesis that attributional biases are heightened prior to the development of SSDs.

The implications of the present findings are further discussed in Chapter 4.

3.5 – Chapter Summary

(1) The defence model of paranoia predicts that a self-esteem-protecting tendency to attribute one's failures to other people contributes to paranoia. Existing studies have provided mixed evidence for there being heightened attributional biases in patients with persecutory delusions.

(2) To test the defence model of paranoia, the present study examined associations between attributional styles, schizotypy, paranoia-spectrum ideation and grandiosity in non-clinical individuals.

(3) Attributional biases and unusual beliefs were measured in undergraduate and postgraduate students who scored in either the top or bottom 15th percentile on a measure of schizotypy. High and low schizotypy groups were formed that were similar in age, gender, cultural background, education and verbal intelligence.

(4) There was evidence that attributional biases are not heightened in people with high schizotypy.

(5) There was evidence that higher attribution of negative events to other people, rather than to situational factors, was related to higher paranoia-spectrum ideation in high schizotypy.

(6) Groups holding (a) both persecutory and grandiose beliefs, (b) just grandiose beliefs, and (c) neither belief were formed that were similar for age, gender, cultural background, education and verbal intelligence. The grandiose beliefs group and group with neither belief had similar levels of depression, anxiety and stress, which were all significantly lower than in the dual beliefs group. The dual beliefs group were highest, the neither belief group lowest, and the grandiose beliefs intermediate for levels of schizotypy, self-consciousness and paranoia.

(7) Tendencies to attribute more positive than negative events to oneself, and more negative events to other people than oneself, were heightened in participants with grandiose but not persecutory beliefs. Self-esteem protecting biases would appear to be associated with grandiose beliefs, rather than persecutory beliefs.

(8) A tendency to attribute negative events to other people, rather than to situational factors, was heightened in participants with persecutory beliefs and / or grandiose beliefs.

(9) Relatively few participants held a persecutory belief without also holding a grandiose belief. Co-occurring grandiosity should be taken into account when investigating attributional style in paranoia.

(10) Grandiose beliefs were significantly more prevalent in the high schizotypy group than the low schizotypy group. Grandiose beliefs may be a schizotypal feature that requires inclusion in assessment tools of schizotypy.

4 General Discussion

This chapter presents a synthesis of the thesis's findings, and discusses their implications for theories of paranoia and grandiosity, clinical practice and future research.

4.1 – Main Findings

The broad aim of the thesis was to examine the defence model of paranoia, which posits that a heightened self-esteem-protecting bias towards holding other people responsible for negative events can lead to paranoia (Bentall et al., 1994, 2001). In particular, the thesis aimed to test the applicability of the defence model to non-clinical paranoia in two ways: by reviewing existing studies of attributional style in non-clinical paranoia (Chapter 2), and by conducting an empirical study of attributional style in people with high schizotypy, persecutory beliefs and grandiose beliefs (Chapter 3).

4.1.1 – The Relationship between Attributional Style and Non-Clinical Paranoia

The thesis sought to examine whether there is a linear relationship between attributional biases and paranoia in the general population. Its literature review found no evidence for a correlational relationship between the two across the non-clinical spectrum of paranoia scores. However, one of the reviewed studies found significant medium-to-strong correlations between other-person blaming bias and levels of persecutory beliefs (Fornells-Ambrojo & Garety 2009a; Section 2.5.19). This tentatively suggests that a tendency to attribute negative events to other people, rather than to oneself, is related to persecutory beliefs in the general population.

The thesis's empirical study addressed this issue by examining correlations between attributional biases and paranoia-spectrum ideation in people with high and low schizotypy. Levels of suspiciousness, paranoia and persecutory belief were all significantly correlated with personalising bias in the high but not low schizotypy scorers. This indicates that a tendency to attribute negative events to other people, rather than situational factors, is related to paranoia-spectrum ideation at a high level of schizotypy, but not throughout the general population.

