The complex interplay between schizotypy and emotional, cognitive and psychological factors

Lucy Webster

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Copyright Statement

Abstract

This thesis is focused on the complex relationships between schizotypy and a host of emotional, cognitive and psychological factors suggested to be risk factors or adverse outcomes for psychosis. The factors of interest included: cognitive insight, negative affect, psychological wellbeing, self-stigma for seeking psychological help, dysfunctional metacognitive beliefs, neurocognition and social cognition. The complex interplay of these factors has remained relatively unexplored in schizotypy and was investigated in this thesis by utilising multiple regression and complex mediation models in five empirical study chapters. **Study one** found multidimensional schizotypy traits had differential relationships with the cognitive insight subcomponents- self-reflectiveness and self-certainty. Furthermore, the results indicated that the relationship between schizotypy and psychological wellbeing was mediated in serial by self-reflectiveness and negative affect, extending the "insight paradox" to schizotypy. **Study two** found that schizotypy was associated with greater self-stigma for seeking psychological help, and psychological wellbeing and the cognitive insight subcomponent- self-certainty mediated these relationships. **Study three** found that multidimensional schizotypy traits had differential relationships with dysfunctional metacognitive beliefs, and these beliefs mediated the relationship between schizotypy and both cognitive insight subcomponents, negative affect and psychological wellbeing. Against expectations, **study four** found only weak associations between a small number of neurocognition domains and one schizotypy trait (impulsive non-conformity), cognitive insight and psychological wellbeing. **Study five** found that out of four social cognition domains (theory of mind, emotion processing, social perception and attribution bias), only attribution bias was associated with schizotypy. Attribution bias also mediated the relationships between schizotypy and both cognitive insight subcomponents, negative affect and psychological wellbeing. Combined, the findings of the thesis not only provide a more

coherent understanding of the complex relationships occurring in schizotypy, but also provide additional evidence for patterns that are potentially occurring across the psychosis continuum.

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Conference presentations

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Chapter 1. Introduction to the thesis

1.1 Introduction

There has been a long-standing scientific debate as to whether the classification of mental disorders should be viewed as categorical or dimensional. Current diagnostic systems for mental disorders use symptoms of illness to assign individuals to a single specific category, whereby diagnostic decisions are binary: either an individual has a disorder or they do not (i.e. Diagnostic and Statistical Manual of the American Psychiatric Association; American Psychiatric Association, 2013, or the International Classification of Diseases of the World Health Organisation; International Statistical Classification of Diseases and Related Health Problems, 1992). The advantages of the categorical approach include clinical decision making and providing useful clinical information in a succinct matter (Heugten-Van der Kloet & van Heugten, 2015). However, the problems with categorical classifications have been extensively documented including but not limited to excessive co-morbidity of disorders, marked heterogeneity within specific disorders and stigma and self-labelling (Cuthbert & Insel, 2013). Additionally, overwhelming evidence suggests that psychopathology is fully dimensional in nature rather than representing a discrete taxa (Hengartner & Lehmann, 2017). Therefore, instead of there being a presence or absence of diagnosis, dimensional classifications rather propose that there are important individual differences among those who would fall below or above threshold for a categorical diagnosis, whereby symptom severity is a continuum, that includes a variety of symptom patterns, symptoms severity and comorbidity (Helzer, Kraemer & Krueger, 2006).

The long-standing dimensional vs categorical debate has been widely documented in psychosis. Traditionally psychotic-spectrum disorders comprise a series of severe psychological disorders including, schizophrenia, schizoaffective disorder, affective psychosis,

brief psychotic disorder, substance- induced psychotic disorder, and personality disorders such as schizoid, schizotypal and paranoid personality disorders (Fonseca-Pedrero & Debbané, 2017). Symptom domains that characterise psychotic disorders include hallucinations and delusions (positive symptoms) disorganised thought and behaviour (disorganised symptoms) and affective flattening or loss of initiative (negative symptoms) (Hecker's et al., 2013). Estimated lifetime prevalence of psychosis ranges between 2% and 3.5% (Perῠlῠ et al., 2007) and the onset of symptoms usually occur in late adolescence and gradually progress over time (Fusar-Poli et al., 2014). Many commentators criticise this categorical view of psychosis and rather favour a continuum approach (Van Os et al., 2009).

The psychosis continuum proposes that subclinical psychosis symptoms occur among a much broader segment of the general population, than just those with traditionally defined psychosis disorders (Esterberg & Compton, 2009; Van Os et al., 2009). More simply, there is a continuum of psychotic phenomena which ranges from psychological wellbeing to full-blown psychosis (Fonseca-Pedrero & Debbané, 2017) and that experiences of psychotic phenomena (e.g. hallucinations and delusions) are not inevitably associated with clinical manifestation (Van Os et al., 2009). Prevalence rates for subclinical psychotic experiences in the general population have ranged from 10-15% for verbal hallucinations (de Leede-Smith & Barkus, 2013) and 25-30% for delusional ideation (Peters et al., 2004).

Subclinical psychotic experiences that are distributed through the general population are usually known as schizotypal traits and psychotic-like experiences (PLEs), and such constructs are useful for exploring the psychosis continuum. Schizotypy represents a cluster of personality traits that closely resemble symptoms of schizophrenia spectrum disorders (Grant, Green & Mason, 2018). Higher levels of schizotypy are associated with heightened risk for the development of psychotic disorders, however, most individuals with schizotypal traits would not be expected to develop psychosis (Barrantes-Vidal, Grant & Kwapil, 2015). Therefore, a

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key advantage to schizotypy research it that it offers a useful framework for understanding variation in normal behaviour as well as the development, trajectory, risk and resilience of the spectrum of psychotic disorders, in individuals who don't have the confounding factors associated with schizophrenia spectrum disorders (e.g. medications and hospitalisations; Kwapil & Barrantes-Vidal, 2014). Furthermore, it provides the opportunity to explore commonalities and differences between schizotypy and psychotic disorders. Several authors use PLE's and schizotypy as interchangeable constructs, however Barrantes-Vidal et al., (2015) propose that PLE's, which are traditionally defined as mild versions of psychotic symptoms, are narrower constructs which manifest along the schizotypy continuum.

1.2 Unique contribution of the thesis

The overarching aim of this thesis was to explore the complex interplay of schizotypy with a host of risk factors and adverse outcomes associated with psychosis. In doing so, this thesis will provide the literature with a greater understanding of potential relationships that are occurring in schizotypy. Secondly, it will help inform interested researchers of potential patterns that could be observed across the psychosis continuum, which in turn may enhance our understanding of the interaction of etiological factors for psychotic disorders.

The focus of this thesis was exploring the relationships between schizotypal traits and cognitive insight, negative affective states, and wellbeing, and factors that could be contributing to or be a consequence of these relationships. The aforementioned constructs have all been suggested to be potential risk factors for transition to psychosis and the relationships between these constructs have been well established in psychotic disorders. However, whilst the exploration of negative affect, wellbeing and cognitive insight have also extended to schizotypy, there is limited research exploring factors that may be contributing to these relationships.

In psychotic disorders, there has been great interest in exploring constructs that could be associated with cognitive insight, negative affect and poor wellbeing, with four key factors being identified. These four key factors include metacognition, neurocognition, social cognition and self-stigma. Dysfunctional metacognitive beliefs and impairments in neurocognition and social cognition are potential risk factors for transition to psychosis. Furthermore, self-stigma has been found to be a significant adverse outcome in psychotic disorders. These four key factors have also been associated with negative affect, wellbeing and cognitive insight in psychotic disorders, yet research exploring the relationships between schizotypal traits and metacognitive beliefs, neurocognition, social cognition and self-stigma have either provided inconsistent findings or have remained unexplored. In addition, these four key factors have remained relatively unexplored in terms of their role in the relationships between schizotypy, cognitive insight, negative affective states and wellbeing.

Therefore, the following broad aims of the thesis were formulated:

1) To explore the unique contributions of multidimensional schizotypy traits and their associations with cognitive insight (self-reflectiveness and self-certainty), self-stigma of seeking help, metacognitive beliefs, neurocognition and social cognition.

2) To explore factors that may contribute or be a consequence of the relationships between schizotypy and cognitive insight subcomponents-self-reflectiveness and self-certainty.

3) To explore factors that may contribute or be a consequence of the relationships between schizotypy and negative affect and psychological wellbeing.

1.3 Synopsis of the remaining thesis chapters

1.3.1 Chapter 2 Literature Review

Chapter 2 will begin within an overview of the current theoretical conceptions of schizotypy and the multidimensional nature of schizotypal traits. This chapter then moves on to providing definitions of the constructs of cognitive insight, negative affect and wellbeing and how the aforementioned factors are related to the psychosis continuum. This is followed by identifying the current gaps in the schizotypy literature and how they will be addressed in the first empirical chapter (Chapter 4. Study 1).

Chapter 2 then moves on to discuss four factors that have been related to both cognitive insight and wellbeing in psychotic disorders (i.e. self-stigma, metacognition, neurocognition and social cognition). First, the literature review will discuss how these aforementioned factors are related to the psychosis continuum, followed by how these four factors have been related to both cognitive insight and wellbeing. This section will then identify the current gaps in the current schizotypy literature and how they will be addressed in the second to fifth empirical chapters (Chapter 5. Study 2. to Chapter 8. Study 5).

The specific aims and hypotheses are presented in the literature review sections (Chapter 2) and also reiterated in each of the empirical study chapters (Chapter 4 to Chapter 8).

1.3.2 Chapter 3 Methods

This chapter outlines the methods used in this thesis. This includes highlighting measures of relevance and is followed by a rationale and description of the chosen measures. The chapter then provides a comprehensive description and rationale for the methods of data collection and statistical analyses.

1.3.3 Chapter 4 Study 1

This chapter reports on the first empirical study and presents the results of both multiple regression and serial mediation analyses used to examine the relationships between multidimensional schizotypy traits and the cognitive insight subcomponents- self-reflectiveness and self-certainty and whether the well-established relationship between schizotypy and psychological wellbeing could be better explained by the cognitive insight subcomponent- self-reflectiveness and negative affect.

1.3.4 Chapter 5 Study 2

This chapter reports on the second empirical study and presents the results of both multiple regression and parallel mediation analyses used to examine the relationship between multidimensional schizotypy traits and self-stigma for seeking psychological help and whether these relationships could be explained by cognitive insight, negative affect and psychological wellbeing.

1.3.5 Chapter 6 Study 3

This chapter reports on the third empirical study and presents the results of both multiple regression and parallel mediation analyses used to explore the relationships between multidimensional schizotypy traits and dysfunctional metacognitive beliefs, and whether these metacognitive beliefs could contribute to the relationships between schizotypy and cognitive insight, negative affect and psychological wellbeing.

1.3.6 Chapter 7 Study 4.

This chapter reports on the fourth empirical study and presents the results of Pearson's correlations used to explore the relationships between neurocognitive abilities and

multidimensional schizotypy traits, cognitive insight, negative affect and psychological wellbeing.

1.3.7 Chapter 8 Study 5.

This chapter reports on the fifth empirical study and presents the results of multiple regression and simple mediation analyses, used to explore whether the relationships between multidimensional schizotypy traits and social cognitive abilities, and whether these social cognitive abilities could contribute to the relationships between schizotypy and cognitive insight, negative affect and psychological wellbeing.

1.3.8 Chapter 9 General Discussion.

This chapter provides a summary of the findings reported in the empirical study chapters. Theoretical implications, practical implications, limitations and recommendations for future research will also be discussed. Finally, a statement of the unique contribution of this thesis to schizotypy/psychosis research concludes the general discussion.

1.4 Conclusion to chapter

This chapter has outlined the structure of the present thesis and the rationale for conducting this research which is to further our understanding of the complex interplay of schizotypy with a host of risk factors and adverse outcomes associated with psychotic disorders.

2. Literature Review

2.1 Schizotypy

In this section of the chapter I will:

- Define the Quasi-dimensional Model and the Fully Dimensional Model of schizotypy.
- Discuss the multidimensional nature of the schizotypy construct.

2.1.1 *Quasi-dimensional model of schizotypy*

Modern approaches to the study of schizotypy derive from two primary models that differ in their conceptualisation of schizotypy and which were developed within both the individual differences and medical traditions (DeRosse & Karlsgodt, 2015).

Meehl's (1962, 1990) quasi-dimensional model of schizotypy was developed within the medical tradition, proposing that a specific "dominant autosomal schizogene" would lead to a neurointergrative defect (schizotaxia) that *could* lead to schizotypy, dependent on "polygenic potentiators" (e.g. individual enviromental exposure and genetically determined personality dimensions, other than schizotaxia; Grant et al., 2018). According to Meehl schizotypy was taxonic in nature, suggesting 10% of the population were schizotypy however, only 10% of those individuals would develop schizophrenia (corresponding with 1% lifetime prevalence of schizophrenia; Kwapil & Chun, 2014). Therefore, Meehl believed one was either a schizotype or not, but within the group of schizotypes (taxon) there is a continuum of severity, placing the entire continuum within the realm of illness (Grant et al., 2018). Inconsistent, with the single "schizogene" aspect of Meehl's Model, studies have shown that psychotic disorders potentially involve thousands of genetic variants (International Schizophrenia Consortium, 2009; Ripke et al., 2014). Most of the support for Meehl's quasi-dimensional model come from taxometric studies which provide support for the schizotypy taxon, with base rates approximating 8.5-

10.5% in general population and undergraduate samples (Lenzenweger & Korfine, 1992; Horan et al., 2004; Linscott, 2013). However, it has been proposed that taxonic schizotypy models, require greater etiological conceptualisation, above and beyond the results found in taxometric studies (Kwapil & Barrantes-Vidal, 2015).

2.1.2 Fully dimensional model of schizotypy

Claridge's fully dimensional model (Claridge & Beech, 1995; Claridge, 1997) was built within the individual difference's tradition and proposes that schizotypy results from a combination of personality traits, genetic variation and enviromental factors, which are normally distributed within the general population (Grant et al., 2018). This is unlike the quasi-dimensional approach which suggests that schizotypy only applies to a subset of the population. Claridge's model proposes that schizotypy is fully dimensional in nature and exists in both illness and health, and that it can represent *both* adaptive manifestations and also the potential for maladaptive functioning (i.e. predisposition to psychotic disorders; Claridge & Beech, 1995). Thus, psychotic features can be seen as an aspect of normal variation in a healthy personality, which are no different to other individual differences traits- such as anxiety- which too can have healthy or unhealthy outcomes (Mason & Claridge, 2006). In Claridge's view, high expressions of schizotypy are necessary for psychotic disorders, however it is simultaneous variation along another dimension, which would mark the risk of transition into illness (i.e. biological and psychological factors; DeRosse & Karlsgodt, 2015).

In support of the fully dimensional model, high positive schizotypy in the absence of other schizotypy traits (i.e. low negative and cognitive/disorganised schizotypy) has been associated with some adaptive outcomes (Mason, 2014) including but not limited to; creativity (Giannotti et al., 2001; Mohr et al., 2001) favourable subjective and psychological wellbeing (Tabak & de Mamani, 2013) and subjective reporting of paranormal experiences as being pleasant

(Schofield & Claridge, 2007). Conversely, high risk studies have revealed that co-occurrence of high positive and negative schizotypy predict the development of psychotic disorders (Mason et al., 2004; Kwapil et al., 2013) and higher values of negative schizotypy rather than positive schizotypy appears to be a better predictor of transition to psychotic disorders (Flückiger et al., 2016; Kotlicka-Antczak et al., 2019). Together these findings support the notion that schizotypy exists in both health and illness.

The fully dimensional model places schizotypy on a continuum, which can represent *both* adaptive manifestations and also the potential for maladaptive functioning (Claridge & Beech, 1995), and working within the fully dimensional model may help us understand variation in normal behaviour as well as the development, trajectory, risk and resilience of the spectrum of psychotic disorders (Kwapil & Barrantes-Vidal, 2014). Based on the research, within this thesis, I will work within the fully dimensional framework and the notion that schizotypy is relevant to the spectrum of all psychotic disorders (Grant et al., 2018).

2.1.3 Multidimensional construct of schizotypy

Both schizotypy and schizophrenia are heterogenous and appear to share a common multidimensional structure (Kwapil & Barrantes-Vidal, 2014). However, there remains to be a consensus on the nature and number of these dimensions (Mason, 2015). Furthermore, the "core" dimensions of schizotypy may differ dependent on which theoretical model the schizotypy measure was developed from (Grant et al., 2018). Studies of "traditional" schizotypy typically identify three dimensions; positive schizotypy, negative schizotypy and disorganised/cognitive disorganisation schizotypy, which loosely map to the symptoms of psychotic illness (i.e. positive, negative and cognitive/disorganised; Grant et al., 2018).

Positive schizotypy is characterised by perceptual aberration, odd beliefs, magical ideation and suspiciousness/paranoia (Kwapil & Barrantes-Vidal, 2014), negative schizotypy is

characterised by social avoidance, physical and social anhedonia (Ödéhn & Goulding, 2018) and disorganised/cognitive disorganisation is characterised by difficulties in organising and expressing thoughts and behaviour (Kwapil & Barrantes-Vidal, 2014). However, it is important to note that the content of these three schizotypy dimensions can differ depending on the schizotypy measures used. For example, whilst some measures include social anxiety within the disorganised/cognitive disorganisation dimension such as the Oxford-Liverpool Inventory of Feelings and Experiences (OLIFE; Mason, Claridge & Jackson, 1995), the Schizotypal Personality Questionnaire (SPQ; Raine, 1991) includes social anxiety within the negative schizotypy dimension (Mason, 2014). Additionally, whilst the disorganised dimension of the SPQ contains characteristics of odd behaviour and speech and closely related to "eccentricity", the respective cognitive disorganisation dimension of the OLIFE is closely related to formal thought disorder (Grant et al., 2018). Whilst these three dimensions of schizotypy have received considerable support, there is evidence of additional dimensions based on the schizotypy measure employed (Kwapil & Barrantes-Vidal, 2014). For example, factor analysis studies have proposed a four-factor model of schizotypy when utilising the SPQ, compromising of positive, negative, disorganised and paranoid dimensions (Compton et al., 2009; Fonseca-Pedrero et al., 2014). Furthermore, the OLIFE includes four factors compromising of unusual experiences (positive schizotypy), introvertive anhedonia (negative schizotypy), cognitive disorganisation and impulsive non-conformity (Mason et al., 1995). The impulsive non-conformity factor refers to impulsive, antisocial and eccentric behaviour (Mason & Claridge, 2006). Mason (2015) proposes that whilst impulsive non-conformity may not be relevant to schizophrenia, it may be relevant to the broader psychosis proneness/ psychosis continuum. A review of the currently most widely used multidimensional schizotypy measures will be discussed within the methods chapter.

2.1.4 Schizotypy summary

In summary the multidimensional construct of schizotypy enables us to explore relationships with potential risk and protective factors, in order to advance our understanding of the etiological factors for psychotic disorders (Barrantes-Vidal et al., 2015). The following sections will discuss a range of cognitive, emotional and psychological factors which have been associated with schizophrenia spectrum disorders. In order to explore commonalities and differences between schizotypy and psychotic disorders, the following sections will discuss how these cognitive, emotional and psychological factors have been associated with psychotic disorders, individuals with at risk mental states (ARMS) and schizotypy. ARMS, also termed ultra-high risk or clinical high risk, refers to young, help seeking individuals whom experience either "attenuated" psychotic symptoms, full blown psychotic symptoms which are brief and limited or a significant and detrimental decline in functioning (Yung et al., 2008). ARMS have been used interchangeably with schizotypy, however, it is suggested that they represent a specific manifestation along the schizotypy continuum (Kwapil & Barrantes-Vidal, 2014).

2.2 A review of cognitive insight, negative affect and wellbeing and the psychosis continuum

In this section of the chapter I will:

- Explore the empirical literature available on cognitive insight, negative affect and psychological wellbeing and the psychosis continuum.
- Identify the gaps in the schizotypy literature, regarding the exploration of cognitive insight and its relationships with multidimensional schizotypy traits.
- Cover literature on how cognitive insight is related to negative affect and wellbeing across the psychosis continuum.
- Identify how cognitive insight and negative affect could account for the well-established relationship between schizotpy and wellbeing.