Together, the literature review and empirical study suggest that a tendency to attribute negative events to other people is related to paranoia in the general community only at high levels of paranoid ideation, and not at milder levels. The empirical study was unable to reliably show that this tendency extended to positive events, and thus a general under-consideration of situational factors when making external attributions. Future studies with greater statistical power are required to clarify whether the tendency to attribute negative events to other people in high paranoia reflects a general under-consideration of situational and / or internal factors when making attributions.

4.1.2 – Attributional Style at High Levels of Schizotypy and Non-Clinical Paranoia

The thesis sought to examine whether attributional biases are significantly heightened in non-clinical individuals with high levels of schizotypy and non-clinical paranoia. The literature review found only one study (Fornells-Ambrojo & Garety, 2009a) that reported heightened other-person blaming bias in non-clinical individuals with very high paranoia (above the 89th percentile) and who held certain persecutory beliefs. Another study found that non-clinical individuals with very high schizotypy (above the 98th percentile) had a heightened self-serving bias (So et al., 2015), although two studies (Janssen et al., 2006; DeVylder et al., 2013; Section 3.1.2) found normal attributional style in high schizotypy. Therefore, there was mixed evidence for heightened attributional biases at high levels of schizotypy and non-clinical paranoia.

The thesis's empirical study addressed this issue by examining attributional biases in non-clinical individuals with high schizotypy and persecutory beliefs. Attributional biases were not found to be heightened in high schizotypy, and

only personalising bias was found to be heightened in people with persecutory beliefs. Therefore, there was no evidence that self-esteem-protecting attributional biases are heightened in people with high schizotypy and persecutory beliefs.

Together, the literature review and empirical study suggest that a tendency to blame other people for negative events may only be heightened at very high levels of non-clinical paranoia, and in people who hold persecutory beliefs. Future studies with greater statistical power are required to clarify whether this heightened tendency reflects a general under-consideration of situational and / or internal factors when making attributions.

The empirical study indicated that self-serving bias is reduced rather than heightened in people with high schizotypy, even when their higher level of depression is controlled for. It may be that the self-serving bias is only heightened at a very high level of schizotypy (i.e., above the 98th percentile), as in the study by So et al. (2015).

4.1.3 – Attributional Style at High Levels of Non-Clinical Grandiosity

The thesis's empirical study provided tentative evidence that a tendency to blame other people, rather than oneself or situational factors, for negative events, is heightened in non-clinical individuals with grandiose beliefs, and that this tendency has a self-esteem-protecting function. These findings support a defence model of grandiosity in which grandiosity serves to protect and / or enhance one's self-esteem. As the present findings are novel, based on small group numbers. and based on a mixture of near-significant and significant between-group differences, they do however require replication by studies with greater statistical power.

4.2 – Explanations of Attributional Biases in Paranoia and Grandiosity

4.2.1 – Paranoia as a Consequence of Self-Esteem-Protecting Attributional Biases

The thesis's literature review and empirical study generally do not support the application of the defence model to non-clinical paranoia, for several reasons. Firstly, a range of studies indicated that self-serving attributional biases are not related to paranoia in the majority of the general population. Secondly, the thesis's empirical study indicated that self-serving biases may be heightened in people with grandiose beliefs, but not in people with persecutory beliefs or high schizotypy. Indeed, there was evidence from the empirical study that the additional presence of persecutory beliefs alongside grandiose beliefs diminishes the self-serving and other-person blaming biases associated with the latter. Thirdly, the thesis's empirical study indicated that, although personalising bias may be related to paranoia-spectrum ideation in people with high schizotypy, and heightened in people with persecutory beliefs, this bias by itself does not have a self-esteem-protecting function.

The hypothesis that heightened attributional biases lead to the development of non-clinical paranoia and persecutory beliefs is therefore not supported. Furthermore, the current empirical evidence generally does not indicate that self-serving bias is heightened in people with a high theoretical predisposition towards developing a SSD, supporting the notion that self-serving bias is not heightened in people prior to the development of persecutory delusions. Future research using a longitudinal design is required to better examine whether heightened attributional biases precede or follow the development of persecutory delusions in patients.

How might the presence of heightened attributional biases in patients with persecutory delusions be explained, if the former does not lead to the latter? The following sections discuss some alternative explanations that are compatible with the thesis's findings.

4.2.2 – Attributional Biases in High Paranoia as a Consequence of a Heightened Perception of Other People as Harmful

The literature review concluded that there is good evidence that a heightened perception of hostile intent in the ambiguous actions of others is related to non-clinical paranoia and is present in people with high schizotypy (Section 2.5). Patients with persecutory delusions have also been shown to have a particular recall bias for threat-related information (Kaney et al., 1992; Bentall et al., 1995). Therefore, it could be speculated that people with high paranoia have an increased perception of other people as being potentially harmful, which then leads to a tendency to attribute negative events to other people. This heightened perception could be related to previous adverse interpersonal experiences, which have been shown to be associated with paranoia (Section 1.4.3.1).

Whilst the thesis's empirical study did not directly examine perceptions of other people as being harmful, the participants with persecutory beliefs could be seen to attribute positive and negative events in a relatively even-handed manner to other people (Figure 3.3), suggesting that they did not perceive other people as being particularly harmful.

4.2.3 – Attributional Biases in High Paranoia as a Consequence of a Heightened Perception of Other People as Powerful

Fornells-Ambrojo & Garety (2009a) was the only reviewed study to show that a tendency to attribute negative events to other people, rather than oneself, was associated with a high level of paranoia and persecutory beliefs. Whilst this finding could be interpreted as supporting the defence model of paranoia, the study did not demonstrate that people with very high paranoia attribute negative events to other people (1) as part of a broader self-serving bias, and (2) not as a result of a tendency to attribute events in general to other people.

Lincoln et al. (2010) showed that SSD patients with persecutory delusions had a personalising bias for positive as well as negative events. Could a heightened perception of other people as being powerful account for the association between a tendency to attribute negative events to other people in paranoia?

The thesis's empirical study found that personalising bias was heightened in participants with persecutory beliefs, and inspection of the means indicated that this bias may have been related to an under-consideration of situational attributions, both for positive as well as negative events (Figure 3.3). However, personalising bias was not shown to be significantly heightened for positive events in this group, despite a promising effect size (r= .21).

Two studies have shown that people with clinical levels of paranoia have a heightened perception of their lives being controlled by other people. Rosenbaum & Hadari (1985) found that patients with paranoid beliefs rated various positive and negative aspects of their lives as being more due to other-person control and less due to chance or circumstantial control, compared to patients with depression. Kaney & Bentall (1989) similarly showed that SSD patients with persecutory delusions had high perceptions of other-person control and low perceptions of chance or circumstantial control.

High levels of paranoia may be related to a heightened perception of other-person control as a result of previous interpersonal experiences in which the individual felt relatively powerless compared to others (Section 1.4.3.1). A future study could test whether high paranoia and persecutory beliefs are associated with a general tendency to attribute events to other people, and with higher perceptions of other people as being powerful and harmful.

4.2.4 – Attributional Biases in Grandiosity as a Consequence of a Heightened Perception of Other People as Inferior

Grandiose beliefs arguably facilitate a sense of superiority over other people that serves to raise one's self-esteem in the absence of commensurate importance, ability or achievement. An increased perception of superiority over other people may lead to difficulty in attributing negative events to oneself, facilitating the attribution of negative events to others. In the thesis's empirical study, individuals with grandiose beliefs appeared to attribute more negative than positive events to other people (unlike the two control groups that appeared to attribute more positive than negative events to other people; Figure 3.3), supporting the hypothesis that grandiose beliefs are associated with a

heightened perception of other people as being inferior. Future studies are needed to test this hypothesis.

4.2.5 – Persecutory Beliefs as a Consequence of Grandiosity

The thesis's empirical study found two types of people with a grandiose belief – those who held a co-occurring persecutory belief and those who did not. It was relatively rare for an individual to hold a persecutory belief without a co-occurring grandiose belief (this was observed in just 4% of the study's total sample). This raises the intriguing speculation that some persecutory beliefs may result from the holding of grandiose beliefs. It is possible that grandiosity is aversive to other people, leading the individual with grandiose beliefs to feel more disliked by, and thus mistrustful of, other people. An individual with grandiose beliefs may also become fearful of other people being jealous of their perceived superior status, leading to greater mistrust of others.