2.2.1 Cognitive insight

Pertinent to psychosis, the versatile concept of insight has been adapted and refined during the last century (Riggs et al., 2010; Van Camp, Sabbe & Oldenburg, 2017). Early accounts of insight were defined as a single dimension, referred to as the realisation an individual has of their own condition (Lewis, 1934), whereby patients either possessed insight or completely lacked it (Lewis, 1934; Riggs et al., 2010). Subsequently, insight into illness also termed **clinical insight** has been broadened into a multidimensional and continuous construct, including an ability to acknowledge symptoms, need for treatment, and awareness of the disorder (David, 1990; Van Camp et al., 2017). Beck and colleagues (2004) have argued that this conceptualisation of insight is too narrow, as whilst individuals may admit they have a mental illness it does necessarily mean that they completely understand the disorder and its consequences (Beck et al., 2004).

Consequently, an important extension of the insight concept includes **cognitive insight** (Beck & Warman, 2004). Cognitive insight encompasses the capability to reflect on anomalous experiences and revaluate these experiences using external feedback from others (Beck et al., 2004). The conceptualisation of cognitive insight compromises two distinct but related concepts: self-reflectiveness and self-certainty and is measured by the Becks Cognitive Insight Scale (BCIS; Beck et al., 2004). Self-reflectiveness refers to an ability to be objective, consider alternative perspectives and openness to feedback, whereas self-certainty refers to an overconfidence in the accuracy of ones' beliefs and a resistance to correction (Beck et al., 2004). Taken together, subtracting self-certainty from self-reflectiveness can be used as a composite of the overall cognitive insight construct and this approach is often used in psychosis when the level of self-certainty diminishes one's ability to be self-reflective (Van Camp et al., 2017). Higher self-reflectiveness and lower self-certainty reflect greater cognitive insight, whereas lower self-reflectiveness and higher self-certainty would reflect lower cognitive insight.

Cognitive insight extends on clinical insight, because it assesses the awareness of thought processes and reasoning rather than exclusively assessing beliefs about psychiatric challenges (Jørgensen et al., 2015). Furthermore, it is suggested that higher cognitive insight could support the development of insight into illness (Riggs et al., 2010). In addition, the cognitive insight construct was originally designed for psychotic disorders, however, there is a growing body of evidence that suggests cognitive insight is relevant to non-clinical populations and diverse disorders such as Major Depressive Disorder, Obsessive Compulsive Disorder and Bipolar Disorder (Van Camp et al., 2017).

2.2.1.1 Cognitive insight and the psychosis continuum

As previously discussed, the cognitive insight construct was originally designed for psychosis symptoms (Van Camp et al., 2017). Becks and Colleagues (2004) contend that a crucial cognitive problem in psychotic disorders is that individuals are incapable of distancing themselves from distorted beliefs and are impervious to corrective feedback (Mortiz et al., 2005). More specifically, individuals with psychotic disorders can be impaired in their ability to be objective about delusional experiences and cognitive distortions, have limited capacity in putting these experiences into perspective, are resistant to corrective information provided by others and are overconfident in their judgements of delusional experiences (Beck & Warman, 2004). Therefore, it is hypothesised that individuals with psychotic disorders would display lower composite cognitive insight and self-reflectiveness scores and higher rates of self-certainty when compared with those without psychotic disorders. Beck & Warman (2004) additionally theorised that symptoms, particularly delusional thinking, should be related to lower self-reflectiveness and higher self-certainty as these are factors that would represent a reasoning style that would maintain delusional beliefs.

In support of the first hypotheses, research has found lower composite cognitive insight and self-reflectiveness and higher self-certainty in individuals with a psychotic disorder, when compared with healthy controls (Warman et al., 2007; Martin et al., 2010; Kimhy et al., 2014). However, contrary to expectations, Lincoln et al., (2014) found higher self-reflectiveness in individuals with a psychotic disorder when compared with healthy controls. Similarly, studies have reported higher self-reflectiveness in individuals with active delusions (Warman et al., 2007) and active hallucinations (Engh et al., 2009) when compared with individuals with psychotic disorders with no active symptoms. This suggests that individuals are aware of alternative explanations for their psychotic experiences but are overconfident in their own conclusions about these beliefs (Warman et al., 2007).

The two subcomponents that contribute to the overall construct of cognitive insight have also demonstrated interesting patterns in individuals with At Risk Mental States (ARMS), which may impact upon people's transition or protection from clinical levels of psychosis. Research has found self-reflectiveness scores to be comparable in individuals with ARMS when compared with healthy controls (Kihmy et al., 2014; Uchida et al., 2014). However, when considering specific symptom profiles, Kihmy et al., (2014) reported that individuals with ARMS with marked unusual thought content had significantly lower self-reflectiveness when compared to a group of arms with moderate/low/no unusual thought content, with rate of transition significantly greater in those with severe unusual thought content. Furthermore, individuals with ARMS reported significantly higher self-certainty when compared with healthy controls, with a slight tendency towards greater self-certainty in those individuals who transitioned to psychosis (Uchida et al., 2014). Therefore, when considering the ARMS literature, self-certainty may be a risk factor for transition to psychosis (Uchida et al., 2014), whereas, self-reflectiveness a risk factor only for individuals with specific symptoms profiles but a potential protective factor in the ARMS risk cohort as a whole (Kihmy et al., 2014).

Correlational studies in the psychotic disorder literature, have also thoroughly investigated the relationships between positive symptoms of psychosis and cognitive insight. In support of Beck et al., (2004) hypotheses, a preponderance of studies have found inverse associations between positive symptomology and self-reflectiveness and positive associations with self-certainty (Beck et al., 2004; Pedrelli et al., 2004; Warman et al., 2007; Bora et al., 2007; Buchy et al., 2009a; Perivoliotis et al., 2010; Lysaker et al., 2011a; Bruno et al., 2012; Vohs et al., 2015).

Several studies have also found cognitive insight to be associated with other symptomology. More specifically, negative symptoms have been inversely associated with self-reflectiveness (Bora et al., 2007; Tranulis et al., 2008) and positively associated with self-certainty (Pedrelli et al., 2004; Vohs et al., 2015). Self-certainty has also been found to be positively associated

with disorganised/cognitive symptoms (Lysaker et al., 2011a). It has been argued that negative and disorganised symptoms are unlikely correlates of cognitive insight (Riggs et al., 2010), and there has been little explanation for these findings. However, it is plausible to suggest that lower cognitive insight is directly associated with negative and disorganised symptoms and may be a cause and/or consequence of such symptoms. For example, lower cognitive insight may precede negative and disorganised symptoms via a rigid reasoning style which may lead to a disengagement in constructive activity, impact on interpersonal expressivity and make it difficult to think clearly or respond appropriately to situations (Choudhary et al., 2017). On the contrary, a rigid reasoning style and an inability to incorporate other people's feedback into a holistic understanding of experiences, may be a consequence of individuals being unable to think clearly or withdrawing from social interactions.

The exploration of cognitive insight has also extended to the schizotypy literature. Consistent with those with psychotic disorders, research has found that higher self-certainty is associated with positive schizotypy (Sacks, de Mamani & Garcia, 2012; Barron et al., 2018). However, contrary to expectations, research that has explored both subcomponents of cognitive insight indicated that delusional proneness (specific features of positive schizotypy) was associated with higher self-certainty but also with higher self-reflectiveness (Warman & Martin, 2006; Carse & Langdon, 2013). These latter findings have been interpreted as self-certainty being a potential vulnerability marker for the formation of psychotic symptoms whereas self-reflectiveness a protective factor against the formation of psychotic symptoms (Warman & Martin, 2006). Extending the prior literature, Carse and Langdon (2013) found that rumination contributed to the relationship between self-reflectiveness and delusional proneness, suggesting that there are commonalities between rumination and self-reflective abilities. Therefore, whilst higher self-reflectiveness could be a protective factor against the formation of psychotic disorders (Warman & Martin, 2006), it may also lead to unhelpful self-focus in

individuals with delusional proneness. In summary, it can be suggested that positive schizotypy is related to both higher levels of self-certainty and self-reflectiveness.

Sacks et al., (2012) is the only study to have explored the associations between cognitive insight and other schizotypy traits beyond that of positive schizotypy. Sacks et al., (2012) focused on the cognitive insight subcomponent-self-certainty and found that consistent with those with psychotic disorders, higher self-certainty was associated with positive schizotypy, negative schizotypy and impulsive non-conformity. However, contrary to expectations lower self-certainty was associated with disorganised schizotypy. The findings suggest that those who are highly confident in their own beliefs and give minimal attention to competing information may react to situations in an impulsive manner and may find social situations less rewarding (Sacks et al., 2012). On the contrary, it is plausible that those who have cognitive difficulties and whom are socially anxious may be less confident in their own beliefs. As this is the first study to explore self-certainty and its associations with multidimensional schizotypy traits, further research is required to confirm these findings (Sacks et al., 2012). In addition, whilst there seems to be a consensus regarding the relationship between positive schizotypy and self-reflectiveness, it remains to be seen whether self-reflectiveness is also associated with other schizotypal personality traits. A recent study revealed that 60% of individuals in a high schizotypy group reported ruminations-obsessions (Torbet et al., 2015). Therefore, given that self-reflectiveness may share commonalities with rumination, then it is plausible that schizotypy traits other than positive schizotypy will be related to higher self-reflectiveness.

2.2.1.1.1 Cognitive insight and schizotypy summary

Previous literature examining associations between cognitive insight and schizotypy have either focused on the cognitive insight subcomponent- self-certainty or on specific schizotypy features i.e. delusional proneness. However, focus on both elements of cognitive insight is

important given that they may serve differently as potential protective and risk factors in the transition to psychotic disorders. Equally, consideration of the full range of schizotypy traits is important because current work has suggested a link between both cognitive insight subcomponents and delusional proneness, but we are unaware how both self-certainty and self-reflectiveness relates to other features of schizotypy. Therefore, an aim of the current thesis which will be examined in Chapter 4 (Study 1) will be to explore the relationships between multidimensional schizotypy traits and both components of cognitive insight-self-reflectiveness and self-certainty. Based on the aforementioned research it is hypothesised that greater schizotypy traits (unusual experiences, introvertive anhedonia and impulsive non-conformity) will predict higher levels of both self-certainty and self-reflectiveness; whereas greater cognitive disorganisation will predict higher levels of self-reflectiveness and lower levels of self-certainty.

2.2.2 Negative affect and wellbeing

2.2.2.1 Negative affect and the psychosis continuum

Negative affect/psychological distress has largely been defined as a state of emotional suffering which is underpinned by symptoms of depression (e.g. loss of self-esteem, hopelessness and low positive affect), anxiety (e.g., autonomic arousal and physiological hyperarousal) and stress (e.g. persistent tension and irritability; Lovibond & Lovibond, 1995). Depression and anxiety symptoms are highly prevalent in individuals with schizophrenia spectrum disorders (Upthegrove et al., 2017), with many factor analysis studies reporting that negative affect is a distinct dimension in psychosis (Reininghaus et al., 2012). Studies in individuals with ARMS have also confirmed high percentages of co-occurring depressive disorders (40.7%) and anxiety disorders (15.3%; Fusar-Poli et al., 2012), with mood symptoms linked to an increased risk of transition to first episode psychosis (Yung et al., 2004; Velthorst et al., 2009). It has

been suggested that stress, such as high expressed emotion, life events and minor stressors can also precede the onset and reoccurrence of psychosis (Palmier-Claus et al., 2012; Collip et al., 2013).

Disruptions in the experiences of emotion have also been implicated in schizotypy, in both university and community samples. Depression, anxiety and stress have all been positively correlated with positive schizotypy, disorganised schizotypy, negative schizotypy and impulsive non-conformity (Hanel & Wolfradt, 2016). However, there are inconsistencies with regards to which schizotypal traits are most strongly associated with negative affect. For example, correlational studies, have found that depression and anxiety were most strongly related to positive schizotypy than negative schizotypy (Lewandowski et al., 2006). On the other hand, a more recent study reported that depression and anxiety were most strongly related to disorganised schizotypy followed by positive and negative schizotypy (Kemp et al., 2018). The inconsistency is perhaps a consequence of studies measuring a different number of schizotypy dimensions. Barrantes-Vidal et al., (2013) also found that stress was associated with both positive schizotypy and negative schizotypy, however it was most strongly related to positive schizotypy. Therefore, whilst it is unclear which schizotypy traits are most strongly related to negative affect, the research does suggest that increased schizotypy may reflect mood fluctuations (Hodgekins, 2015). The cross-sectional design of these studies limits the ability to interpret the direction of these relationships, and negative affect may be a cause and/or consequence of schizotypal traits. However, it is plausible to suggest that schizotypy traits could lead to distress which results in mood fluctuations such as increased negative affect (Hodgekins, 2015). Despite the fact that most individuals with schizotypy are not expected to go on and develop psychotic disorders, the aforementioned research has provided evidence that negative affect is a common feature in schizotypy as well as a risk factor for transition to psychotic disorders. Therefore, elucidating factors that may be contributing to the relationships

between schizotypy and negative affective states may have important research and clinical implications.

2.2.2.2 Wellbeing and the psychosis continuum

Wellbeing broadly encompasses aspects of both subjective and psychological wellbeing. Subjective wellbeing (SWB) can typically be described as happiness or positive subjective state that is based on cognitive and affective evaluations of one's life (Diener, 2000). SWB falls within the 'hedonic' perspective due to its emphasis on maximising pleasure and avoiding or minimising pain (Ryan & Deci, 2001). The affective evaluations refer to one's emotional reactions (e.g. happiness, unhappiness). The cognitive aspect refers to global evaluations of one's life/circumstances (e.g. overall life satisfaction or quality of life) and satisfaction regarding specific life domains such as job satisfaction and numbers of social contacts (Browne et al., 2017).

Psychological wellbeing (PWB) takes on a eudemonic approach, due to its emphasis on the importance of finding purpose and meaning in life through one's potential, along with values of accomplishment and deep personal relations (Ryff, 1989). A well-validated theoretical model of PWB, developed by Ryff et al., (1996) proposes that these positive mental health aspects represent assets that have a potentially important restorative and protective role in one's mental and physical health (Uzenoff et al., 2010). As such, this eudemonic approach to PWB is thought to compromise of self-acceptance, positive relationships, autonomy, environmental mastery, purpose in life and personal growth (Ryff, 1989).

 PWB and SWB are related but distinct constructs, with longitudinal studies providing evidence that PWB unequivocally predicts SWB over time (Joshanloo, 2019). PWB is proposed to represent positive mental health aspects that play an important restorative and protective role in one's mental and physical health (Uzenoff et al., 2010). Therefore, based on these important

implications, PWB will be the predominant focus of the current thesis. It is important to note that SWB has received relatively more attention than PWB in the psychosis and schizotypy literature. Therefore, this literature review will discuss research relating to both SWB and PWB.

A consistently replicated finding in research on psychotic disorders is that individuals report significantly lower PWB and SWB compared with control groups (Uzenoff et al., 2010; Strauss et al., 2012). In addition, correlational studies have consistently found that psychiatric symptoms (i.e. negative symptoms and positive symptoms) are associated with poorer PWB and SWB in individuals with psychotic disorders (Cotton et al., 2010; Galuppi et al., 2010; Priebe et al., 2011; Strauss et al. 2012).

Regarding the schizotypy literature, there is also a consensus that multidimensional schizotypy traits are associated with SWB and PWB. A number of studies have found that negative and disorganised schizotypy are associated with lower PWB and SWB, whereas positive schizotypy or features of positive schizotypy, in the absence of other schizotypy are associated with better PWB and SWB (Cohen, Thompson & Davis, 2009; Abbott & Bryne, 2012; Fumero, Marrero & Fonseca-Pedrero, 2018). Tabak and de Mamani (2013) extended these findings by exploring both SWB and PWB in schizotypy clusters. They identified that a negative/disorganised schizotypy cluster demonstrated the lowest levels of PWB and SWB, a high schizotypy cluster and a high negative schizotypy cluster also reported lower PWB and SWB, and a high solely positive schizotypy group reported SWB and PWB comparable to individuals with low schizotypy (Tabak & de Mamani, 2013). The findings overall supporting the fully dimensional model, whereby positive schizotypy, in the absence of other schizotypy traits can be associated with adaptive functioning, whereas negative and disorganised schizotypy may be associated with maladaptive functioning and in particular poorer wellbeing (Mason, 2014). However, despite there being a consensus that schizotypy is related to

wellbeing, research exploring factors that may be contributing to these relationships have remained relatively unexplored.

2.2.3 Cognitive insight, negative affect and wellbeing

In psychotic disorders, research has consistently shown that depressive symptoms are more strongly related to SWB and PWB, than positive and negative psychosis symptoms (Eack & Newhill, 2007; Priebe et al., 2011; Strauss et al., 2012; Fulford et al., 2013).Therefore, one important consideration when exploring the relationship between schizotypy and wellbeing is the potential contribution of negative affect. One study has explored the possible role of negative affect (i.e. depression, anxiety and stress) in the relationships between schizotypy and SWB. Abbott, Do & Byrne (2012) found that after controlling for negative affect, negative and disorganised schizotypy traits were still associated with poorer SWB, however positive schizotypy was not. This demonstrates that negative affect may partially explain the relationship between schizotypy and wellbeing. As previously mentioned, SWB and PWB are related but distinct constructs and I am unaware of any research explicitly exploring negative affect's role in the relationship between schizotypy and PWB. However, based on the aforementioned research, it is plausible that negative affect may play a mediating role in the well-established relationship between schizotypy and PWB. Furthermore, it has been suggested that other factors beyond negative affect, could also be contributing to this particular relationship (Abbott et al., 2012a).

The current view on cognitive insight, is that higher cognitive insight is associated with fewer psychotic symptoms (Beck et al., 2004), yet emerging evidence demonstrates that higher cognitive insight is not always psychologically healthier, a phenomenon known as the "insight paradox" (Belvederi Murri et al., 2016; Van Camp et al., 2017). For example, a recent meta-

analysis showed that in psychotic disorders, higher self-reflectiveness but not self-certainty was significantly associated with greater depression (Palmer, Gilleen & David, 2015).

There are two leading propositions for how depression is associated with cognitive insight. First, Granholm et al., (2005) propose that individuals who reflect and try to understand their unusual experiences gain cognitive insight, which may result in distress as they lose confidence in their previous 'incorrect beliefs' and rather understand that these experiences are symptoms of their illnesses (Palmer et al., 2015). Alternatively, it has been suggested, that low mood may lead to a 'depressive realism' whereby individuals have a more accurate appraisal of the world and themselves, which would be expected to lead to higher cognitive insight (Haaga & Beck, 1995). Van Camp et al., (2017) therefore proposed that very high levels of self-reflectiveness may not always be psychologically healthy. I am unaware of any research exploring the relationship between cognitive insight and negative affect in schizotypy, however based on the aforementioned research it is plausible that higher self-reflectiveness could be associated with greater negative affect.

Research into individuals' psychotic disorders has also begun to explore the relationships between cognitive insight and SWB, albeit with inconsistent findings. For example, some studies have found that higher self-reflectiveness is associated with better SWB in individuals with psychotic disorders (Phalen et al., 2015; Pu et al., 2018). However, other studies have found that higher self-reflectiveness was related to lower SWB, and depression symptoms accounted for some of this relationship (Kim et al., 2015). The authors of the latter study suggested that individuals with greater self-reflectiveness may realise their restrictions more clearly, leading to more severe depressive symptoms and detrimentally affecting wellbeing (Kim et al., 2015).

One study to date has investigated the role of cognitive insight in the relationship between schizotypy and wellbeing in a university sample. Weintraub & de Mamani, (2015) found that greater composite cognitive insight was negatively associated with wellbeing, however, cognitive insight did not moderate the relationship between schizotypy and wellbeing (Weintraub & de Mamani, 2015). The authors of the latter study reported that elevated schizotypy traits were positively related to cognitive insight, therefore it was difficult to see moderation when the two variables were strongly correlated (Weintraub & de Mamani, 2015). Therefore, it is also plausible that research utilising mediation analysis may better explain the relationship between schizotypy, cognitive insight and wellbeing. For example, individuals with schizotypy, may reflect on their experiences, interpret them as being unusual or not normal in turn becoming disheartened and thus negatively impact wellbeing.