The defence model of paranoia was built on studies that found associations between attributional biases and persecutory delusions in SSD patients. Given the present findings of high co-occurrence of persecutory and grandiose beliefs, it could be speculated that these associations were due to these studies failing to take into account the effect of patients' grandiosity on their attributional style.

However, the thesis's empirical study indicates that persecutory beliefs held with grandiose beliefs diminish the heightened attributional biases associated with the latter. It is unclear why persecutory ideation would diminish self-serving attributional biases in non-clinical individuals but not in patients with grandiose beliefs. It may be that the level of grandiosity in patients with persecutory delusions is generally higher than in non-clinical individuals with grandiose beliefs, counteracting the putative moderating effect of persecutory beliefs on self-serving attributional biases. Further research is needed to show that the association between attributional biases and persecutory delusions that is sometimes found in SSD patients is not mediated or moderated by co-occurring grandiosity.

As noted in Section 1.3, there may be a close relationship between persecutory and grandiose ideation It could be argued that *all* delusions, regardless of their

content, indicate a heightened level of grandiosity in the holder, as delusions by definition require a strong degree of self-certainty and imperviousness to counter-evidence. This is supported by studies that have found an association between jumping to conclusions bias and delusions in general, regardless of content (Garety & Freeman 1999; Section 1.4.3.5). The relationship between heightened grandiosity and the development of persecutory delusions would benefit from further investigation by future studies.

4.2.6 – Conclusions

The defence model of paranoia regards attributional biases as resulting from a type of belief about the self (low implicit self-esteem) and as leading to a type of belief about other people (e.g., as being harmful). However, beliefs about the self (e.g. self-esteem) and other people (e.g., as being harmful, powerful or inferior) could all contribute to (rather than result from) an individual's attributional style.

If paranoia does not result from self-esteem-protecting tendencies, other explanations of heightened attributional biases in high paranoia are required. There may be heightened perceptions of other people as being harmful or powerful, which increases the availability of other people in imagination and memory when making causal judgements, and which prevents situational factors from being taken into greater account. Some persecutory beliefs could also result from heightened grandiosity, with the heightened attributional biases found in patients with persecutory delusions a product of co-occurring grandiose ideation.

In conclusion, the thesis proposes that paranoia in the general population is unlikely to develop from a need to protect one's self-esteem. Instead, paranoia may be caused by the heightened perception of others as being powerful and harmful, perhaps due to previous experiences of powerlessness and harm from others.

Grandiose beliefs and an associated perception of other people as being inferior to or jealous of the individual, may lead to (rather than result from) a heightened tendency to blame other people for negative events in a self-serving

way. Grandiose beliefs in the general population may develop from a need to protect or enhance one's self-esteem, which may then cause self-serving and other-person blaming biases.

Future research measuring perceptions of harmfulness, powerfulness, inferiority and jealousy in other people could be conducted to test whether they are related to persecutory and grandiose beliefs. In order to better elucidate the causal factors of persecutory and grandiose delusions, future research using a longitudinal design could examine the order in which attributional style, persecutory beliefs and grandiose beliefs change over time.

4.3 – Reflections on Measuring Attributional Style in Paranoia

4.3.1 – Measuring Attributional Style

The thesis's review of attributional style measurement instruments suggested that the *IPSAQ* is limited by the lengthy and repetitive nature of its items, its use of abstract scenarios, its heavy dependence on the imaginative and reflective capacities of the participant, its exclusive focus on interpersonal scenarios, the lack of validation of its personalising score, and the mono-causal, categorical attributional style it promotes (Section 2.2.4). As noted in Section 2.3.2, Müller et al. (2021) found that studies using the *ASQ* were more successful than the *IPSAQ* in finding heightened self-serving biases in patients with persecutory delusions. Furthermore, as noted in Section 2.5.19, Fornells-Ambrojo & Garety (2009a) found that paranoia was significantly predicted by the number of other-person attributions made for negative events on the *ARAT*, but not on the *IPSAQ*. Therefore, it could be speculated that the thesis's failure to find associations between *IPSAQ* self-serving bias and non-clinical paranoia, both in the studies it reviewed and its own empirical study, was due to the *IPSAQ* not being a particularly valid measure of attributional style.