2.2.3.1 Summary of the potential relationships between schizotypy, cognitive insight and wellbeing

Based on the aforementioned research it is plausible to suggest that both the cognitive insight subcomponent self-reflectiveness and negative affect contribute to poorer wellbeing across the psychosis continuum. As previously mentioned, Weintraub & de Mamani (2015) are the only research to date that has explored the relationship between schizotypy, cognitive insight and wellbeing using moderation analysis. The current thesis will extend on this prior literature by being the first to utilise complex serial mediation analysis in an attempt to better understand the complex interplay of schizotypy traits, self-reflectiveness, negative affect and wellbeing. Given that self-reflective behaviour may take on a ruminative quality (Carse & Langdon, 2013), it may be that greater schizotypy traits could predict higher self-reflectiveness, which in turn could predict greater negative affect, that in turn could predict lower PWB. Therefore, a further aim of the current thesis which will be addressed in Chapter 4 (Study 1) was to explore the serial mediating roles of self-reflectiveness and negative affect in the well-established

relationship between schizotypy and PWB. In exploring said relationship, it may elucidate whether the "insight paradox" is occurring across the psychosis continuum, and better inform the schizotypy literature of factors potentially contributing to wellbeing in individuals with greater schizotypy traits. Based on the aforementioned research, it is hypothesised that self-reflectiveness and negative affect will mediate the relationship between schizotypy traits and PWB in serial (schizotypy → self-reflectiveness → negative affect → PWB).

In this section of the chapter I have:

- Summarised evidence that the cognitive insight subcomponents-lower self-reflectiveness and higher self-certainty are potential vulnerability markers related to psychotic disorders and at-risk mental states.
- Summarised evidence that higher self-reflectiveness and higher self-certainty are both related to delusional proneness and that self-certainty has differential relationships will multidimensional schizotypy traits. However, argued that it remains unclear how both cognitive insight subcomponents are related to multidimensional schizotypy traits.
- Summarised evidence that higher self-reflectiveness is related to both greater depression and lower wellbeing in psychotic disorders- known as the insight paradox.
- Identified that previous schizotypy literature has not explored the contribution of both self-reflectiveness and negative affect in the well-established relationship between schizotypy and wellbeing.

2.3 A review of self-stigma, metacognition, neurocognition and social cognition

The aforementioned literature has provided evidence that schizotypy is related to cognitive insight, negative affect and wellbeing. However, it is important to understand what other factors could be contributing to these relationships. Researchers have been dedicated to exploring factors that are related to cognitive insight and wellbeing in individuals with

psychotic disorders, with emerging evidence suggesting four factors are of particular importance (i.e. self-stigma, neurocognition, social cognition and metacognition). However, prior to exploring the relationships between these four factors and both cognitive insight and wellbeing, it is important to identify whether self-stigma, neurocognition, social cognition and metacognition are first related to multidimensional schizotypy traits. Therefore, the following sections of the literature review will individually discuss each of these four factors, and how they are related to the psychosis continuum, cognitive insight, negative affect and wellbeing. This thesis will then identify the current gaps in the schizotypy literature and address how Chapter 5 (Study 2) to Chapter 8 (Study 5) will extend this prior literature. In addition, measures which assess the aforementioned constructs, may be highlighted in this section, however, a full description and critical review of these measures will be discussed within the methods chapter.

2.3.1 Self-stigma

In this section of the chapter I will:

- Explore the empirical literature available on self-stigma and the psychosis continuum and identify gaps in the schizotypy literature regarding the relationship between schizotypy and self-stigma.
- Explore the empirical literature available on how self-stigma is related to cognitive insight, negative affect and wellbeing in psychotic disorders, and how these factors could account for a potential relationship between schizotypy and self-stigma.

Stigma towards mental health has been identified as a significant barrier for diagnosis and treatment of mental health conditions (Robinson et al., 2019). Stigma has also been linked with a number of negative outcomes in individuals with mental health conditions (Hing & Russell, 2017). There are three broad types of stigma associated with mental health. This includes:

public stigma- negative and prejudicial stereotypes held collectively by people in a society or community, *perceived stigma-* one's individual perception of a public stigma and *self-stigma-* agreeing with negative public stereotypes, internalising them and applying them to one's self (Corrigan, 2004). Corrigan, Watson and Barr (2006) propose that these concepts of stigma can develop sequentially. For example, individuals with mental health conditions, can be made aware of public stigma, in turn perceived stigma may occur depending on whether they agree or disagree with the public stigma, which then determines whether an individual will or will not apply these stigmatised beliefs to one's self (Eisenberg et al., 2009). Self-stigma is particularly harmful as it includes a type of identity transformation among affected persons, whereby feelings becoming dysfunctional (e.g. low self-esteem and low self-confidence), which ultimately leads to poor health outcomes and wellbeing (Corrigan et al., 2006; Watson et al., 2007). Thus, it has been proposed that self-stigma of mental health is equally or more debilitating than mental illness itself (Vogel, Wade & Haake, 2006).

This thesis will focus on self-stigma and its contribution to the psychosis continuum and will discuss two related but distinct constructs of self-stigma and mental health (i.e. self-stigma of having a mental illness and self-stigma of seeking psychological help).

2.3.1.1 Self-Stigma and the psychosis continuum

Unfortunately, individuals with a diagnosis of schizophrenia spectrum disorders are at particular risk of experiencing self-stigma (Rose et al., 2011; Lakeman et al., 2012), as they internalise perceived stigmatising conceptions about mental illness. Consequently, a recent review demonstrated high prevalence rates of self-stigma among people with schizophrenia, with shame being the most common aspect (Brohan et al., 2010; Gerlinger et al., 2013). Research has revealed that the detrimental effects of self-stigma of having a mental illness in schizophrenia are manifold. In particular research has shown that self-stigma is associated with

hopelessness, depression, reduced feeling of empowerment, poor functional outcome and reduced motivation towards recovery goals (Lysaker et al., 2007; Livingston & Boyd, 2010; Yanos et al., 2010).

Labels that define mental illness such as symptoms and clinical diagnosis are suggested to play an important role in self-stigma (Corrigan, 2007). In schizophrenia spectrum disorders, greater positive and negative symptoms have been associated with increased self-stigma of mental illness (Lysaker et al., 2007; Yanos et al., 2008; Lysaker et al., 2009; Hill & Startup, 2013; Chan et al., 2017; Vrbova et al., 2018). Furthermore, Denenny et al., (2015) found that subthreshold psychotic symptom distress was associated with greater self-stigma of mental illness, in university students with past or present mental health diagnoses. Presumably, psychotic symptoms may attract negative attention and result in self-stigmatising beliefs (e.g. "I am dangerous" and "I am afraid of myself"; Horssenlenberg et al., 2016; Hofer et al., 2019). Despite recent research demonstrating that psychosis symptoms may potentially be a predictor of self-stigma, no research to date has explored the associations between schizotypal traits and self-stigma. However, I acknowledge that self-stigma of mental illness is not a feasible measure to use in schizotypy research utilising general population samples, as whilst individuals may feel that their experiences are unusual or strange, the majority of individuals will not have a diagnosis of a mental disorder, thus are less likely to endorse self-stigma of mental illness questions (e.g. "Because I have a mental illness, I am unpredictable").

Therefore, an alternative avenue for schizotypy research may be to explore self-stigma of seeking psychological help. The Self-Stigma of Seeking Help scale (SSOSH; Vogel et al., 2006) explores anticipated reductions in self-esteem and self-efficacy if one was to hypothetically receive the label of a seeker of psychological help (e.g. "If I went to a therapist, I would be less satisfied with myself"; Vogel & Wade, 2009). It is proposed that self-stigma of mental illness and self-stigma of seeking help are related but distinct constructs (Tucker et al.,

2013). For example, it is suggested that people avoid mental health services in an attempt to avoid the stigmatisation of mental illness (Tucker et al, 2013). Furthermore, anticipated self-stigma for seeking psychological help predicts negative attitudes and intentions towards help seeking intentions (Vogel et al., 2006). In schizophrenia spectrum disorders, the detrimental impact of self-stigma of mental illness has been linked with poorer adherence to treatment, and a prominent barrier to help seeking in individuals with ARMS (Fung et al., 2008; Tsang et al., 2010; Yang et al., 2010). This has important implications given that prolonged durations of untreated psychosis have been associated with detrimental long-term outcomes (Pentillä et al., 2014).

Schizotypy research has identified that higher levels of negative and disorganised schizotypal traits are associated with poorer mental health (Ödéhn & Goulding, 2018). Self-stigma for seeking psychological help has also been identified as a major barrier that prevents individuals with mental health concerns from seeking help (Lannin, et al., 2016). As previously mentioned, higher levels of schizotypy are associated with heightened risk for the development of psychotic disorders (Barrantes-Vidal et al., 2015). Therefore, exploring associations between schizotypy and self-stigma for seeking psychological help may have important clinical implications, particularly if individuals come to a possible critical juncture in the future (i.e. seeking mental health services).

2.3.1.1.1 Self-Stigma and schizotypy summary

In summary, I am unaware of any research exploring the associations between schizotypy and self-stigma of seeking psychological help. Thus, an aim of the current thesis which will be addressed in Chapter 5 (Study 2) is to explore the associations between multidimensional schizotypy traits and self-stigma for seeking psychological help. Based on the previous literature, it is plausible to suggest that schizotypal individuals may feel that their experiences

are unusual or strange. Additionally, if individuals internalise the public's negative stereotyping of mental health and seeking help, this may result in individuals deeming seeking psychological help as unacceptable, which would negatively impact on one's self-esteem and self-efficacy. Therefore, it is hypothesised that greater schizotypal traits will predict greater self-stigma towards seeking psychological help.

2.3.1.2 Self-stigma and cognitive insight

Emerging evidence suggests that self-stigma is especially relevant to individuals who are aware of their experiences, symptoms and diagnoses (Hasson-Ohayon, 2018). Recent literature has found that both insight into one's illness and cognitive insight contribute to self-stigma of having a mental illness, in individuals with psychotic disorders (Sharaf et al., 2012; Pruβ et al., 2012; Lien et al., 2018a). Several studies have found that greater levels of the cognitive insight composite score and higher self-reflectiveness scores are related to greater self-stigma of having a mental illness in schizophrenia spectrum disorders (Mak & Wu, 2006; Grover et al., 2018; Lien et al., 2018b). These findings have been interpreted as those who have greater cognitive insight are better aware of the stigmatised status of mental illness which may potentially lead to internalisation of stigma (Mak & Wu, 2006). On the contrary, one study also observed a positive association between self-certainty and self-stigma of mental illness (Grover et al., 2018). The authors did not provide an explanation for this latter finding, however, it is plausible that individuals who are overconfident in the accuracy of their beliefs would view the label of having a mental illness as a threat to one's self-esteem and self-confidence. This explanation is not too distant from the proposition that some individuals with psychotic disorders who have higher self-certainty may have a socially naïve self-appraisal (i.e. positive beliefs about the self which are unchecked by social norms) that leads to more self-confidence (Guerrero & Lysaker, 2013).

2.3.1.2.1 Summary of the potential relationships between schizotypy, cognitive insight and self-stigma

No research to date has explored the relationships between cognitive insight and self-stigma of seeking psychological help. However, as self-stigma of mental illness and self-stigma of seeking help are related but distinct constructs, it is plausible that similar relationships could be observed. Therefore, a further aim of the thesis which will be addressed in Chapter 5 (Study 2) was to explore whether the cognitive insight subcomponents-self-reflectiveness and self-certainty would mediate the relationships between schizotypy traits and self-stigma of seeking help. Based on the aforementioned research, higher levels of both self-reflectiveness and self-certainty could predict greater self-stigma for seeking psychological help. Therefore, it is hypothesised that self-reflectiveness and self-certainty would mediate the relationship between schizotypal traits and self-stigma of seeking help.

2.3.1.3 Self-stigma, negative affect and wellbeing

Self-stigma of having a mental illness is harmful to individuals with mental health disorders due to its contribution towards dysfunctional attitudes (Park et al., 2013). A vast number of studies in individuals with schizophrenia spectrum disorders and ARMS have found inverse relationships between self-stigma of mental illness and SWB and positive correlations with depression symptoms (Park et al., 2013; Mosanya et al., 2014; Holubuova et al., 2016; Vrbova et al., 2017). Longitudinal research has also indicated that self-stigma of mental illness and depressive symptoms are positively correlated over time in individuals with schizophrenia spectrum disorders (Lagger et al., 2018). Lysaker et al., (2007) interprets these findings as once a person is labelled as having a mental illness, negative public attitudes would become self-relevant, potentially threatening feelings of wellbeing. Consequently, it has been proposed that self-stigma is a potentially useful target for intervention (Rüsch et al., 2014).

As previously mentioned, schizophrenia research suggests that depressive symptoms and wellbeing are potential adverse outcomes of self-stigma. However, in terms of self-stigma for seeking psychological help, it is plausible to suggest the opposite direction, whereby subthreshold psychological distress/negative affect and lower wellbeing precede greater self-stigma towards seeking psychological help. For example, those experiencing distress may be vulnerable to internalising stigmatising beliefs e.g. "Individuals seeking mental health treatment are seen as weak", because help-seeking decisions become more personally relevant (Heath et al., 2017; Surapaneni et al., 2018). Evidence to support this suggestion comes from studies that have found greater psychological distress is associated with higher self-stigma for seeking psychological help, in university and general population samples (Kim & Zane, 2016; Talebi, Matheson & Anisman, 2016; Surapaneni et al., 2018). I am unaware of any research to date exploring the relationship between PWB and self-stigma for seeking psychological help. However, it is plausible to suggest that individuals who have lower levels of positive functioning, i.e. poorer relatedness with others and self-referent attitudes such as poorer self-acceptance and autonomy (e.g." I tend to worry about what other people think of me"), may be particularly vulnerable to internalising stigmatising beliefs and view hypothetically seeking help as a threat to one's self esteem and self-confidence.

2.3.1.3.1 Summary of the potential relationships between schizotypy, negative affect, wellbeing and self-stigma

If greater schizotypal traits are associated with higher self-stigma towards seeking psychological help, then it is important to explore what factors could be contributing to this relationship. Therefore, a further aim of the thesis which will be addressed in Chapter 5 (Study 2) was to explore whether negative affect and PWB mediate the relationships between schizotypy traits and self-stigma of seeking psychological help. Based on the previous literature greater negative affect and lower PWB could predict greater self-stigma for seeking

psychological help. Therefore, it is hypothesised that negative affect and PWB would mediate the relationships between schizotypal personality traits and self-stigma for seeking psychological help.

In this section of the chapter I have:

- Summarised evidence that psychotic symptoms are associated with greater self-stigma of mental illness in psychotic disorders.
- Argued that different types of self-stigma could occur across the psychosis continuum. Furthermore, identifying that the relationship between schizotypy and self-stigma of seeking help has previously been unexplored.
- Summarised evidence that higher levels of self-reflectiveness, self-certainty, negative affect and lower wellbeing are associated with greater self-stigma in psychotic disorders.
- Argued that cognitive insight, negative affect and wellbeing could also be contributing to the potential relationship between schizotypy and self-stigma.

2.3.2 Metacognition

In this section of the chapter I will:

- Explore the empirical literature available on dysfunctional metacognitive beliefs and the psychosis continuum and identify gaps in the schizotypy literature regarding the relationships between schizotypy and dysfunctional metacognitive beliefs.
- Explore the empirical literature available on how metacognition is related to cognitive insight, negative affect and wellbeing in psychotic disorders, and identify how dysfunctional metacognitive beliefs could account for a potential relationships between schizotypy and cognitive insight, negative affect and wellbeing.

Metacognition is broadly defined as "thinking about thinking" (Flavell, 1979), and is often described as an individual's ability to evaluate their own cognitive processes and use these evaluations to form behaviour (Barbato et al., 2014). Metacognition involves a continuum of activities from recognising discrete acts (noticing errors, thoughts and emotions) to integrating these elements into a larger complex synthetic representation of self and others (Lysaker et al., 2013). Discrete and synthetic metacognition are suggested to bi-directionally inform one another, as individuals' mature, so do their beliefs about themselves and others (Lysaker et al., 2014). Within the psychosis literature, both discrete and synthetic metacognition have been widely investigated (Sellers et al., 2016).

Synthetic metacognitive processes refer to one's ability to organise complex social information, so that an individual can understand and reflect upon others' mental states and use this information to deal with experiences that are distressing whilst guiding an individual's own actions in specific situations (Semerari et al., 2003; Lysaker et al., 2013). Synthetic metacognition includes four domains; *self-reflectivity* (the ability to recognise one's own mental states), *Understanding of others minds* (the ability to recognise other individuals' mental states), *Decentration* (the ability to view the world in which they exist as understandable from a number of different perspectives and *Mastery* (the ability to use their own mental states to respond to real world psychological dilemmas (Lysaker et al., 2014). Poorer synthetic metacognitive abilities have been linked to psychosis symptoms and impaired functioning in individuals with prolonged psychosis (Lysaker et al., 2005; Lysaker et al., 2007) and therefore has important implications for clinical course and outcomes in psychotic disorders (Vohs et al., 2015).

Another major focus of the psychosis literature has been exploring discrete dysfunctional metacognitive beliefs (Wells & Matthews, 1996). The Self-Regulatory Executive Functioning (S-REF) model proposes that a core Cognitive Attentional Syndrome (CAS) is associated with

unhelpful self-focussed attention and ruminative processes which result in the maintenance of symptoms and distress (Sellers et al., 2016). The CAS includes three main processes; worry/rumination, threat monitoring and maladaptive coping behaviours, which are underpinned by dysfunctional metacognitive beliefs (Bright et al., 2018). The most widely used measure of discrete metacognitive abilities is the Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997). Broad dimensions of metacognitive beliefs which are deemed to be detrimental include the following: Positive beliefs reflect an individual's belief about the usefulness of worry, rumination and threat monitoring (e.g. "focussing on danger will keep me safe"). Negative metacognitive beliefs reflect an individual's belief about the uncontrollability of thoughts (e.g. "My worrying could make me go mad") and the danger, importance and meaning of thoughts (e.g. "I should be in control of my thoughts all of the time"). Two further related domains of unhelpful metacognitive beliefs include a lack of cognitive confidence (e.g. "I do not trust my memory") and cognitive self-consciousness which reflects a tendency to be aware of and monitor thinking (e.g. "I constantly examine my thoughts") (Wells, 2009). The aforementioned dysfunctional metacognitive beliefs are proposed to be transdiagnostic factors across psychological disorders including anxiety, depression, psychotic disorders, obsessive-compulsive disorders and bipolar disorders (Sellers et al., 2016; Sun et al., 2017).

The below sections will predominantly focus on the discrete metacognitive beliefs implicated in the S-REF model because they are suggested to be potential vulnerability markers for psychiatric disorders. However, aims and hypotheses for the current thesis will also be drawn from the synthetic metacognition research, when the former literature is sparse.

2.3.2.1 Metacognition and the psychosis continuum

The application of the metacognitive model to psychosis has received substantial investigation. Morrison et al., (1995, 2001) built upon the S-REF model, proposing that dysfunctional metacognitive beliefs played a potential role in the onset and maintenance of psychotic symptoms. Specifically, it was proposed that positive metacognitive beliefs contributed to more frequent and severe positive psychotic symptoms, whereas negative beliefs about these thoughts lead to arousal and help-seeking behaviour, which then lead to the occurrence of more positive symptoms (Morrison, 2001; Sellers et al., 2016). However, an emerging consensus is that dysfunctional metacognitive beliefs do not underlie specific symptoms (i.e. hallucinations and delusions) but are rather a general vulnerability marker for psychological disorder, which influence symptom maintenance and distress (Brett et al., 2009; Varese, Barkus, & Bentall, 2011; Hill et al., 2012; Cotter et al., 2017).