However, the empirical study's findings of significant associations between *IPSAQ* self-serving bias and (1) depression (Section 3.3.7) and (2) grandiose beliefs (Section 3.3.15.1) support the criterion validity of the *IPSAQ* as a

measure of attributional style, suggesting that studies' failure to find relationships between *IPSAQ* self-serving bias and non-clinical paranoia may not be due to problems with the way the *IPSAQ* measures attributional style. Nevertheless, going forward, future studies may wish to consider using the *ARAT* measure of attributional style (Section 2.2.5), rather than the *IPSAQ*, as it has fewer items, less repetitive and more varied items, and items with less abstract and more contextualised scenarios.

4.3. 2 – Sampling Paranoia

The findings of the literature review and empirical study suggest that the tendency to blame other people for negative events does not generally relate to levels of paranoia across the general population, but may reside exclusively at the very high levels of paranoia demonstrated in people with persecutory beliefs. As noted in Section 2.5, the majority of reviewed studies that failed to find associations between attributional style and non-clinical paranoia may have done so because they recruited relatively small samples that may not have captured high levels of paranoia. Another widespread limitation of studies of this area, including the thesis's empirical study, was the predominant use of university students as participants, which limits the generalisabilty of findings to the general population.

Individuals with high levels of paranoia may be difficult to recruit for psychology studies, given their inherent mistrust of other people. The thesis's empirical study was perhaps successful in recruiting these individuals because participants were identified following a large screening process and using a combination of recruitment methods, including a personal approach by the recruiter (Section 3.2.3). This may have encouraged a greater range of people to participate in the study than might normally have occurred, and thus a greater chance of recruiting people with high paranoia.

In conclusion, it would seem important that studies of attributional style in paranoia are able to show that a high level of paranoia is represented in their participant sample, which is likely to require the recruitment of large numbers of participants. One way of doing this might be to identify participants who report having persecutory beliefs on instruments such as the *PDI* and *PDI-21* during a

screening stage, as persecutory beliefs appear to represent a particularly high level of paranoia ideation.

4.4 – Implications for Clinical Practice

The thesis's findings may be of relevance for working with people at high risk of developing a SSD and patients with persecutory and grandiose delusions. Psychological interventions based on shifting attributional biases in order to decrease paranoia and grandiosity may not be successful if these biases are not a causal component. Instead, interventions that aim to reshape the schemas that individuals hold about other people in general – particularly how harmful, powerful, inferior and jealous they are perceived as being – may serve to reduce the distress and dysfunction associated with paranoia and grandiosity. In addressing a schema about other people being harmful and powerful, this might involve helping the individual give greater consideration to situational and non-intentional factors when viewing how other people interact with them.

4.5 – Dissemination of Findings

It is anticipated that modified versions of the thesis's literature review and empirical study will be submitted for publication in scientific journals and that applications will be made to present the thesis's findings at conferences of schizophrenia research. Data from the empirical study will also be made available to the authors of relevant meta-analytical studies.

4.6 – Chapter Summary

(1) The defence model of paranoia was generally not supported by the thesis's literature review and empirical study. Paranoia in the general population would seem unlikely to develop from a need to protect one's self-esteem. Other-person blaming and / or personalising biases may be found in people with persecutory delusions due to increased perceptions of harmfulness or powerfulness in other people, and co-occurring grandiose ideation.

(2) The perception of other people as being inferior or jealous may drive heightened attributional biases in individuals with grandiose beliefs. Grandiose beliefs in the general population may develop from a need to protect or enhance one's self-esteem.