In support of the S-REF model, a recent meta-analysis found that individuals with psychosis scored significantly higher on all five domains of metacognitive beliefs compared to control groups and scored significantly higher on positive beliefs about worry compared to individuals with emotional disorders (Sellers et al., 2017). A further meta-analysis revealed that individuals with ARMS did not differ from individuals with psychotic disorders on any metacognitive belief's subscale, however reported significantly higher dysfunctional metacognitive beliefs, with the exception of positive beliefs about worry, when compared to control groups (Cotter et al., 2017). Longitudinal studies have also indicated that individuals with ARMS who converted to a psychotic disorder had significantly greater dysfunctional negative metacognitive beliefs at baseline, and these beliefs predicted a continually psychotic course of illness (Barbato et al., 2014; Austin et al., 2015). Furthermore, research has also found that dysfunctional metacognitive beliefs were similar in individuals with high schizotypy when compared with individuals with at risk mental states (Barkus et al., 2010) and that individuals with high

schizotypy endorsed greater dysfunctional metacognitive beliefs compared to a low schizotypy group (Chan et al., 2015). Therefore, the preponderance of research suggesting that metacognitive beliefs are a potential vulnerability marker for conversion to psychosis and confirms the potential value of assessing metacognitive beliefs across the psychosis continuum (Morrison, French & Wells, 2007; Barbato et al., 2014).

In additional support for the S-REF model, researchers have reported associations between dysfunctional metacognitive beliefs and positive psychotic phenomena across the psychosis continuum. Cross-sectional studies have revealed positive relationships between hallucinations, delusions, and positive, negative and cognitive-confidence metacognitive beliefs in individuals with psychosis (Fraser, Morrison & Wells, 2006; Varese & Bentall, 2011). Furthermore, negative metacognitive beliefs have been associated with hallucinations in first episode psychosis and positive symptoms in individuals with ARMS (McLeod et al., 2014; Welsh et al., 2014; Sellers et al., 2016). However, several studies have found limited associations between metacognitive beliefs and specific psychotic phenomena (i.e. hallucinations and delusions) after controlling for comorbid symptoms (Brett et al., 2009; Varese & Bentall, 2011; Goldstone et al., 2013; Cotter et al., 2017). Therefore, they provide little support for Morrison et al., (1995, 2001) proposition that dysfunctional metacognitive beliefs play a role in the onset of hallucinations and delusions. The latter findings instead provide further support for the recent consensus previously discussed, whereby dysfunctional metacognitive beliefs are a general vulnerability marker for psychological disorder, in which they influence symptom maintenance and distress (Cotter et al., 2017).

Further, support for the consensus that dysfunctional metacognitive beliefs are not specific to positive psychotic phenomena, comes from cross-sectional studies that have found relationships between dysfunctional metacognitive beliefs and negative symptoms in individuals with psychotic disorders (Østefjells et al., 2015), and positive associations between

unhelpful metacognitive beliefs and both manic symptoms and cognitive difficulties in individuals with ARMS (Brett et al., 2009; Welsch et al., 2014; Bright et al., 2018). The previous research highlights the importance of investigating the associations between various symptomology and dysfunctional metacognitive beliefs.

The aforementioned findings have also extended to studies exploring the relationships between dysfunctional metacognitive beliefs and total schizotypy, positive schizotypy and specific features of positive schizotypy (i.e. hallucination and delusional proneness). The findings have remained mixed in terms of which metacognitive beliefs have been related to schizotypy traits. A largely consistent finding has been that negative metacognitive beliefs significantly predict greater total schizotypy, positive schizotypy, hallucination and delusional proneness (Larøi & Van der Linden, 2005; García-Montes et al., 2006; Stirling et al., 2007; Reeder et al., 2010; Debbané et al, 2012; Goldstone et al., 2013). On the contrary, only one study found that unhelpful positive metacognitive beliefs were associated with specific features of positive schizotypy (Larøi & Van der Linden, 2005). In addition, some studies reported significant associations between lower cognitive confidence and specific features of positive schizotypy (García-Montes et al., 2006; Goldstone et al., 2013), whereas others found no association between this metacognitive domain and schizotypy (e.g. Stirling et al., 2007; Debbané et al., 2012). Similarly, Larøi and Van der Linden (2005) indicated that greater cognitive self-consciousness predicted specific features of positive schizotypy. However, other studies reported no associations between this metacognitive domain and schizotypy (e.g. Reeder et al., 2010; Debbané et al., 2012). The aforementioned studies did not control for concurrent schizotypy traits or other psychotic phenomena, which may have influenced the inconsistent findings. However, in summary, there is a consistent finding that dysfunctional negative metacognitive beliefs are related to positive schizotypy, but relationships with dysfunctional

positive metacognitive beliefs, cognitive self-consciousness and cognitive confidence has provided mixed evidence.

2.3.2.1.1 Metacognition and schizotypy summary

As previously mentioned, the prior literature has focused on positive schizotypy or total schizotypy and their relationships with dysfunctional metacognitive beliefs, and I am unaware of any research exploring how metacognitive beliefs are associated with other dimensions of schizotypy. However, the psychosis literature has provided evidence that negative, disorganised and manic symptoms have also been associated with metacognitive beliefs. Therefore, based on the general consensus that metacognitive beliefs may be associated with a range of symptoms and not specific to positive psychotic phenomena, it is plausible to suggest that dysfunctional metacognitive beliefs are related to differential schizotypy traits other than just positive schizotypy. Furthermore, given that the preponderance of research suggests that metacognitive beliefs may potentially be a vulnerability marker for conversion to psychosis, then it is important for future research to elucidate how these metacognitive beliefs are related to dimensional schizotypy traits.

Consequently, an aim of the current thesis was to explore whether multidimensional schizotypy traits were related to dysfunctional metacognitive beliefs, and this will be addressed in Chapter 6 (Study 3). Based on the previous literature it is expected that multidimensional schizotypy traits will predict greater dysfunctional metacognitive beliefs, however, it is unknown which schizotypy traits will be related to the differential metacognitive beliefs. Therefore, it is hypothesised that greater schizotypy traits will significant predict higher levels of all five dysfunctional metacognitive beliefs.

2.3.2.2 Metacognition and cognitive insight

It is proposed that metacognition is a potential barrier for insight in psychosis (Vohs et al., 2015). However, studies in psychotic disorders, have predominantly focused on exploring the relationships between insight and synthetic metacognition abilities rather than dysfunctional discrete metacognitive beliefs. It is theorised that deficits in metacognition in individuals with psychotic disorders, may limit their ability to grasp the perspective of others, and may limit a person's ability to know how their own mental states have changed and to evaluate the impact of those on others, hence limiting ones clinical and cognitive insight (Vohs et al., 2015). In psychosis, lower clinical insight into one's illness has consistently been associated with poorer synthetic metacognition (Lysaker et al., 2011b; Nicolo et al., 2012; Chan, 2016). One study has also explored the associations between cognitive insight and synthetic metacognition in individuals with psychotic disorders. Sharma et al., (2017) found a positive association between self-reflectiveness and metacognition. This infers that the ability to consider different perspectives and evaluate alternate hypotheses may be reliant on the ability to produce complex representations of one's own mental states (Lysaker et al., 2011b).

I am unaware of any research to date exploring the associations between the discrete dysfunctional metacognitive beliefs, and clinical or cognitive insight in psychotic disorders. Therefore, there needs to be further exploration of the different facets of metacognition and their contribution to insight across the psychosis continuum, particularly as discrete dysfunctional metacognitive beliefs may be a vulnerability marker for psychosis.

It is suggested that cognitive insight fits within the broader conceptualisation of metacognition as it also requires self-appraisal and is likely based on similar "higher-level" cognitive processes (Van Camp et al., 2017). Recent research has begun to investigate the associations between dysfunctional metacognitive beliefs and cognitive insight in individuals with

Obsessive Compulsive Disorder (OCD), with studies finding similarities in dysfunctional metacognitive beliefs in individuals with OCD and schizophrenia, suggesting that these two diagnoses share a common metacognitive pathway (Mortiz et al., 2010). Eckini & Eckini, (2016) found that greater endorsement of dysfunctional metacognitive beliefs (i.e. greater cognitive self-consciousness and lack of cognitive confidence) were associated with higher self-reflectiveness. This is somewhat counterintuitive to the hypothesis that poorer metacognitive abilities are associated with lower cognitive insight. The latter findings instead lending additional support to the "insight paradox", whereby higher self-reflectiveness may not always be beneficial. One explanation for the findings, it that the relationship between dysfunctional metacognitive and higher self-reflectiveness may be a consequence of rumination processes. It has been proposed that dysfunctional metacognitive beliefs can give rise to worry or rumination in individuals with schizophrenia (Wells, 2007) and schizophrenia research has found that greater rumination is associated with awareness and consequences of illness (Thomas, Ribaux & Phillips, 2014). In addition, research has also found that rumination was positively associated with greater self-reflectiveness in a non-clinical sample with high delusional proneness (Carse & Langdon, 2013). Therefore, taking the research into consideration, it may be that dysfunctional metacognitive beliefs predict the ability to consider a variety of perspectives and evaluate alternate hypotheses (i.e. self-reflectiveness) because of a focussed attention on the symptoms of one's distress and on its possible causes and consequences.

2.3.2.2.1 Summary of the potential relationships between schizotypy, metacognition and cognitive insight

Because dysfunctional metacognitive beliefs are potentially a vulnerability marker for psychosis, exploring associations with cognitive insight are of great research and clinical importance. The findings of this thesis may also inform researchers of the potential benefit of

exploring the relationships between cognitive insight and unhelpful metacognitive beliefs in psychotic disorders. Therefore, a further aim of the current thesis was to explore whether dysfunctional metacognitive beliefs play a mediating role in the relationship between schizotypy and the cognitive insight subcomponents- self-reflectiveness and self-certainty, which will be addressed in Chapter 6 (Study 3). It is expected that greater dysfunctional metacognitive beliefs- in particular greater cognitive self-consciousness and lack of cognitive confidence, would predict higher self-reflectiveness. It remains unclear whether metacognitive beliefs would also predict self-certainty. Overall, it is hypothesised that dysfunctional metacognitive beliefs- in particular cognitive self-consciousness and lack of cognitive confidence would mediate the relationship between schizotypy and the cognitive insight subcomponents- self-reflectiveness and self-certainty.

2.3.2.3 Metacognition and negative affect

A further core assumption of the SREF model is that negative metacognitive beliefs are associated with enduring negative affect (i.e. depression and anxiety) because they guide unhelpful coping strategies such as worry and rumination (Wells, 2009). It has since been proposed that metacognitive beliefs may play an important role in psychological distress in psychotic disorders as dysfunctional metacognitive beliefs could mediate or moderate the affective response (i.e. depression and anxiety) to psychotic symptomology (van Oosterhout et al., 2013). For example, dysfunctional metacognitive beliefs have also been found to mediate the relationship between intrusive thoughts and both anxiety and depression in individuals with schizophrenia spectrum disorders (Bortolon et al., 2014).

However, findings regarding the relationships between specific metacognitive beliefs and negative affect have remained mixed in psychotic disorders. One consistent finding is that unhelpful negative metacognitive beliefs have been associated with greater negative affect,

often over and above psychotic symptom severity (Brett et al., 2009; Hill et al., 2012; Van Oosterhout et al., 2013; Sellers et al., 2016). In addition, some of the aforementioned studies have also found that higher cognitive self-consciousness and lack of cognitive confidence were associated with greater negative affect (Brett et al., 2009; Barbato et al., 2014), whereas others have not found this relationship (Hill et al., 2012; Van Oosterhout et al., 2013; Sellers et al., 2016). These inconsistent findings may be a consequence of some studies controlling for different metacognitive beliefs (i.e. multiple regression) and others just exploring the correlations between metacognitive beliefs and negative affect. In summary it may be suggested that dysfunctional negative metacognitive beliefs are associated with greater negative affect in psychotic disorders and other metacognitive beliefs such as cognitive self-consciousness and cognitive confidence may also play a potential role.

Despite knowledge that metacognitive beliefs contribute to negative affect in individuals with psychotic disorders, investigations of their associations with negative affect in individuals with schizotypy traits has remained sparse, with studies focusing on positive schizotypy or paranoid ideation. Debbané et al., (2012) found that dysfunctional metacognitive beliefs were independently associated with both anxiety and positive schizotypy in an adolescence sample. Additionally, Sellers et al., (2018) reported that dysfunctional metacognitive beliefs moderated the relationship between non-clinical paranoid ideation and negative affect. Therefore, there are currently limitations to our knowledge, regarding whether metacognitive beliefs may influence affective states in individuals with schizotypy traits. However, it is plausible that dysfunctional metacognitive beliefs will mediate the relationships between multidimensional schizotypy traits and negative affect.

2.3.2.3.1 Summary of the potential relationships between schizotypy, metacognition and negative affect

As previously mentioned, dysfunctional metacognitive beliefs may play an important role in distress in psychotic disorders. However, their relationships with distress in schizotypy has remained relatively unexplored with previous research focusing on either positive schizotypy or delusional proneness. Exploring the relationships between multidimensional schizotypy traits, metacognitive beliefs and negative affective states has important research and clinical implications given that unhelpful metacognitive beliefs and affective states are risk factors for transition to psychotic disorders.

Therefore, a further aim of the current thesis was to explore the mediating role of dysfunctional metacognitive beliefs in the relationship between schizotypy traits and negative affect and this will be addressed in Chapter 6 (Study 3). It is expected that greater unhelpful <u>negative</u> metacognitive beliefs would predict greater negative affect, however, based on the previous inconsistent findings it is unclear whether the following metacognitive domains: cognitive self-consciousness and cognitive confidence will also predict negative affect. As such the hypotheses remained broad and it is hypothesised that greater dysfunctional metacognitive beliefs, with the exception of positive beliefs about worry, will mediate the relationship between schizotypy and negative affect.

2.3.2.4 Metacognition and wellbeing

Despite emerging evidence implicating dysfunctional metacognitive beliefs in the relationships between psychotic symptoms and associated distress, little research has explored the link between metacognitive beliefs and wellbeing across the psychosis continuum. One study to date has explored the relationship between metacognitive beliefs and PWB in individuals with psychotic disorders. Valiente et al., (2012) found PWB to be compromised in psychotic

individuals whom have high levels of persecutory thinking, when they have lower cognitive self-consciousness. The authors of the research suggested that individuals with persecutory thinking use cognitive self-consciousness to sustain a sense of wellness, however the impact of metacognitive beliefs may differ dependent on the symptoms experienced (Valiente et al., 2012). Furthermore, the study focussed on one metacognitive belief, therefore, it remains to be seen whether other dysfunctional metacognitive beliefs are associated with better or poorer PWB across the psychosis continuum. Given that the aforementioned research has consistently found negative metacognitive beliefs to be associated with greater negative affect, then it is plausible to suggest that these particular metacognitive beliefs are also associated with poorer PWB.

Further evidence to support this suggestion comes from the Obsessive-Compulsive Disorder (OCD) research, which revealed that greater endorsement of negative metacognitive beliefs predicted poorer quality of life, whereas similar to the psychosis literature, a great endorsement of cognitive self-consciousness predicted greater quality of life (Barahmand et al., 2014). Therefore, whilst limited studies have examined the relationships between dysfunctional metacognitive beliefs and PWB in schizophrenia spectrum disorders, evidence from the aforementioned literature may suggest that negative metacognitive beliefs predict poorer PWB whereas, cognitive self-consciousness may predict better PWB. This relationship however, has remained unexplored in schizotypy.

2.3.2.4.1 Summary of the potential relationships between schizotypy, metacognition and wellbeing

In summary, there has been limited research exploring the relationships between metacognitive beliefs and wellbeing in psychotic disorders, and this relationship has remained unexplored in schizotypy. Taking into consideration the limited previous evidence, it may be that metacognitive beliefs play an important role in the well-established relationship between schizotypy and PWB. Therefore, an aim of the thesis was to explore metacognitive beliefs mediating role in the well-established relationship between schizotypy and PWB and this will be addressed in Chapter 6 (Study 3). Based on the aforementioned research it was expected that greater levels of negative metacognitive beliefs and lower cognitive self-consciousness would predict poorer PWB. Therefore, it was hypothesised that these specific metacognitive beliefs would mediate the relationships between schizotypy and PWB.

In this section of the chapter I have:

- Summarised evidence that dysfunctional metacognitive beliefs are a potential vulnerability marker associated with psychotic disorders, at-risk mental states and positive features of schizotypy.
- Argued that the relationships between dysfunctional metacognitive beliefs has yet to be extended to multidimensional schizotypy traits beyond positive schizotypy.
- Summarised evidence that dysfunctional metacognitive beliefs are associated with cognitive insight, negative affect and wellbeing.
- Identified that previous literature has not explored dysfunctional metacognitive beliefs contribution to the relationships between schizotypy and cognitive insight, negative affect and wellbeing.

2.3.3 Neurocognition

In this section of the chapter I will:

- Explore the empirical literature available on neurocognition and psychotic disorders, at risk mental states and schizotypy, and identify the methodological limitations of the previous schizotypy literature.
- Explore the empirical literature available on how neurocognition is related to cognitive insight, negative affect and wellbeing in psychotic disorders, and identify how neurocognition could account for a potential relationship between schizotypy and cognitive insight, negative affect and wellbeing.

Neurocognition deficits are suggested to be a core feature of schizophrenia and are central to the manifestation of the pathophysiology of the disorder (Fusar-Poli et al., 2012). The MATRICS Consensus statement for Cognition in schizophrenia indicates there are six relevant cognitive domains: Speed of Processing, Attention/Vigilance, Working Memory, Verbal Learning & Memory, Visual Learning & Memory and Reasoning and Problem Solving (Neuchterlein & Green, 2006). The trajectory of cognitive deficits has been a part of a major debate, with regards to whether schizophrenia follows a neurodevelopment or a neurodegenerative course (Bora, 2015). However, most researchers accept the neurodevelopment model, which suggests that cognitive deficits in schizophrenia spectrum disorders are a consequence of genetic and non-genetic risk factors which lead to abnormal brain development, which can be associated with a lag during development (i.e. problems in acquiring cognitive abilities; Bora, 2015). Furthermore, it has been suggested that the emergence of symptoms of psychosis may interfere with the maturation of advanced cognitive abilities (e.g. reasoning and problem solving) during development (Bora et al., 2018). Meta-analyses have shown that negative symptoms have the strongest associations with

neurocognitive domains followed by disorganised symptoms and positive symptoms (Ventura et al., 2011). It is proposed that neurocognitive deficits represent endophenotypes and are vulnerability markers of schizophrenia (Gur et al., 2007). Therefore, further studies of neurocognition particularly in healthy individuals may provide important insights into neurocognitive abilities across the psychosis continuum.

2.3.3.1 Neurocognition and the psychosis continuum

The below sections will discuss each of the neurocognitive domains separately and how they are related to the psychosis continuum, which will be followed by a summary of the schizotypy literature and how this thesis will extend on the prior research. The relationships between neurocognition and cognitive insight, negative affect and wellbeing will then be discussed.

2.3.3.1.1 Speed of Processing

Speed of processing refers to the skill of processing new information rapidly and efficiently (Kalkstein, Hurford & Gur, 2010). This particular domain is of vital concern for individuals with psychotic disorders, as many other cognitive operations such as retrieval and coding rely on speed of processing (Kalkstein et al., 2010). In support of the neurodevelopmental model of schizophrenia, recent studies and meta-analyses have demonstrated large impairments in speed of processing for individuals with schizophrenia spectrum disorders (Rajji et al., 2013; McCleery et al., 2014; Bora & Pantelis, 2015) and individuals with ARMS (Kelleher et al., 2012; Hou et al., 2016). Further studies have demonstrated that speed of processing is one of the largest cognitive impairments in psychotic disorders (Knowles, David & Reichenberg, 2010; Kern et al., 2011), and is a significant predictor of later transition to psychosis in individuals with ARMS (Addington et al., 2016). Therefore, exploring speed of processing abilities across the psychosis continuum is of great importance.

Correlational studies have also explored the relationships between speed of processing and psychotic symptoms. A preponderance of studies has found that negative symptoms are associated with poorer speed of processing in individuals with schizophrenia spectrum disorders (Leeson et al., 2008; Lin et al., 2013) and individuals with ARMS (Yung et al., 2019). Furthermore, in psychotic disorders, poorer speed of processing has also been associated with positive symptoms (Rund et al., 2004; Addington, Saeedi & Addington, 2005) and disorganised symptoms (Lindsberg Poutiainen & Kalska, 2009).