(3) Future research could investigate relationships between attributional style and perceptions of harmfulness, powerfulness, inferiority and jealousy in other people, and how attributional style, persecutory beliefs and grandiose beliefs change over time.

(4) Future investigation of attributional style in paranoia will benefit from the use of improved measures of attributional style such as the *ARAT* and adequate sampling of participants with very high levels of paranoia / persecutory beliefs.

(5) Psychological interventions based on shifting attributional biases may not be successful at decreasing paranoia. If schemas that individuals hold about themselves and other people are related to their paranoia, then interventions to reshape them may be effective at reducing paranoia.

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A Quality Assessment Tool Criteria and Reliability

As noted in Section 2.5.3, the *Quality Assessment Tool for Quantitative Studie*s (*QATQS*; Thomas et al., 2004) was used to assess the methodological quality of the studies reviewed in Section 2.5. This appendix describes the domains of the *QATQS*, the criteria for rating them, and an exercise that tested the tool's reliability.

A.1 – Rating Criteria for the *QATQS* Domains

A.1.1 – Participant Selection

A 'strong' rating is given if the study's participants are deemed to be very likely to be representative of the target population *and* if at least 80% of selected individuals agreed to participate in the study.

A 'moderate' rating is given if the study's participants are deemed to be somewhat likely to be representative of the target population *and* if between 60% and 79%of selected individuals agreed to participate in the study.

A 'weak' rating is given if the study's participants are deemed to be unlikely to be representative of the target population *or* if less than 60% of selected individuals agreed to participate in the study *or* if either issue is not stated.

A.1.2 – Design

This domain is rated on the basis of the type of study design used. Randomised controlled trials and controlled clinical trials are given 'strong' ratings, cohort analytic, case-control, cohort or interrupted times series designs are given 'moderate' ratings, and all other designs are rated as 'weak'.

A.1.3 – Confounders

A ‘strong’, ‘moderate’ or ‘weak’ rating is given if the percentage of relevant confounders that were controlled for in the study was (1) at least 80%, (2) between 60% and 79% or (3) less than 60% or not stated, respectively.

A.1.4 – Blinding

A ‘strong’ rating is given if the study’s outcome assessor is blinded to the intervention status of the participants, and participants are blinded to their intervention status and the research question.

A ‘moderate’ rating is given if *either* the study’s outcome assessor is blinded to the intervention status of the participants, *or* participants are blinded to their intervention status and the research question.

A ‘weak’ rating is given if the study’s outcome assessor is not blinded to the intervention status of the participants, *and* participants are not blinded to their intervention status and the research question, or this is not stated.

This domain was rated as ‘not relevant’ for all of the studies reviewed in Section 2.5.

A.1.5 – Measures

A ‘strong’ rating is given if the study’s measures have been shown to be valid and reliable.

A ‘moderate’ rating is given if the study’s measures have been shown to be valid but their reliability is unclear.

A ‘weak’ rating is given if there is no evidence of validity or reliability for the study’s measures.

A.1.6 – Withdrawals

A ‘strong’, ‘moderate’ or ‘weak’ rating is given if the percentage of participants that withdrew from the study was (1) at least 80%, (2) between 60% and 79% or (3) less than 60% or not stated, respectively.

A.1.7 – Analysis

A ‘strong’ or ‘moderate’ rating is given for this domain if the statistical methods used in the study’s analyses are deemed to be (1) appropriate or (2) somewhat appropriate, with a ‘weak’ rating given if they were inappropriate or unclear.

A.1.8 – Intervention Integrity

This domain is rated as the aggregate of the following two sub-ratings. Firstly, a ‘strong’, ‘moderate’ or ‘weak’ rating is given if the percentage of participate who received their allocated intervention was between (1) 80 – 100%, (2) 60 – 79% or (3) less than 60%, respectively.

Secondly, a ‘strong’ or ‘moderate’ rating is given if the consistency of the intervention was (1) measured or (2) not measured, with a ‘weak’ rating given if this information was unclear.

This domain was rated as ‘not relevant’ for all of the studies reviewed in Section 2.5.