Speed of processing has received substantial investigation in the schizotypy literature utilising general population and university samples, albeit with inconsistent findings. For example, poorer speed of processing has been found in high schizotypy compared with low schizotypy groups (Hori et al., 2014). Furthermore, poorer speed of processing has been significantly associated with greater negative schizotypy (Louise et al., 2015; Martín-Santiago et al., 2016) and positive schizotypy (Martín-Santiago et al., 2016). The findings suggest there are a continuity of cognitive impairments across the psychosis continuum. On the contrary, other studies have found no differences in speed of processing when comparing high and low schizotypy groups (Badcock et al., 2015; Xavier et al., 2015), nor significant associations with multidimensional schizotypy traits (Badcock et al., 2015; Karagiannopolou et al., 2016). Badcock et al., (2015) propose that the lack of associations observed between schizotypy and speed of process suggests that this neurocognitive domain is a potential compensatory or protective factor in schizotypy.

2.3.3.1.2 Working Memory

Working memory refers to the ability of maintaining and manipulating information (Kalkstein et al., 2010). Evidence proposes that working memory alongside speed of processing is one of the most impaired cognitive domains in psychotic disorders (Kern et al., 2011). Studies have

found large impairments in working memory for individuals with psychotic disorders (Forbes et al., 2009; Mesholam-Gately et al., 2009) and individuals with ARMS (Fusar-Poli et al., 2012). Longitudinal studies have also demonstrated that individuals with ARMS who transitioned to psychosis had greater deficits in working memory compared with those that did not transition (Seidman et al., 2016). In addition, correlational studies have shown that working memory is associated with negative symptoms (Addington et al., 2005; González-Ortega et al., 2013; Lin et al., 2013) and positive symptoms (Addington et al., 2005) in individuals with schizophrenia spectrum disorders.

Similar to patterns observed in speed of processing, the relationship between schizotypy and working memory has provided mixed evidence. Recent meta-analyses have revealed small deficits in individuals with schizotypy compared to controls (Chun, Minor & Cohen, 2013; Siddi, Petretto & Preti, 2017). Individual correlational studies have also found that poorer working memory is associated with negative schizotypy (Karagiannopolou et al., 2016; Zouraki et al., 2016) and positive and disorganised schizotypy (Schmidt-Hansen & Honey, 2009; Zouraki et al., 2016). However, other studies have reported no associations between working memory and schizotypy traits (Daly, Afroz & Walder, 2012). In addition, a recent community study revealed that participants with high levels of subclinical positive symptoms performed significantly better in measures of working memory (Korponay et al., 2014), thus, supporting the suggestion that schizotypy can be related to adaptive functioning.

2.3.3.1.3 Attention/Vigilance

Attention has been defined as the ability to identify the signal in complex incoming sensory information, whilst vigilance is the ability to sustain attention over a prolonged time period (Kalkstein et al., 2010). Meta-analyses have revealed that attention is significantly impaired in individuals with psychotic disorders (Fioravanti, Bianchi & Cinti, 2012) and individuals with

ARMS (Zheng et al., 2018). Attention has also been associated with negative symptoms and disorganised symptoms in individuals with psychotic disorders (Ventura et al., 2011; Lin et al., 2013) and negative symptoms in individuals with ARMS (Lin et al., 2013). However, research regarding attentions role in the transition to psychotic disorders has remained mixed. A recent longitudinal study found attention is a significant predictor of transition to a psychotic disorder in individuals with ARMS (Carrión et al., 2015). However, other longitudinal studies have found no association between risk of transition and attention in individuals at ARMS (Fusar-Poli et al., 2012; Bora et al., 2014). The latter findings may indicate that other neurocognitive domains such as speed of processing and working memory are more important cognitive markers for risk of transition to psychosis.

A review by Ettinger et al., (2015) reported that a group of individuals with high schizotypy displayed poorer selective and sustained attention compared with individuals with low schizotypy. Correlational studies have also reported relationships between poorer attention and negative schizotypy (Louise et al., 2015; Karagiannopolou et al., 2016) and positive and disorganised schizotypy (Kane et al., 2016). However, on the contrary, a meta-analyses revealed no differences in attention in schizotypy compared to controls (Chun et al., 2013). Therefore, it remains unclear whether schizotypy is associated with attention abilities.

2.3.3.1.4 Reasoning and Problem Solving

Reasoning and problem solving has been defined as higher level cognitive processes that control the decision making and deal with the "how" and "whether" aspects of certain processes (Kalkstein et al., 2010). Meta-analyses have revealed that individuals with schizophrenia spectrum disorders display significantly impaired problem solving and reasoning, albeit with smaller effect sizes in comparison to speed of processing and working memory (Fatouros-Bergman et al., 2015). In the at-risk mental state's literature, research has found that reasoning

and problem solving is relatively preserved (Corigliano et al., 2014; Bang et al., 2015). Furthermore, a recent meta-analyses demonstrating that there were no significant differences in problem solving/reasoning in individuals with ARMS who converted to psychosis in comparison to individuals with ARMS who did not transition (De Herdt et al., 2013). Studies which have focused on exploring the associations between clinical symptoms and problem solving/reasoning, have also found significant associations between problem solving/reasoning and positive, negative and disorganised symptoms in individuals with schizophrenia spectrum disorders (Heydebrand et al., 2004; Lindsberg et al., 2009; Lin et al., 2013) and disorganised and negative symptoms in individuals with ARMS (Meyer et al., 2014).

In the schizotypy literature, research has found poorer levels of problem solving/reasoning in individuals high in schizotypy compared to individuals with low schizotypal traits (Cimino & Haywood, 2008; Kim et al., 2011), and negative schizotypy also related to poorer problem solving/reasoning (Louise et al., 2015). On the contrary, a preponderance of research has observed no differences in problem solving/reasoning in high schizotypy and non-significant relationships with the individual multidimensional schizotypy traits (Jahshan & Sergi, 2007; Laws, Patel & Tyson, 2008; Chun et al., 2013; Korponay et al., 2014; Karagiannopolou et al., 2016). Therefore, the research suggests that cognitive deficits may only be apparent in individuals with high schizotypy, yet potentially adaptive in individuals with varying levels of schizotypy traits.

2.3.3.1.5 *Visual and Verbal Learning and Memory*

Visual and verbal learning and memory are separate abilities which are defined as the ability to learn and remember information provided by a verbal cue or a visual cue (Kurtz et al., 2017). Meta-analytic reviews have revealed significant impairments in verbal recall memory tasks and visual recall memory tasks in individuals with schizophrenia when compared with healthy

controls (Forbes et al., 2009; Mesholam-Gately et al., 2009). Comparative findings have also been observed in individuals with ARMS, with the meta-analytic reviews identifying that marked deficits in visual and verbal memory were significant predictors of later transition to psychosis (Fusar-Poli et al., 2012; Bora et al., 2014). Furthermore, impairments in both verbal and visual learning and memory have been associated with disorganised symptoms (Ventura et al., 2010) and negative symptoms (Lin et al., 2013) in individuals with schizophrenia spectrum disorders, and negative symptoms in individuals with ARMS (Lin et al., 2011).

Similar to patterns observed in individuals with schizophrenia spectrum disorders and ARMS, a recent meta-analysis found significant impairments in visual and verbal memory in individuals with high schizotypy when compared with controls (Siddi et al., 2017). On the contrary, correlational studies exploring the associations between multidimensional schizotypy traits and the aforementioned cognitive domains has remained mixed. Some studies have found that verbal fluency/memory is inversely associated with negative schizotypy (Cohrane et al., 2012; Dinzeo et al., 2018). However, other studies have found better verbal memory and learning in individuals with high schizotypy (Cohen, Inglesias & Minor, 2009), and positive associations between subclinical psychotic symptoms and verbal and visual learning and memory (Korponay et al., 2014; Gagnon et al., 2018). Further studies have also reported non-significant relationships between visual or verbal learning and memory, and schizotypy personality traits (Lenzenweger & Gold, 2000; Karagiannopolou et al., 2016). Therefore, as I previously suggested, cognitive deficits may only be related to high levels of concurrent schizotypy (i.e. high total schizotypy), whereas, adaptive in other individuals with varying levels of schizotypy traits.

2.3.3.1.6 Neurocognition and schizotypy summary

Overall there has been a plethora of research exploring the relationships between schizotypy and neurocognitive abilities, in student and community samples. However, whilst neurocognitive impairments have been well established in schizophrenia spectrum disorders and ARMS, the schizotypy literature has been equivocal. Studies which have observed impairments in neurocognitive abilities in individuals with schizotypy traits albeit with attenuated severity, provide evidence for the neurodevelopmental model of schizophrenia and provide further support for continuities between schizotypy and schizophrenia spectrum disorders. On the contrary studies that have observed superior cognitive performance in individuals with schizotypy or no differences in neurocognitive abilities, provide evidence for the suggestion that intact neurocognition in individuals with schizotypy or subclinical psychosis symptoms could be due to compensatory mechanisms, which in turn protects said individuals from the precipitation of psychosis (Ettinger et al., 2015; Gagnon et al., 2018).

Furthermore, differential methodologies have made it difficult to reconcile the literature and may also account for the inconsistencies previously found. Most studies which have utilised community samples have observed impairments in neurocognitive abilities in individuals with schizotypy (Hori et al., 2014; Louise et al., 2015; Martín-Santiago et al., 2016; Karagiannopolou et al., 2016; Zouraki et al., 2016), albeit with two studies which found better performance (Korponay et al., 2014; Gagnon et al., 2018). On the contrary the majority of inconsistent findings come from studies utilising student samples. Some studies have observed impairments (Cimino & Haywood, 2008; Cochrane et al., 2012; Schmidt-Hansen & Honey, 2009; Kane et al., 2016; Dinzeo et al., 2018) others found no associations (Lenzenweger et al., 2000; Jahshan & Sergi, 2007; Laws et al., 2008; Daly et al., 2012; Xavier et al., 2015) and further studies finding better performance (Cohen, Iglesias & Minor, 2009). Badcock et al., (2015) suggested that educational attainment and cognitive resources in university samples

may potentially influence the inconsistent findings. Therefore, given the clinical importance of neurocognition in psychotic disorders, future research is required to clarify how multidimensional schizotypy traits are related to neurocognitive abilities in university samples. Use of university samples has been considered a conservative approach to assessing schizotypy and psychosis risk in research as these individuals are expected to have a host of protective factors (Kwapil & Barrantes-Vidal, 2014). Therefore, any significant findings observed, encourage research to extend to broader community samples as well integrating with high risk research studies (Kwapil & Barrantes-Vidal, 2014).

In addition, most studies assess specific cognitive domains using a variety of different measures, with only a small number of studies assessing neurocognitive abilities using a standardised battery of cognition tasks (e.g. Cohen et al., 2009; Korponay et al., 2014; Badcock et al., 2015). Therefore, future research should look to utilise measures that assess the full range of cognitive domains which have typically demonstrated impairments across the psychosis continuum.

Furthermore, most studies have used the SPQ or the Wisconsin Schizotypy Scales (Chapman, Chapman & Raulin, 1976) to assess schizotypy, with only a small number of studies utilising the OLIFE (Cimino & Haywood, 2008; Schmidt-Hansen & Honey, 2009; Louise et al., 2015). Additionally, some studies assess multidimensional schizotypy traits continuously, whereas others dichotomise into high and low schizotypy groups. Therefore, differences in neurocognitive abilities may arise as a function of how schizotypy is defined (Chun et al., 2013), and it has been suggested that neurocognitive abilities may be differentially associated with multidimensional schizotypy traits (Badcock et al., 2015). The majority of the previous literature has explored the relationship between neurocognition and traditional schizotypy dimensions i.e. positive, negative and disorganised schizotypy. However, Louise et al., (2015) found that whilst impulsive non-conformity was not associated with traditional neurocognitive

measures, it was significantly associated with poorer cognitive control. Cognitive control can be defined as processes involved in carrying out goal-directed behaviour during interference (Steffens et al., 2018). The latter study demonstrates the importance of future research assessing the range of multidimensional schizotypy traits and their unique associations with neurocognitive abilities.

Consequently, the present thesis aimed to investigate a battery of neurocognitive domains and their unique associations with multidimensional schizotypy traits, utilising a university sample and will be addressed in Chapter 7 (Study 4). Given that previous studies have reported mixed findings, the current thesis expects that neurocognition will be associated with schizotypy traits, however the direction of this relationship remains unclear (i.e. better performance or poorer performance in cognitive domains). Therefore, it is hypothesised that greater schizotypy will significantly predict neurocognitive abilities.

2.3.3.2 Neurocognition and cognitive insight

The neuropsychological model of insight proposes that a lack of insight into illness is a result of impairments in neurocognitive functioning (Lysaker & Bell, 1994). Following this line of reasoning, it has been proposed that impairments in neurocognitive abilities may cause diminished cognitive insight in psychotic disorders (Riggs et al., 2010). In support of this hypothesis, several studies in individuals with schizophrenia spectrum disorders have found relationships between cognitive insight and neurocognitive domains. Regarding self-certainty, studies have found inverse associations between this element of cognitive insight and verbal learning and memory (Engh et al., 2011), speed of processing (Poyraz et al., 2016) and problem solving/reasoning (Cooke et al., 2010; Srivastava & Kumar, 2016). In regard to self-reflectiveness, this subcomponent of cognitive insight has been positively associated with verbal learning and memory (Buchy et al., 2009; Poyraz et al., 2016) and problem

solving/reasoning (Kao et al., 2013; González-Blanch et al., 2014). Further studies focusing on exploring the relationships between the cognitive insight composite score and neurocognition, have also found positive associations with verbal learning/memory (Lepage et al., 2008) speed of processing (Gilleen, Greenwood & David, 2010), attention (Kao et al., 2013) and working memory (Orfei et al., 2010). The findings overall have been interpreted as an ability to evaluate one's own aberrant ideas and apply self-correction strategies, is reliant on one's ability to remember past information, process new information rapidly and efficiently and be able to form and follow strategies (Engh et al., 2011).

In contrast to these individual studies, a recent meta-analyses in psychotic disorders, found that memory was the only neurocognition domain to be associated with cognitive insight, and whilst it was associated with self-certainty it was not associated with self-reflectiveness (Nair et al., 2014). A plausible explanation for the lack of relationships observed between self-reflectiveness and memory in the meta-analysis, may be a consequence of high levels of self-certainty diminishing the capacity to be self-reflective in individuals with psychotic disorders. This is supported by research observing positive associations between self-reflectiveness and speed of processing, problem solving and reasoning, verbal memory and visual memory in healthy participants (Orfei et al., 2011) and individuals with bipolar disorder (Van Camp et al., 2016). Emerging research has also begun to explore the associations between cognitive insight and neurocognition in individuals with ARMS, with higher self-certainty associated with poorer problem solving/reasoning abilities (Ohmuro et al., 2018). Therefore, whilst limited, the evidence suggests that relationships between cognitive insight and neurocognition may be occurring across the psychosis continuum.

2.3.3.2.1 Summary of the potential relationships between schizotypy, neurocognition and cognitive insight

The aforementioned research has provided evidence that neurocognitive abilities are associated with cognitive insight in individuals with psychotic disorders, ARMS, individuals with bipolar disorder and healthy participants. However, the relationships between neurocognition and cognitive insight have yet to be explored in schizotypy. Given that neurocognition and cognitive insight subcomponents may serve as potential protective and risk factors in psychosis, exploring such relationships has important research and clinical implications. Therefore, the present thesis (Chapter 7. Study 4) will explore the mediating role of neurocognitive abilities in the relationship between schizotypy and cognitive insight subcomponents- self-reflectiveness and self-certainty. Based on the prior research it is expected that greater neurocognitive abilities will predict higher self-reflectiveness and lower self-certainty. Therefore, it was hypothesised that neurocognitive abilities would mediate the relationship between schizotypy and cognitive insight subcomponents- self-reflectiveness and self-certainty.

2.3.3.3 Neurocognition and negative affect

There is a general consensus that neurocognitive impairments are significant predictors of poor functional outcomes in psychotic disorders (Kurtz & Tolman, 2011). However, studies that have investigated the relationships between neurocognition and negative affect and wellbeing have been highly discordant.

In schizophrenia spectrum disorders, depressive symptoms have been inversely associated with global cognition (de Raykeer et al., 2019) attention (Kohler et al., 1998), and memory (Brébion et al., 1997) and speed of processing (Brébion et al., 2000). These findings have also extended to the ARMS literature, with a recent study finding poorer global cognition was significantly

associated with greater depressive symptoms (Ohmuro et al., 2015). These findings are comparative with research in major depressive disorder, which indicates that impairments in cognitive performance are significantly correlated with depressive symptoms (McDermott & Ebmeier, 2009; Lee et al., 2012). On the contrary, other studies have found positive relationships between speed of processing and depressive symptoms in schizophrenia spectrum disorders (Herniman et al., 2018), or failed to find associations between depressive symptoms and any neurocognitive abilities (Jepsen et al., 2013; Ohmuro et al., 2015). A plausible explanation for these inconsistent findings may be that the relationship between neurocognition and depression differs somewhat during the different phases of psychotic illness (Herniman et al., 2018). For example, it has been speculated that those who are not in an active phase of psychosis would have better cognitive abilities, allowing them to be aware of their environment and situations (i.e. insight) which may lead to greater depression (Herniman et al., 2018).

2.3.3.3.1 Summary of the potential relationships between schizotypy, neurocognition and negative affect

The aforementioned research has provided evidence that neurocognitive abilities are associated with negative affect in individuals with psychotic disorders, however, this relationship has been unexplored in schizotypy. Given the suggestion that negative affect is a risk factor for transition to psychotic disorders, elucidating whether neurocognition may be contributing to the relationships between schizotypy and negative affect may have important research and clinical implications. Therefore, an aim of the present thesis will be to explore whether neurocognition plays a mediating role in the relationship between schizotypy traits and negative affect, which will be explored in Chapter 7 (Study 4). It is unclear whether neurocognitive abilities would significantly predict higher or lower negative affect, however, it is hypothesised that neurocognitive abilities will mediate the relationship between schizotypy and negative affect.

2.3.3.4 Neurocognition and wellbeing

In psychotic disorders, the relationship between neurocognition and wellbeing has also been inconsistent, with the preponderance of research focusing on measures of quality of life. For example, studies have found better quality of life is associated with greater working memory and verbal learning/memory abilities (Alptekin et al., 2005) and better problem solving/reasoning abilities (Tas et al., 2013). Contrarily, other research has found that better verbal learning/memory, attention, working memory and problem solving/reasoning was associated with poorer quality of life (Kurtz & Tolman, 2011) and a number of studies have also found no relationships between neurocognitive abilities and quality of life (Brissos et al., 2008; Chino et al., 2008). The inconsistent results have been suggested to be a consequence of using different objective and subjective measures of quality of life (Tolman et al., 2010). For example, a meta-analysis in individuals with schizophrenia spectrum disorders, revealed positive associations between neurocognitive domains and objective measures of quality of life, however, inverse associations with subjective measures of quality of life. It is suggested that those individuals with higher cognitive abilities would be more likely to function better, maintain social networks and live independently (objective quality of life). However, paradoxically having greater cognitive capacity may result in better insight into illness which could lead negative social comparison, thus lowering subjective life satisfaction (Tolman et al., 2010).

The schizotypy research has also begun to explore the relationship between neurocognition and wellbeing (i.e. quality of life), albeit limited with inconsistent findings. Xavier et al., (2015) found an inverse association between a composite neurocognition domain and subjective quality of life in individuals with high schizotypy, which may suggest that relationships between neurocognition and wellbeing are occurring across the psychosis continuum. On the other hand, Chun et al., (2013) found no relationship between neurocognitive domains and

either subjective or objective quality of life in individuals with high schizotypy. Therefore, it remains unclear as to whether neurocognition is associated with wellbeing in individuals with schizotypy traits.

2.3.3.4.1 Summary of the potential relationships between schizotypy, neurocognition and wellbeing

The previous research has focused on measures of quality of life, which closely relate to subjective wellbeing (Joshanloo, 2019), with little studies exploring the relationships between neurocognition and PWB. However, given the evidence that psychological wellbeing precedes both subjective wellbeing and quality of life (Joshanloo, 2019), it is plausible to suggest that neurocognition will be associated with this wellbeing domain. Furthermore, a potential limitation of the previous schizotypy literature exploring the relationships between neurocognition and wellbeing is that it has focused on high and low psychometrically defined schizotypy groups. Therefore, it remains unknown whether the relationships between neurocognition and wellbeing could be linked to specific schizotypal traits. For example, schizophrenia research has found that it is mainly negative symptoms which mediate the influence of neurocognition on quality of life and functional outcome (Lin et al., 2013).

Therefore, the present thesis will extend the prior literature (i.e. Chapter 7. Study 4) by exploring whether neurocognition is related to PWB and whether it mediates the well-established relationship between differential schizotypal personality traits and PWB. This may have important implications given that PWB represents positive mental health aspects that play an important restorative and protective role in one's mental and physical health (Uzenoff et al., 2010). Similar to the relationship with negative affect, it is unclear whether neurocognitive abilities would predict either higher or lower PWB, however, it is hypothesised that neurocognitive abilities will mediate the relationship between schizotypy and PWB.

In this section of the chapter I have:

- Summarised evidence that impaired neurocognitive abilities are a potential vulnerability marker associated with psychotic disorders and at-risk mental states.
- Argued that methodological limitations of previous schizotypy research may have contributed to inconsistent findings regarding the relationships between schizotypy and neurocognition.
- Summarised evidence that neurocognition has been associated with cognitive insight, negative affect and wellbeing in psychotic disorders.
- Identified that previous literature has not explored neurocognitions contribution to the relationships between schizotypy and cognitive insight, negative affect and wellbeing.

2.3.4 Social cognition

In this section of the chapter I will:

- Explore the empirical literature available on social cognition and psychotic disorders, at risk mental states and schizotypy, and identify the methodological limitations of the previous schizotypy literature.
- Explore the empirical literature available on how social cognition is related to cognitive insight, negative affect and wellbeing in psychotic disorders, and identify how social cognition could account for a potential relationship between schizotypy and cognitive insight, negative affect and wellbeing.

Social cognition is referred to as the processes by which we draw in inferences about other individual's beliefs and intentions, and how we use social situational factors to make these inferences" (Green et al., 2008). A National Institute of Mental Health (NIMH) consensus statement suggests that there are four social cognition domains relevant to schizophrenia: Theory of Mind (ToM), Emotion Processing, Social Perception and Attribution Bias/Style

(Green et al., 2011). Growing evidence has led to the proposition that social cognition impairments may precede the onset of illness, are trait-like qualities and candidates for endophenotypes of schizophrenia spectrum disorders (Pinkham et al., 2013; Green, Horan & Lee, 2015). Therefore, further studies of social cognition across the psychosis continuum, particularly in healthy individuals may provide important insights into the neurobiological factors that potentially contribute to and underlie the vulnerability to schizophrenia spectrum disorders (Green et al., 2015).

2.3.4.1 Social cognition and the psychosis continuum

The below sections will discuss each social cognition domain separately and how they are related to the psychosis continuum, which will be followed by a summary of the schizotypy literature and how this thesis will extend on the prior research. The relationships between social cognition and cognitive insight, negative affect and wellbeing will then be discussed.

2.3.4.1.1 Theory of Mind

Theory of Mind (ToM) has been defined as the ability to understand other people's mental states (e.g. beliefs, knowledge and intentions; Savla et al., 2012). ToM can also be split into affective ToM (i.e. ability to infer about other people's emotions and feelings) and cognitive ToM (i.e. the ability to understand the difference between a speaker's knowledge and the listeners knowledge of beliefs; Stanford et al., 2011; Rominger et al., 2016). Recent meta-analyses have found significantly impaired ToM abilities in schizophrenia spectrum disorders (Bora, Yucel & Pantelis, 2009; Bora & Pantelis, 2013) and individuals with ARMS (Bora & Pantelis, 2013) when compared with healthy controls. A preponderance of individual studies has also found both impaired cognitive and affective ToM in schizophrenia spectrum disorders and individuals with ARMS (Barbato et al., 2013; Vohs et al., 2015; Ventura et al., 2015; Ohmuro et al., 2016; Piskulic et al., 2016; Rominger et al., 2016; Zhang et al., 2016a; Zhang

et al., 2016b). This has led researchers to propose that ToM is one of the most impaired social cognitive domains in psychosis and a potential trait-marker for the disorder (Bora & Pantelis, 2013).

Brüne (2005) propose that individuals with prominent negative and disorganised symptoms would be most impaired in ToM because of their incapacity to represent mental states. Furthermore, individuals with positive symptoms may have intact ToM with regards to knowing that others have mental states but are impaired in is the use of contextual information which leads the individual to make incorrect "online" references about what the mental states are (Brüne, 2005). In support of this recent meta-analyses have shown strong inverse relationships between ToM and negative and disorganised symptoms, and weaker inverse relationships with positive symptoms in individuals with schizophrenia spectrum disorders (Sprong et al., 2007; Ventura et al., 2011). Individual studies have also found inverse associations between ToM and negative and disorganised symptoms in individuals with ARMS (Healey et al., 2013).

Schizotypy research utilising university samples and community samples have also found similar patterns to individuals with psychotic disorders, regarding cognitive ToM. For example, high schizotypy groups have displayed poorer cognitive ToM abilities when compared with controls (Gooding & Pflum, 2011; Pflum, Gooding & White, 2013), and consistently finding inverse associations between cognitive ToM and positive schizotypy (Meyer & Shean, 2006; Pickup, 2006; Barragan et al., 2011; Gooding & Pflum, 2011; Sacks et al., 2012; Pflum et al., 2013; Deptula & Bedwell, 2015). A small number of studies also observing inverse associations between cognitive ToM and negative schizotypy (Barragan et al., 2011). It has been suggested that the consistent associations found between positive schizotypy and cognitive ToM rather than other schizotypal traits is because positive schizotypal traits are the strongest index of psychosis-proneness in healthy individuals (Pickup, 2006).

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In contrast to cognitive ToM, the study of affective ToM in the schizotypy research has yield inconsistent findings. A study utilising a mixed community and university sample found positive and negative schizotypy were inversely associated with affective ToM (Henry, Bailey & Rendell, 2008). Other studies have also found inverse relationships between affective ToM and negative schizotypy (Sacks et al., 2012) and positive schizotypal features (i.e. magical ideation) (Meyer & Shean, 2006). However, studies that have compared affective ToM across schizotypy groups (high positive schizotypy group, high negative schizotypy group and low schizotypy group), found no significant differences in ToM performance (Gooding, Johnson & Peterman, 2010; Gooding & Pflum, 2011), and a further study reported non-significant associations between affective ToM and four schizotypy dimensions, in a large undergraduate sample (Bedwell et al., 2014). A recent imaging study found that affective and cognitive ToM, have different neural correlates (Schlaffke et al., 2015), which could suggest that there are differential patterns between schizotypal traits and different domains of ToM.

It is plausible that the inconsistent findings may be a consequence of differential methodological designs. As previously discussed in the neurocognition chapter, university students may have greater resources and educational attainment to achieve intact ToM performance (Badcock et al., 2015). Furthermore, correlational studies exploring the unique multidimensional schizotypy traits may be more fruitful than studies which utilised extreme group designs (high and low schizotypy groups). Additionally, social cognition abilities may be differentially associated with schizotypal traits based on how schizotypy is defined. For example, studies which utilised the OLIFE found correlations between schizotypy and affective ToM (Sacks et al., 2012), whereas others using the Wisconsin schizotypy scales found no differences in ToM (e.g. Gooding, Johnson & Peterman, 2010).

Consequently, it currently remains unclear whether affective ToM is associated with schizotypal personality traits. It is important to note that all aforementioned studies used the

Reading the Mind in the Eyes task (Eyes; Baron-Cohen et al., 2001) to measure affective ToM. Therefore, the present study will extend the current research by exploring whether affective ToM as measured by the Eyes, is associated with multidimensional schizotypy traits as measured by the OLIFE, utilising a more diverse convenience sample of both community volunteers and university students.

2.3.4.1.2 Emotion Processing

Emotion processing is broadly defined as identifying and using emotions and subsumes 3 domains that represent lower level and higher-level processes (Pinkham et al., 2013). Emotion perception is at a lower perceptual level and refers to the ability to identify and recognise emotions via facial expressions or voice prosody (Savla et al., 2012). Understanding emotions and managing emotions are two subdomains at a higher perceptual level (Pinkham et al., 2013). Similar to ToM, a developing body of evidence suggests that emotion processing; more simply facial emotion perception is a potential trait-susceptibility marker for schizophrenia (Barkl et al., 2014). Therefore, the following section will focus on the lower perceptual level of identifying and recognising facial emotion expressions.

Recent meta-analyses have revealed emotion perception impairments in individuals with schizophrenia (Savla et al., 2012; Barkl et al., 2014) and individuals with ARMS (Barkl et al., 2014; Kohler et al., 2014), compared with healthy controls. Further individual studies have also provided evidence that impairments in emotion perception can be both general and emotion specific. For example, research has found individuals with a diagnosis of schizophrenia have a difficulty in accurately identifying negative emotions such as fear, disgust and sadness (Marwick & Hall, 2008) and individuals with ARMS difficulty in identifying happy, sad and fearful emotions (Kohler et al., 2014). Imaging studies have revealed that impaired negative emotion processing is coupled with selective amygdala dysfunctions in individuals with

schizophrenia (Taylor et al., 2012; Bjorkquist et al., 2016), which may reflect limbic system dysfunction across the psychosis continuum.

As impaired emotion processing may reflect limbic system dysfunction across the psychosis continuum, it has been argued that these processes may also underlie the development of symptoms such as suspicion, ideas of reference, social isolation and anhedonia (Kohler et al., 2014). It is suggested that an impairment in the decoding of emotional expression during social situations is a barrier to social interactions, and this stressor may exacerbate symptoms in individuals with schizophrenia, and potentially plays a role in the onset of psychosis in individuals at ultra-high risk (Ventura et al., 2015). In support of this, a number of studies have found inverse relationships between facial emotion perception and greater negative symptoms in individuals with schizophrenia spectrum disorders (Chan et al., 2010; Irani et al., 2012; Ventura et al., 2015) and individuals with ARMS (Corcoran et al., 2015). This pattern has also been observed in relation to positive symptoms in both schizophrenia spectrum disorders (Irani et al., 2012) and individuals with ARMS (Lee et al., 2015).

In the schizotypy literature, individuals with high schizotypy have demonstrated poorer facial emotion perception when compared to control groups (Williams, Henry, Green, 2007; Brown & Cohen, 2010; Morrison, Brown & Cohen, 2013). This finding has also extended to studies exploring the relationships between individual schizotypal traits and facial emotion perception. However, it remains unclear as to what schizotypal traits are associated with facial emotion perception. For example, negative schizotypy has consistently been inversely associated with facial emotion perception (Williams et al., 2007; Abbott & Bryne, 2013; Abbott & Green, 2013; Morrison et al., 2013). However, some studies have also reported inverse associations between facial emotion perception and positive schizotypy (Germine & Hooker, 2011; Abbott & Bryne, 2013) and disorganised schizotypy (Germine & Hooker, 2011), whereas others found no significant associations with either positive or disorganised schizotypy (Abbott & Green,

2013). In the domain of emotion processing, it seems schizotypy results mirror those seen in the schizophrenia literature. Overall, the research suggests that there are difficulties in facial affect recognition in people with schizotypy, which may be driven by an inability to integrate facial cues more broadly (Cowan, Le & Cohen, 2019). Importantly the previous research has predominantly used the Schizotypal Personality Questionnaire to assess schizotypy traits, and I am unaware of any previous research exploring the relationships between emotion processing and schizotypy using the OLIFE measure. Therefore, it remains unclear whether facial emotion perception may be associated with different schizotypal traits based on the schizotypy measure used. Therefore, the present thesis will extend on the prior literature by exploring the unique contributions of the four schizotypal dimensions measured by the OLIFE and whether they are associated with facial emotion perception abilities.

2.3.4.1.3 Social Perception

Social perception has been defined as the ability to identify, decode and utilise social cues in others (Savla et al., 2012). It includes social knowledge, which refers to one's knowledge about social roles, rules and schemas, derived from social situations and interactions (McCleery, Horan & Green, 2014). Unlike emotion processing and ToM; social perception has received relativity less investigation in psychosis. Nevertheless, research has shown impaired social perception ability in individuals with schizophrenia spectrum disorders (Sergi et al., 2009; Green et al., 2011) and individuals with ARMS (Barbato et al., 2015; Piskulic et al., 2016). Pinkham et al., (2013) identify social perception impairments as a potential vulnerability marker to psychosis. In support of this, research has demonstrated that whilst social perception was impaired across prodromal, first episode and chronic schizophrenia, there was no significant differences across the three groups (Green et al., 2011). Moreover, Piskulic et al., (2016) demonstrated that social perception performance did not significantly differ between individuals with ARMS who developed psychosis and individuals at ARMS who did not

develop psychosis. The literature highlighting that social perception impairment is present even before one reaches threshold for a clinical disorder, and is consistent and stable, fitting the pattern of a vulnerability marker (Green et al., 2011).

As with other social cognition domains, it has been proposed that social perception processes may also underlie the development of symptoms (Kohler et al., 2014). Research has found inverse relationships between social perception and both negative and positive symptoms in schizophrenia spectrum disorders (Sergi et al., 2009; Green et al., 2011) and individuals with ARMS (Green et al., 2011). It is suggested an impairment in the ability to identify, decode and utilise social cues, leaves individuals with room for speculation, such as negatively biased conclusions, which may lead to be a barrier in interacting in social situations and exacerbating symptoms (Lin et al., 2013).

To my knowledge there has been scarce investigation of social perception in the schizotypy literature, with only one study exploring this domain using the Profile of Nonverbal Sensitivity measure (half PONS; Ambady, Hallahan & Rosenthal, 1995). The half PONS assesses an individual's ability to use cues to accurately identify how someone is reacting in a social situation e.g. expressing jealous anger, or "admiring nature" (Ambady et al., 1995). Miller & Lenzenweger (2012) found that a high schizotypy group performed significantly worse than controls on social perception performance. Everyday life includes numerous interactions in which we often have to make judgements based on minimal information however, it may be suggested that individuals with schizotypy traits may find it difficult to "pick up" on social cues and correctly interpret interactions (Miller & Lenzenweger, 2012). As the previous study focused on high schizotypy, it remains unclear whether social perception abilities may be specific to certain schizotypy traits. Therefore, future research is required to clarify this potential relationship. Furthermore, the initial Social Cognition Psychometric Evaluation for schizophrenia (SCOPE) study addressed the need to establish a complete gold-standard battery

of social cognition measures, recommending that the Relationship Across Domains measure (RAD; Sergi et al., 2009) was the best available task to assess social perception (Pinkham et al., 2013). Therefore, the present thesis will explore the relationships between multidimensional schizotypy traits and social perception using the RAD measure.

2.3.4.1.4 Attribution Bias/Style

Attributional style/bias refers to the causal explanations an individual makes for social events and interactions (Pinkham et al., 2013). Attribution style/bias has been the least studied social cognition domain in schizophrenia spectrum disorders. In accordance with the SCOPE study, the Ambiguous Intentions and Hostility Questionnaire (AIHQ; Combs et al., 2007) has been suggested to be the best available measure of attribution bias. This task is designed to test hostile social cognitive biases i.e. how much blame, hostility, aggression and anger one would have towards another person for a situation that was ambiguous (i.e. intentional or accidental). Furthermore, the hostility and blame dimensions of the AIHQ have been the most frequently explored in the schizophrenia literature. Therefore, the below section will discuss attribution bias/style in relation to the hostility and blame dimensions of the AIHQ. It has been hypothesised that a greater tendency to consider negative events as external, whilst projecting the responsibility of the events on to other people, may predispose individuals to persecutory thinking, hallucinations and delusions (Thompson et al., 2013). In support of this, research has shown a greater hostility bias and blame bias in paranoid schizophrenia (Combs et al., 2009; Pinkham, Harvey & Penn, 2016) first episode psychosis (An et al., 2010; Zaytseva et al., 2013) and individuals with ARMS (An et al., 2010; Kim et al, 2014; Park et al., 2018). Furthermore, greater hostility and blame bias towards others for ambiguous situations has been associated with persecutory delusions and paranoid ideations in individuals with schizophrenia (Pinkham, Harvey & Penn, 2016), first episode psychosis (An et al., 2010; Zaytseva et al., 2013), and ARMS (An et al., 2010; Kim et al., 2014)

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Given the hypothesis that hostile attribution biases may lead to persecutory thinking, studies exploring attribution biases in "healthy populations" have focused on subclinical paranoia. Several studies have found that subclinical paranoia (i.e. features of positive schizotypy) is associated with greater levels of hostility and blame towards others for ambiguous social situations (Combs et al., 2007; Combs et al., 2009; Klein, Kelsven & Pinkham, 2018). However, it remains to be seen whether attribution biases may also be associated with other schizotypal features. Based on the aforementioned research it is expected that positive schizotypy will be related to attribution bias/style. However, individuals whom have antisocial behaviours, who avoid social situations, are social anxious and experience self-reported cognitive difficulties may also demonstrate difficulties in interpreting ambiguous social interactions. Therefore, it is also plausible to suggest that other schizotypy dimensions such as negative and disorganised schizotypy will also be associated with attribution bias. Therefore, the present thesis will explore the relationships between attribution bias and multidimensional schizotypy traits.

2.3.4.1.5 Social cognition and schizotypy summary

In exploring social cognition in schizotypy, research has demonstrated that there are a potential pattern of impairments emerging in the domains of ToM, emotion processing, social perception and attribution bias. Whilst the previous literature has identified impairments in emotion processing and cognitive ToM, the domain of affective ToM has remained inconsistent. Furthermore, there is sparse literature exploring other social cognitive domains such as social perception and attribution bias in schizotypy. Thus, given that social cognitive domains are a potential risk factor for psychosis, it is important for future research to elucidate how these four social cognition domains are related to schizotypy traits. It is also important to note that the previous schizotypy literature, has often narrowly focused on one or two domains of social cognition, and this thesis will extend the prior literature, by being the first to explore

multidimensional schizotypy traits relationships with all four social cognition domains, identified as relevant to psychosis (Chapter 8. Study 5). Furthermore, employing four social cognition tasks which have been identified as the best available measures by the NIMH multiphase Social Cognition Psychometric Evaluation (SCOPE) project for schizophrenia (Pinkham et al., 2013). It is hypothesised that greater schizotypy traits will significantly predict poorer performance in all four social cognition domains.

2.3.4.2 Social cognition and cognitive insight

Social developmentalists have long posited that self-representations are built from experiential learning, reflection and engaging in social interactions. Therefore, having intact social cognition abilities not only aid an individual in understanding the motives of others, but also has an essential importance for own self-reflective abilities and mechanisms (Gallagher & Meltzoff, 1996; Bora et al., 2007). As such, researchers propose that social cognition could be a better predictor of insight in psychosis over that of traditional cognition (Pijnenborg et al., 2013).

Several researchers have suggested that the development of ToM precedes maturation of insight into one's self in individuals with schizophrenia (Carruthers, 2009; Wiffen & David, 2009). In support of this, a preponderance of studies has found that poorer clinical insight is associated with impaired cognitive ToM and affective ToM in individuals with schizophrenia spectrum disorders (Langdon et al., 2006; Bora et al., 2007; Langdon & Ward, 2008; Pousa et al., 2008; Konstantakopolous et al., 2014; Ng, Fish & Granholm, 2015; Zhang et al., 2016c). The evidence suggesting that aspects of clinical insight require a capacity to use a third-person perspective and the inability to assume the stance of others may contribute to the lack of awareness of illness (Bora et al., 2007; Ng et al., 2015).

The relationships between cognitive insight and ToM has received less attention in the psychosis literature and have yield inconsistent results. One recent study found an association between the composite cognitive insight score and cognitive ToM even after controlling for psychopathology, in individuals with schizophrenia spectrum disorders (Popolo et al., 2016). This suggests that individuals with schizophrenia may have an inability to imagine other people's beliefs and intentions, which may limit their ability to notice their own cognitive limitations (Popolo et al., 2016). However, contrary to the above study, other recent studies have found no association between cognitive insight and ToM in schizophrenia (Giusti et al., 2013; Ng et al., 2015; Zhang et al., 2016c). It has been suggested that the inconsistent results may be a consequence of using different ToM tasks that may differ in their extent to which they are associated with cognitive insight., as well as sampling differences such as severity of symptoms and neurocognitive impairment (Popolo et al., 2016). However, overall, the literature suggests that both clinical and cognitive insight could be associated with ToM impairments in individuals with schizophrenia spectrum disorders.