A.1.9 – Overall Quality

A study’s overall quality is determined by how many ‘weak’ ratings it receives over the first six domains (A.1.1 – A.1.6), with no ‘weak’ ratings leading to a ‘strong’ overall rating, one ‘weak’ rating leading to a ‘moderate’ overall rating, and more than one ‘weak’ ratings leading to a ‘weak’ overall rating.

A.2 – Inter-Rater Reliability Exercise

A.2.1 – Areas of Inter-Rater Agreement and Disagreement

As noted in Section 2.5.3, an inter-rater reliability exercise was performed with the quality assessment ratings made by the present author (Rater 1) and a colleague (Rater 2) for five of the reviewed studies. These ratings are presented in Table A.1, which shows the areas of agreement and disagreement between the two sets of ratings.

In terms of the six relevant methodological domains (not including the overall quality rating), four studies had one domain with discrepant ratings, and one study had two domains with discrepant ratings. For all areas of disagreement, there was a tendency for Rater 1 to make lower ratings than Rater 2.

Disagreement was most frequent regarding the quality of studies' analyses, with ratings discrepant in this domain for three studies (Table A.1). This was typically due to Rater 1 giving more consideration than Rater 2 to the small sample sizes and low statistical power of these studies.

Disagreement about the quality of participant selection in the DeVylder et al. (2013) study was due to Rater 1 regarding the control group as being less likely to be representative of the target population due to its small size than Rater 2 did.

Disagreement about the quality of confounder-control in the Kinderman & Bentall (1996) study was due to Rater 1 regarding the absence of demographic information for the experimental groups as being more problematic than Rater 2 did.

Disagreement about the quality of the measures used in the Combs et al. (2003) study was due to Rater 1 regarding the absence of positive events from the measure of attributional style as being more problematic than Rater 2 did.

Study	Participant Selection	Design	Confounders	Blinding	Measures	Withdrawals	Analysis	Overall Quality
Kinderman & Bentall (1996)	1 = Moderate 2 = Moderate	1 = Moderate 2 = Moderate	**1 = Weak** **2 = Moderate**	1 = Not relevant 2 = Not relevant	1 = Moderate 2 = Moderate	1 = Strong 2 = Strong	1 = Weak 2 = Weak	**1 = Moderate** **2 = Strong**
McKay et al. (2005)	1 = Weak 2 = Weak	1 = Moderate 2 = Moderate	1 = Moderate 2 = Moderate	1 = Not relevant 2 = Not relevant	1 = Moderate 2 = Moderate	1 = Strong 2 = Strong	**1 = Moderate** **2 = Strong**	1 = Moderate 2 = Moderate
Langdon et al. (2008)	1 = Moderate 2 = Moderate	1 = Moderate 2 = Moderate	1 = Strong 2 = Strong	1 = Not relevant 2 = Not relevant	1 = Moderate 2 = Moderate	1 = Strong 2 = Strong	**1 = Moderate** **2 = Strong**	1 = Strong 2 = Strong
DeVylder et al. (2013)	**1 = Weak** **2 = Moderate**	1 = Moderate 2 = Moderate	1 = Weak 2 = Weak	1 = Not relevant 2 = Not relevant	1 = Moderate 2 = Moderate	1 = Strong 2 = Strong	**1 = Weak** **2 = Moderate**	**1 = Weak** **2 = Moderate**
Combs et al. (2003)	1 = Moderate 2 = Moderate	1 = Moderate 2 = Moderate	1 = Moderate 2 = Moderate	1 = Not relevant 2 = Not relevant	**1 = Moderate** **2 = Strong**	1 = Strong 2 = Strong	1 = Weak 2 = Weak	1 = Strong 2 = Strong

Table A.1: Quality assessment ratings by the present author (Rater 1) and a colleague (Rater 2) for a sample of the reviewed studies

Assessment scale for the nine domains ranges from ‘weak’ to ‘moderate’ to ‘strong’, based on criteria set by Thomas et al. (2004; Appendix A).

Rating disagreements between the two raters are in bold font.