Emotion processing requires the ability to observe other people and insight requires the ability to observe one's self from an outside perspective (Vaskinn et al, 2013). Researchers hypothesise that because the two processes share particular features, then the two constructs should be related to one another (Vaskinn et al., 2013). Based on these hypotheses, a preponderance of research has explored the relationships between clinical insight and emotion perception, finding that impaired emotion perception is associated with poorer clinical insight in individuals with schizophrenia spectrum disorders (Quee et al., 2010; Lysaker et al., 2013; Vaskinn et al., 2013; Bhagyavathi, Mehta & Thirthalli, 2014). Research is yet to explore the associations between emotion processing and cognitive insight. However, it is argued, that cognitive insight contributes to clinical insight in individuals with schizophrenia (Beck et al., 2004). Therefore, it is plausible to suggest that difficulties in being able to identify the emotions

of others may impact on an individual's ability to be self-reflective and understand the perspective of others.

Furthermore, I am unaware of any research to date that has explored the relationships between either clinical insight or cognitive insight and social perception or attribution bias (i.e. hostility and blame bias). However as previously mentioned, researchers posit that self-representations are built from reflecting and engaging in social interactions (Gallagher & Meltzoff, 1996; Bora et al., 2007). Therefore, as social perception requires the ability to identify, decode and utilise social cues, then it may suggest that these abilities are of great importance for our own self-reflective abilities and mechanisms (Bora et al., 2007). Furthermore, it is plausible to suggest that those whom are hostile and blame others in ambiguous social situations, would be less able to understand the perspective of others and would be more confident in their own beliefs.

2.3.4.2.1 Summary of the potential relationships between schizotypy, social cognition and cognitive insight

Overall, the literature suggests that emotion processing and ToM, could be associated with insight in individuals with schizophrenia spectrum disorders. However, research to date has yet to explore the relationships between cognitive insight and emotion processing, social perception or attribution bias in individuals with schizophrenia spectrum disorders. Furthermore, there has been no research that has explored the relationship between social cognition and cognitive insight in schizotypy. Therefore, exploring such relationships in schizotypy may help inform the schizophrenia literature of potential relationships that could be occurring across the psychosis continuum, whilst elucidating what factors may be contributing to cognitive insight in individuals with schizotypy.

Therefore, the present thesis will explore the mediating role of social cognition in the relationship between schizotypy and cognitive insight subcomponents- self-reflectiveness and

self-certainty (Chapter 8. Study 5). Based on the aforementioned research it is expected that poorer social cognitive abilities would be related to lower self-reflectiveness and higher self-certainty. It is hypothesised that the four social cognition domains will mediate the relationship between schizotypy and the cognitive insight subcomponents-self-reflectiveness and self-certainty.

2.3.4.3 Social cognition and negative affect

As previously discussed, symptom severity in respect to psychotic symptoms have been associated with social cognitive impairments in individuals with schizophrenia spectrum disorders. However, emerging studies have also provided evidence that this relationship may also extend to affective symptoms. For example, studies found that impairments in ToM and greater attribution biases (hostility and blame) were associated with greater depression in individuals with schizophrenia spectrum disorders and individuals with ARMS (Mancuso et al., 2011; Darrell-Berry et al., 2017). Therefore, individuals may find difficulties in drawing inferences about other individuals' beliefs and intentions, particularly distressing.

2.3.4.3.1 Summary of the potential relationships between schizotypy, social cognition and negative affect

I am unaware of any studies in schizotypy exploring the relationships between social cognition and negative affect. However, given the aforementioned research, it is plausible that social cognitive abilities could be associated with negative affect in individuals with schizotypy. Therefore, an aim of the current thesis will be to explore the mediating role of the four social cognition domains in the relationships between schizotypy and negative affect (Chapter 8. Study 5). It is expected that poorer performance in the four social cognition domains will be related to greater negative affect and it is hypothesised that these social cognition domains will mediate the relationship between schizotypy and negative affect.

2.3.4.4 Social cognition and wellbeing

Researchers have long posited that social cognitive impairments detrimentally impact on functional outcomes (i.e. social functioning, community functioning and global functioning) in individuals with schizophrenia spectrum disorders (Fett et al., 2011; Horan et al., 2011; Irani et al., 2012). For example, meta-analyses have demonstrated that impairments in ToM, social perception and emotion processing are associated with poorer functional outcome in individuals with psychotic disorders (Fett et al., 2011; Irani et al., 2012). Individual studies have also found that hostile attribution style is also associated with poorer functional outcomes (Buck et al., 2016; Vigarsdottir et al., 2019).

A number of studies have also begun to explore the relationships between social cognition and wellbeing in psychotic disorders. However, the majority of studies have focused on measures of quality of life and have produced mixed findings. For example, some studies have reported that poorer quality of life was significantly associated with impairments in facial emotion perception (Kurtz et al., 2012; Hasson-Ohayon et al., 2017), impairments in ToM (Maat et al., 2012; Tas et al., 2013) and greater hostile attribution bias (Hasson-Ohayon et al., 2017). On the contrary, a number of studies have found no associations between social cognition and quality of life (Urbach et al., 2013; Hasson-Ohayon et al, 2017). It has been suggested that one reason for these inconsistent findings is due to the confounding effects of symptom severity (Buck et al., 2016). However, overall social cognitive abilities could be associated with both functioning and wellbeing in individuals with psychotic disorders. I am unaware of any studies exploring the relationships between social cognitive domains and PWB. However, PWB and functional outcomes have been associated with one another in schizophrenia spectrum disorders (Brekke, Kohrt & Green, 2001; Aki et al., 2008). Therefore, intuitively it has been hypothesised that social cognitive impairments may negatively impact on wellbeing in individuals with psychotic disorders (Maat et al., 2012).

In schizotypy research, investigations into the relationships between social cognition and wellbeing has remained sparse, with limited research focusing on social functioning and limited social cognitive domains. Jahshan & Sergi (2007) found non-significant associations between social functioning and *both* ToM and facial emotion perception in a high schizotypy group. Furthermore, a more recent study, found that schizotypal traits were negatively correlated with both facial emotion perception and social functioning, however, facial emotion perception did not mediate the relationship between schizotypal traits and social functioning (Statucka & Walder, 2017).

2.3.4.4.1 Summary of the potential relationships between schizotypy social cognition and wellbeing

Unlike the psychotic disorder research, the relationships between social cognitive abilities and functioning is less apparent in schizotypy. A limitation of these studies is that they only focused on a specific set of social cognitive domains, therefore, it remains unclear whether other social cognitive domains i.e. social perception and attribution bias/style are associated with functioning in schizotypy. It is also plausible to suggest that social cognitive abilities are not directly related to functioning in schizotypy but may be indirectly related via other outcomes such as SWB and PWB. Therefore, an aim of the present thesis will be to explore the mediating role of social cognition in the relationship between schizotypy and PWB (Chapter 8. Study 5). It is expected that the poorer performance in all four social cognitive domains will be associated with lower PWB, and it is hypothesised that all four social cognition domains will mediate the relationship between schizotypy and PWB.

In this section of the chapter I have:

- Summarised evidence that impaired social cognitive abilities are a potential vulnerability marker associated with psychotic disorders and at-risk mental states.
- Argued that previous schizotypy literature has narrowly focused on one or two domains of social cognition often yielding inconsistent findings.
- Summarised evidence that social cognition has been associated with cognitive insight, negative affect and wellbeing in psychotic disorders.
- Identified that previous literature has not explored social cognitions contribution to the relationships between schizotypy and cognitive insight, negative affect and wellbeing.

2.4 Thesis Research Aims

The preceding literature review provides support that negative affect, cognitive insight, metacognitive beliefs, neurocognition and social cognition are potential risk factors, whereas, poorer wellbeing and greater self-stigma are frequent outcomes for psychotic disorders. What remains unclear is the relationships between the aforementioned factors and schizotypy. For example, findings have remained inconsistent regarding the relationships between schizotypy and both neurocognition and social cognition. Furthermore, only certain schizotypy dimensions have been explored in relation to both cognitive insight subcomponents and metacognitive beliefs, and I am unaware of any previous research exploring the relationship between schizotypy and self-stigma of seeking psychological help. In addition, the psychotic disorder literature has begun exploring the complex interplay of these factors. In particular, exploring how metacognitive beliefs, neurocognition, social cognition, and self-stigma are associated with cognitive insight, negative affect and PWB. However, within the schizotypy literature these relationships have remained relatively unexplored.

Thus, the overarching aim of this thesis was to explore the complex interplay of schizotypy with a host of risk factors and adverse outcomes associated with psychotic disorders. In doing so, this thesis will provide the literature with a greater understanding of potential relationships that are occurring in schizotypy. Secondly, it will help inform interested researchers of potential patterns that could be observed across the psychosis continuum, which in turn may enhance our understanding of the interaction of etiological factors for psychotic disorders.

The broad aims of the thesis are presented here:

1) To explore the unique contributions of multidimensional schizotypy traits and their associations with cognitive insight (self-reflectiveness and self-certainty), self-stigma of seeking help, metacognitive beliefs, neurocognition and social cognition.

2) To explore factors that may contribute or be a consequence of the relationship between schizotypy and cognitive insight subcomponents-self-reflectiveness and self-certainty.

3) To explore factors that may contribute or be a consequence of the relationship between schizotypy and negative affect and wellbeing.

See Table 2.1 for an overview of how the specific aims and hypotheses for each of the empirical chapters.

Table 2.1. Description of the specific aims of hypothesis of the thesis' five empirical study chapters.

Empirical Study Chapter	Empirical chapter Aims	Empirical chapter Hypotheses
Chapter 4. Study 1.	Aim 1: Examine the associations between multidimensional schizotypy traits and both cognitive insight subcomponents-self-reflectiveness and self-certainty **(relates to Broad Aim 1).** Aim 2: Examine the serial mediating role of self-reflectiveness and negative affect in the relationship between schizotypy and psychological wellbeing **(relates to Broad Aim 2 and 3).**	Hypothesis 1: Greater schizotypy traits (unusual experiences, introvertive anhedonia and impulsive non-conformity) will predict higher levels of both self-certainty and self-reflectiveness; whereas greater cognitive disorganisation will predict higher levels of self-reflectiveness and lower levels of self-certainty. Hypothesis 2: Self-reflectiveness and negative affect will mediate the relationship between schizotypy traits and PWB in serial.
Chapter 5. Study 2.	Aim 1: Examine the associations between multidimensional schizotypy traits and self-stigma for seeking psychological help **(relates to Broad Aim 1).** Aim 2: Examine the mediating role of cognitive insight subcomponents- self-reflectiveness and self-certainty, and negative affect and psychological wellbeing in the relationship between schizotypy and self-stigma for	Hypothesis 1: Greater schizotypy traits will predict higher levels of self-stigma for seeking psychological help. Hypothesis 2: Self-reflectiveness, self-certainty, negative affect and PWB will mediate the relationship between schizotypy and self-stigma for seeking psychological help.

	seeking psychological help **(relates to Broad Aim 2 and 3).**	
Chapter 6. Study 3.	Aim 1: Examine the associations between multidimensional schizotypy traits and dysfunctional metacognitive beliefs **(relates to Broad Aim 1).**	Hypothesis 1: Greater multidimensional schizotypy traits will significantly predict higher levels of all five dysfunctional metacognitive beliefs
	Aim 2: Examine the mediating role of dysfunctional metacognitive beliefs in the relationships between schizotypy and both cognitive insight subcomponents-self-reflectiveness and self-certainty **(relates to Broad Aim 2).**	Hypothesis 2: Dysfunctional metacognitive beliefs- in particular cognitive confidence and cognitive self-consciousness will mediate the relationship between schizotypy and the cognitive insight subcomponents- self-reflectiveness and self-certainty.
	Aim 3: Examine the mediating role of dysfunctional metacognitive beliefs in the relationships between schizotypy and both negative affect and psychological wellbeing **(relates to Broad Aim 3).**	Hypothesis 3: All five dysfunctional metacognitive beliefs would mediate the relationship between schizotypy and negative affect. Whereas only negative metacognitive beliefs and lower cognitive self-consciousness would mediate the relationships between schizotypy and PWB.

Chapter 7. Study 4.	Aim 1: Examine the associations between multidimensional schizotypy traits and neurocognition **(relates to Broad Aim 1).**	Hypothesis 1: Greater schizotypy traits will significantly predict neurocognitive abilities.
	Aim 2: Examine the mediating role of neurocognition abilities in the relationships between schizotypy and both cognitive insight subcomponents -self-reflectiveness and self-certainty **(relates to Broad Aim 2).**	Hypothesis 2: Neurocognitive abilities will mediate the relationship between schizotypy and cognitive insight subcomponents- self-reflectiveness and self-certainty.
	Aim 3: Examine the mediating role of neurocognition abilities in the relationships between schizotypy and both negative affect and psychological wellbeing **(relates to Broad Aim 3**).	Hypothesis 3: Neurocognitive abilities will mediate the relationship between schizotypy and both negative affect and PWB.
Chapter 8. Study 5.	Aim 1: Examine the associations between multidimensional schizotypy traits and social cognition **(relates to Broad Aim 1).**	Hypothesis: Greater schizotypy traits will significantly predict poorer performance in all four social cognition domains.
	Aim 2: Examine the mediating role of social cognition abilities in the relationships between schizotypy and both cognitive insight subcomponents -self-reflectiveness and self-certainty **(relates to Broad Aim 2).**	Hypothesis 2: The four social cognition domains will mediate the relationship between schizotypy and the cognitive insight subcomponents-self-reflectiveness and self-certainty.

	Aim 3: Examine the mediating role of social cognition abilities in the relationships between schizotypy and both negative affect and psychological wellbeing **(relates to Broad Aim 3).**	Hypothesis 3: The four social cognition domains would mediate the relationships between schizotypy and both negative affect and PWB.

3. Methods

This chapter will begin by highlighting the measures which are of relevance to the current thesis and which are frequently used in the schizotypy/psychosis literature, followed by justification for each of the chosen measures used to address the aims of the current thesis. The chapter then provides a description of the measures used, methods of data collection and statistical analyses used in the empirical study chapters.

3.1 Measuring Schizotypy

The two approaches to measuring schizotypy, the clinical and the personality-based approach, have been operationalised through different self-report questionnaires and interview schedules. The fully-dimensional model places emphasis on schizotypy being a personality construct, where like other personality dimensions such as neuroticism, are normally distributed in the general population (Mason, 2015). Alternatively, the clinical approach to schizotypy measurement tends to take a "diluted" symptomatic or diagnostic approach (Mason, 2015). Self-report questionnaires that measures schizotypy are highly advantageous as they are relatively inexpensive, brief and can be used to screen large numbers of both clinical and nonclinical samples (Kwapil et al., 2018). This section will outline the main self-report measures derived from both personality and clinical approaches to schizotypy that are currently in wide spread use. The decision to limit the discussion to the scales discussed below is not intended to overlook other schizotypy measures or related constructs such as paranoid and delusional ideation, but rather condense focus on the most current and widely used measures of the multidimensional construct of schizotypy.

3.1.1 Clinical approach to measuring schizotypy

Chapman and colleagues developed the family of Wisconsin schizotypy scales, which relied heavily on Meehl's description of schizotypy and his Checklist of schizotypy signs (Meehl,

1962; Meehl, 1964), and Hoch's and Cattell's (1959) description of pseudo neurotic schizophrenia. These self-report measures include the Magical Ideation, Perceptual Aberration, Physical Anhedonia and Revised Social Anhedonia Scales (Chapman, Chapman & Raulin, 1976; Chapman, Chapman & Raulin, 1978; Eckblad et al., 1982; Eckblad & Chapman, 1983). These measures are also available in a shortened form (Winterstein et al., 2011). The Magical Ideation and Perceptual Aberration scales were developed to tap positive schizotypy, whereas the Physical Anhedonia and Revised Social Anhedonia scales were developed to assess negative schizotypy (Kwapil et al., 2007). The Wisconsin schizotypy scales demonstrate good construct validity (Kwapil et al., 2007; Gross et al., 2012), with longitudinal studies indicating that high scores on these scales are at heightened risk for developing psychosis (Chapman, Chapman & Kwapil, 1994; Kwapil et al., 1997; Kwapil, 1998; Gooding et al., 2005). There are notable limitations to the Wisconsin scales. For example, they do not assess disorganised schizotypy and the Physical Anhedonia and Revised Social Anhedonia scales do not cover features of negative schizotypy other than anhedonia (Kwapil & Chun, 2015). Furthermore, many items on the scales are rarely endorsed in general populations (Mason, 2015).

A further extensively used multidimensional schizotypy measure is the Schizotypal Personality Questionnaire (SPQ; Raine, 1991). The development of the original 74-item SPQ questionnaire (Raine, 1991) took a broader syndromal approach and assesses 9 schizotypal features modelled from DSM-III R/IV criteria for schizotypal personality disorder (American Psychiatric Association, 1987). These 9 subscales were grouped into three higher-order factors named- cognitive-perceptual, interpersonal and disorganised (Raine et al., 1994). Raine & Benishay (1995) created a short form of the SPQ (SPQ-B) and Cohen et al., (2010) created a modified Likert-scale revision (SPQ-BR). The psychometric properties of the SPQ, SPQ-B and SPQ-BR are well documented and have demonstrated adequate internal reliabilities and construct validity (e.g. Raine, 1991; Raine & Benishay, 1995; Fonseca-Pedrero et al., 2009;

Cohen et al., 2010; Morrison et al., 2013; Callaway et al., 2014; Fonseca-Pedrero et al., 2018). However, limitations of the SPQ and SPQ-B include high intercorrelations amongst items of the different subscales (Compton et al., 2009; Cohen et al., 2010). Furthermore, there is poor replicability of the factor structure, with some studies supporting the three-factor structure (e.g., Raine et al., 1994; Reynolds et al., 2000; Fossati et al., 2003) and others supporting four or five factor models (Stefanis et al., 2004; Wuthrich & Bates, 2006; Fonseca-Pedrero et al., 2014; Barron et al., 2015; Zhang & Brenner, 2017). Despite these limitations, the SPQ, SPQ-B and SPQ-BR provide a measurement of continuous multidimensional schizotypy traits, making them important measures for schizotypy research (Kwapil & Chun, 2015).

3.1.2 Personality approach to measuring schizotypy

The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE; Mason et al., 1995) is one of the most widely used personality measures of schizotypy. The O-LIFE was created from a factor analysis of the Combined Schizotypal Traits Questionnaire (CSTQ; Bentall et al., 1989). The CSTQ collated more than a dozen different measures of both clinical based schizotypy scales, personality scales and psychotic trait scales and 420 items long, thus, whilst it was comprehensive it was not especially practical. The resulting OLIFE scale has 104 items and its short version is 43 items long (sO-LIFE) (Mason, Linney, & Claridge, 2005). The OLIFE and the sOLIFE assesses four dimensions; unusual experiences (positive schizotypy), cognitive disorganisation (disorganised schizotypy), introvertive anhedonia (negative schizotypy) and impulsive non-conformity. The impulsive non-conformity dimension has high positive loading with Eysenck's Psychoticism Scale (Claridge et al., 1996) and there has been a large debate regarding its relevance to schizotypy (Mason, 2015). Mason (2015) suggests impulsive non-conformity may not be so relevant to schizophrenia and its inclusion has mainly been argued for in relation to the broader psychosis proneness/ psychosis continuum. The OLIFE and the sOLIFE has been translated into many languages and their psychometric

properties are well established (Mason et al., 2005; Mason & Claridge, 2006; Cohrane, Petch & Pickering, 2010; Cella et al., 2013; Lin et al., 2013; Fonseca-Pedrero et al., 2015a; Sierro et al., 2016). However, limitations of the OLIFE and the sOLIFE, include mixed evidence for their factorial structure. For example, several studies have found that the three-factor model fitted the data well (i.e. without impulsive non-conformity, Cella et al., 2013; Lin et al., 2013), whereas other studies found that the four-factor model fitted the data well, when compared with competing models (Fonseca-Pedrero et al., 2015a; Sierro et al., 2016). Furthermore, there have been lower levels of reliability regarding Cronbach alpha co-efficients (0.62-0.80) for the sO-LIFE than long form (Mason et al., 2005). However, this is a common problem with shortened scales, and whilst alpha co-efficients <.70 are less than ideal, alpha coefficients >.60 have been described as acceptable (Kline, 2000; George & Mallery, 2003). Fonseca-Pedrero et al., (2015b) further suggested that obtaining ordinal alpha coefficients may be a better measure of reliability for the categorical nature of the sO-LIFE items.

The Community Assessment of Psychic Experiences (CAPE; Stefanis et al., 2002) has also been extensively used as a measurement of psychosis proneness, which assesses frequency and distress of positive psychotic like experiences, lack of motivation, emotion and social interest and the cognitive symptoms of depression in the general population. A recent meta-analyses revealed that the CAPE demonstrated good internal reliabilities (Mark & Toulopoulou, 2015). However, the CAPE' original three-dimensional structure i.e. positive dimension, depressive dimension and negative dimension, has yield inconsistent findings (Stefanis et al., 2002; Brenner et al., 2007; Fonseca-Pedrero et al., 2012; Vleeschouwer et al., 2014). Psychotic like experiences are suggested to be narrower constructs that manifest along the schizotypy continuum (Barrantes-Vidal et al., 2015). Therefore, whilst the CAPE is advantageous in that it measures psychotic like experiences in the general population, it's use as a measure of

multidimensional schizotypy is limited, predominantly due to its lack of a disorganised schizotypy factor.

In summary the OLIFE and the sO-LIFE are advantageous in that they comprehensively measure the multidimensional construct of schizotypy whilst allowing for broad screening of large general population samples (Kwapil & Chun, 2015). Furthermore, their primary use is to assess the continuous nature of schizotypy traits and their relationships with a range of psychological and behavioural factors, rather than serving quasi-clinical aims e.g. comparing high and low schizotypy group (Mason, 2015). As previously mentioned in the literature review, within this thesis I will work within the framework of the fully-dimensional model which assumes that schizotypy is fully dimensional and exists in both health and illness (Claridge, 1997). Therefore, the sO-LIFE was considered more appropriate than the full version OLIFE for the current thesis, considering the number and length of other measures also to be included.

3.1.3 Schizotypy sample characteristics

Schizotypy can be assessed in clinical and non-clinical samples, i.e. individuals with schizophrenia spectrum disorders, relatives of individuals with psychosis, individuals with at risk mental states, and individuals from the general population. An advantage to assessing schizotypy in the general population, is that it enables us to screen large numbers of participants and explore relationships with potential risk and protective factors, in order to understand, the commonalities and differences between schizotypy and psychotic disorders (Barrantes-Vidal et al., 2015). The preponderance of schizotypy research often focuses on university samples (predominantly psychology students, and individuals between 18 years to 30 years of age), as they are at or near the age of greatest risk for developing schizophrenia spectrum disorders (Gross et al., 2018). The ease with which researchers can access students is an advantage and

large amounts of data can be collected. A limitation of studying university samples is whether their performance can be generalised to the general population (Neill, 2014), with researchers encouraging extending this method to screening broader samples (Kwapil & Barrantes-Vidal, 2014). Therefore, this thesis aims to recruit a more diverse convenience sample of individuals between 18 to 30 years of age, including university students and other individuals from the wider community.

As previously mentioned, the advantage of examining schizotypy in the general population is the potential to achieve large sample sizes. Multiple regression analyses with underpowered studies can yield misleading results and result in Type II errors (Kelley, Maxwell & Scott, 2003), therefore, larger sample sizes are required to increase power and decrease estimation error (VanVoorhis & Morgan, 2007). Green (1991) provides a comprehensive review of rules of thumb regarding minimum sample size for regression analyses, proposing that to test individual predictors in multiple regression, minimum sample size should be $104 + k$, where k is the number of predictors. Taking into consideration the aims of the thesis, minimum sample sizes for regression and mediation analyses would be $n=108$ for study 1, $n=109$ for studies 2 and 5, $n=110$ for study 3 and $n=111$ for study 4.

3.1.4 Methods to assess schizotypy and its relation to aspects of psychological, physiological and cognitive functioning

There are two broad statistical approaches to assessing schizotypy. First dichotomizing continuous measures of schizotypy into low and high schizotypy groups, either by using median splits or preselecting groups based on schizotypy scores in the top and bottom 25% of samples. Splitting groups into low and high schizotypy traits can sometimes be seen as aligning with the clinical approach, however this design is often used based on pragmatic considerations (Mason, 2014). For example, pre-selecting high and low schizotypy reduces the number of

participants needed to be tested in order to achieve statistical power, an advantage for certain types of research (i.e. fMRI studies; Mason, 2014). Limitations to these approaches are that it over simplifies the complex multidimensional construct of schizotypy (Sacks et al., 2012), equates to losing a large proportion of data, and increases risk of type I and type II errors for median splits (Neill, 2014).

A second approach is to use statistical methods that complement the fully dimensional approach of schizotypy (e.g. correlations and regression analyses). The strengths of correlational approaches are that it provides a more nuanced level of analysis whereby researchers can distinguish how the facets of schizotypy may be differentially related with a range of other features. For example, whilst positive schizotypy may be related with higher wellbeing, other facets of schizotypy may be related with poorer wellbeing (Fumero et al., 2018). Therefore, examining the relationships between the facets of schizotypy and other variables is of great importance. It also enables researchers to explore what factors may be underpinning relationships in schizotypy (mediation analyses), which will provide greater insights into the complex interplay of schizotypy and psychological, physiological and behavioural functioning. The thesis takes the approach that the multidimensional construct of schizotypy is a genuine continua of personality traits (Claridge & Beech, 1995), therefore I will adopt the correlational approach to assessing schizotypy

I acknowledge that a limitation to the prior mentioned correlational approach is that it cannot take into account that individuals may be simultaneously scoring highly on more than one schizotypy dimension (Barrantes-Vidal et al., 2010). Cluster analysis improves on correlational approaches and allows individuals to be elevated in more than one schizotypy dimension (Suhr & Spitznagel, 2001). An advantage to this type of analysis is that it can identify distinct groups of individuals which could be associated differentially with psychopathology, impairment and risk of developing schizophrenia-spectrum disorders (Chabrol & Raynal, 2018). However,

there remains to be a consensus on the number of schizotypy clusters, and findings have been mixed across studies, which may be a consequence of the schizotypy measures used and the schizotypy dimensions included (Suhr & Spitznagel, 2001; Barrantes-Vidal, et al., 2003; Goulding, 2004; Barrantes-Vidal, Lewandowski, & Kwapil, 2010; Tabak & de Mamani, 2013; Raynal et al., 2016). It may be suggested that for there to be a consensus on schizotypy clusters and their characteristics, larger studies are required, which take into consideration differential schizotypy measures. Secondly, a main aim of the thesis was to explore the complex interplay of schizotypy and other factors, using mediation analyses. Associations between factors such as social cognition and psychological wellbeing may be explored within schizotypy clusters. However, the sample size would be dramatically reduced and may result in increased risk of type I and type II errors, paralleling limitations like those observed for studies using median splits. Therefore, whilst cluster analysis has many advantages it was not the most appropriate method to assess the current thesis' aims.

3.2 Measuring cognitive insight

Cognitive insight is measured by the Becks Cognitive Insight Scale (BCIS; Becks et al., 2004), and has been applied to psychosis, bipolar disorder, major depressive disorder, obsessive compulsive disorder and participants from the general population (Van Camp et al., 2017). The BCIS includes two dimensions-self-reflectiveness and self-certainty, which assess the capability to reflect on anomalous experiences and revaluate these experiences using external feedback from others (Beck et al., 2004). The 2-factor structure of the BCIS has consistently been found in individuals with psychotic disorders (Pedrelli et al., 2004; Kim et al., 2007; Favrod et al., 2008), first episode psychosis (Tranulis et al., 2008) and healthy controls (Uchida et al., 2009; Martin et al., 2010; Kao et al., 2011). The BCIS has also demonstrated good construct and criterion validity and distinguishes individuals with psychosis from healthy controls (Riggs et al., 2010). The BCIS has also demonstrated internal reliability ranging from

0.55 to 0.82 in psychotic disorders (Beck et al., 2004; Pedrelli et al., 2004; Mak & Wu, 2006; Engh et al., 2007; Favrod et al., 2008) and ranging from 0.63 to 0.75 general population samples (Engh et al., 2007; Martin et al., 2010). The Cronbach alphas for the BCIS subscales have been considered as within an acceptable range, given that both subscales consist of less than 10 items (Cortina, 1993). Limitations to the BCIS include a lack of longitudinal evidence and normative data (Riggs et al., 2010). It is important to note one study found that a large proportion of their healthy control sample ommited some items that measured the self-reflectiveness dimension which referred to psychotic like experiences (e.g. "Other people can understand the cause of my unusual experiences better than I can"). On the contrary, Martin et al., (2010) found that their healthy control group had no difficulty in interpreting these items and internal consistency of the self-reflectiveness dimension was reduced when these items were omitted. The latter results suggested that the BCIS is a valid measure to use in the general population and provides evidence that unusual experiences and thinking are on a continuum (Johns & van Os, 2001). Therefore, the BCIS was used in the current thesis to measure cognitive insight.

3.3 Measuring negative affect

Two of the most widely used self-report measures of negative affect in the schizotypy literature includes the 21-item Beck Depression Inventory II (BDI-II; Beck, Steer & Brown, 1996) and the 21-item Beck Anxiety Inventory (BAI; Beck et al., 1990). Meta-analyses have revealed that the BDI-II and BAI have consistently demonstrated good internal consistency and test-retest reliability, in the general population and in clinical samples, as well as showing good sensitivity and specificity for detecting depression and anxiety, demonstrating their clinical utility for diagnostic purposes (Wang & Gorenstein, 2008; Bardoshi, Duncan & Erford, 2016). However, the factor structure of both the BDI-II and BAI has remained somewhat inconsistent ranging from single factors to four or five factors (Lee et al., 2016; García-Batista et al., 2018). The BDI-II and the BAI both incur a cost which is required for the manual and record forms,

limiting their availability (Jackson-Koku, 2016). A further measure that has frequently been used in the schizotypy research is the 40 item State-trait anxiety inventory (STAI; Spielberger & Gorsuch, 1983). The STAI is a relatively brief measure to administer and assesses both state anxiety and trait anxiety. The STAI has demonstrated good internal consistency in general population samples, however test-retest reliability has been less consistent and somewhat limited in discriminating anxiety from depression (Julian, 2011). Perhaps a limitation of the aforementioned measures is that they are specific to anxiety or depression and do not assess general negative affect/psychological distress.

A further measure that has grown in popularity in the schizotypy research is the freely available 42 item Depression Anxiety Stress Scale (DASS-42; Lovibond & Lovibond, 1995) and its 21-item short form (DASS-21; Lovibond & Lovibond, 1995). The DASS-42 and DASS-21 are not viewed as diagnostic measures but a screening tool to examine levels of all three emotional states concurrently (Kyriazos et al., 2018). The DASS-42 and DASS-21 assess domains of depression, anxiety and stress. In the original scale validation study, internal consistencies (Cronbach alphas) of the DASS-42 were 0.88, 0.82, 0.90 and 0.93, for depression, anxiety, stress and the total scale respectively, and for the DASS-21; 0.81, 0.73 and 0.81 for depression, anxiety and stress respectively (Lovibond & Lovibond, 1995). Since then, a plethora of research has reproduced the excellent internal consistency of both the DASS-42 and DASS-21 (Henry & Crawford, 2005; Norton, 2007; Page, Hooke, & Morrison, 2007; Gloster et al., 2008). Both measures have also demonstrated acceptable convergent, divergent and discriminant validity (Kyriazos et al., 2018). A preponderance of research also supports a four-factor structure with a common general negative affect factor plus orthogonal factors of depression, anxiety and stress (Henry & Crawford, 2005; Osman et al., 2012; Botessi et al., 2015; Le et al., 2017).

Therefore, the DASS-21 total score was chosen to measure negative affect in the current thesis, as it takes less time complete when compared with the DASS-42 and extends on measures such as the BDI and BAI by assessing general negative affect, rather than just specific negative emotional states.

3.4 Measuring Psychological Wellbeing

There have been two approaches to studying wellbeing in individuals with schizotypy traits. The first focuses on subjective wellbeing (SWB), which has been described as happiness or positive subjective state that is based on cognitive and affective evaluations of one's life (Diener., 2000; Browne et al., 2017). Schizotypy research that has focused on subjective wellbeing used the Personal Wellbeing Index (International Wellbeing Group, 2006), the Quality of Life Inventory (Frisch et al., 1992) and the Satisfaction with Life Scale (Diener et al., 1985). All three measures have demonstrated good reliability and validity (Durak et al., 2010, International Wellbeing Group, 2006; McAliden & Oei, 2006).

The second approach is psychological wellbeing (PWB). The well validated model of PWB places emphasis on the importance of finding purpose and meaning in life through one's potential, along with values of accomplishment and deep personal relations (Ryff, 1989). Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989) were developed to measure the model of PWB and have been frequently used in the schizotypy research (Tabak & de Mamani, 2013; Weintraub & de Mamani, 2015; Fumero et al., 2018). The SPWB compromises six factors including autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance, which can integrate into a single second-order factor (Ryff & Keyes, 1995; Abbott et al., 2006). PWB is proposed to represent positive mental health aspects that play an important restorative and protective role in one's mental and physical

health (Uzenoff et al., 2010). Based on these important implications, the SPWB was the chosen measure to assess wellbeing in the current thesis.

The original SPWB included 120 items, however shorter versions compromising 84 items (14 items per subscale), 54 items (9 items per subscale) and 18 items (3 items per subscale) are now widely used (Ryff, 2014). A recent meta-analysis revealed that the mean scores for internal consistency for the SPWB subscales and total score ranged from 0.80-0.94 for the 84-item SPWB, 0.75- 0.91 for the 54-item SPWB and 0.42- 0.79 for the 18-item SPWB (Crouch et al., 2017). Ryff (2014) strongly recommends researchers use either the 84-item SPWB or the 54-item SPWB due to the 18 item SPWB's low internal consistency. A limitation of the SPWB measures include mixed evidence for their factorial structure, (Abbott et al., 2006; Burns & Machin, 2009). Due to the number of measures included within the current thesis, the 54-item SPWB total score was used to measure PWB.

3.5 Measuring self-stigma

Two of the mostly widely used measures of self-stigma in psychotic disorders, include the Internalized Stigma of Mental Illness Scale (ISMIS; Ritscher, Otillingam & Grajales, 2003) and the Self-Stigma of Mental Illness Scale (SSMIS; Corrigan et al., 2006).

The ISMIS, is a 29-item measure that assesses self-stigma among individuals with psychiatric disorders (Ritscher et al., 2003). The ISMIS includes four subscales; Alienation (e.g. "I feel inferior to others who don't have a mental illness"), Stereotype Endorsement (e.g. Stereotypes about the mentally ill apply to me"), Discrimination Experience (e.g. "People ignore me or take me less seriously just because I have a mental illness") and Social Withdrawal/avoidance (e.g. "I don't talk about myself much because I don't want to burden others with my mental illness"). The ISMIS has demonstrated excellent internal consistency, and convergent and discriminant validity in individuals with psychiatric disorders (Boyd et al., 2014). The ISMIS was designed

for individuals with psychiatric disorders and therefore, would not be suitable for a general population sample, as a large proportion of individuals would not endorse these items.

The SSMIS is a 40-item measure. This assesses stereotype awareness, and three self-stigma subscales; stereotype agreement, self-concurrence and self-esteem decrement. The SSMIS represents a progressive four stage process of self-stigma in individuals with mental illness (Corrigan et al., 2006). (1) stereotype awareness- individuals must first be aware of the stereotypes of mental illness (e.g. "I think the public believes most people with mental illness are unpredictable"). (2) stereotype agreement-they then may agree with these stereotypes (e.g. "I think most persons with mental illness are unpredictable"). (3) self-concurrence-they then may apply these stereotypes to themselves (e.g. "Because I have a mental illness, I am unpredictable"). (4) self-esteem decrement- they then experience loss of self-esteem and self-efficacy (e.g. "I currently respect myself less because I am unpredictable") (Corrigan & Watson, 2002). The scale has excellent internal consistency and concurrent validity in individuals with psychiatric disorders (Corrigan et al., 2006; Rüsch et al., 2006; Watson et al., 2007).   In this thesis, the two subscales; self-concurrent and self-esteem decrement would not be suitable, as they are specific for people with mental illness. The author of the thesis acknowledges that they could have used the stereotype awareness and stereotype agreement subscales to measure stigma. However, in a general population sample, this would assess public stigma rather than assessing the progressive model of self-stigma of mental illness, i.e. the general population endorsing prejudice and manifesting discrimination towards individuals with psychiatric disorders (Corrigan & Watson, 2002). The thesis was focused on exploring self-stigma rather than public stigma, therefore, it was decided that this would not be a suitable measure for a general population sample.

A newly emerging measure is the Personal Beliefs about Experiences Questionnaire (PBEQ; Pyle et al., 2015). The PBEQ was adapted from The Personal Beliefs about Illness

Questionnaire (PBIllQ; Birchwood et al., 1993) to measure negative beliefs or appraisals about psychotic experiences, in individuals with psychotic disorders and individuals with at risk mental states. The PBEQ contains thirteen items on a four-point Likert scale (1=strongly disagree to 4=strongly agree), which assesses negative expectations (e.g. " my experiences frighten me"), internal shame ("There must always have been something wrong with me as a person to have caused these experiences") and external shame (" I am ashamed to talk about my experiences"). The use of the PBEQ is limited and has focused on at risk mental states for psychosis and individuals with psychotic disorders (Pyle et al., 2015; Stowkowy et al., 2015; Taylor et al., 2015; Pyle & Morrison, 2017). Internal consistencies (e.g. Cronbach alphas) have ranged from 0.51 to 0.72 for individuals with at risk mental states and individuals with psychotic disorders (Pyle et al., 2015; Pyle & Morrison, 2017). Limitations include inconsistencies regarding factor structure, current validity hasn't been measured, and the scale has not been used in non-clinical samples (Pyle & Morrison, 2017). The PBEQ was in its infancy when the thesis began, and because it has not been measured in non-clinical samples, it remains to be seen whether this would be a suitable measure to use within a general population sample.

Another avenue of research focussing on self-stigma of mental health, is self-stigma towards seeking psychological help. Tucker et al., (2013) proposes that self-stigma of mental illness and self-stigma of seeking psychological help are related but distinct constructs. A self-stigma measure that has been frequently used within non-clinical samples is the Self-Stigma of Seeking Help (SSOSH; Vogel et al., 2006). The SSOSH assesses anticipated self-stigma about seeking psychological help, whereby a personally held belief that potentially seeking psychological help would make one undesirable and socially unacceptable (e.g., "I would feel inadequate if I went to a therapist for psychological help"). The SSOSH has consistently demonstrated excellent internal reliability (i.e. Cronbach co-efficients) 0.86- 0.91 (Vogel et al.,

2006; Jennings et al., 2015; Stanley et al., 2018). The SSOSH also demonstrates good construct, criterion and predictive validity, and the ability to differentiate between university students who did and did not seek help for mental health problems (Vogel et al., 2006). There is empirical evidence that people with a higher level of anticipated self-stigma towards seeking help have more negative help-seeking attitudes and are reluctant to seek help (Vogel et al., 2007; Tucker et al., 2013).

The SSOSH has not previously been used in the psychosis literature. However, this type of self-stigma may have important implications for individuals with schizotypy traits, particularly if individuals may come to a possible critical juncture (i.e. seeking mental health services) in the future. Therefore, it was chosen as the most appropriate measure of self-stigma to use in the current thesis.

3.6 Measuring metacognition

Metacognitive capacity can be conceptualised as being a spectrum of discrete to more synthetic metacognitive abilities (Lysaker et al., 2014). The most widely used measure of Synthetic metacognitive abilities in psychotic disorders is known as the Metacognition Assessment Scale – Abbreviated (MAS-A; Lysaker et al., 2005). The MAS-A is a coding system which requires a narrative obtained through the semi-structured Indiana Psychiatry Illness Interview (IPII; Lysaker et al., 2002). The IPII is conducted by a clinician or researcher, lasting 30-60 minutes and enables individuals to discuss their lives and the understanding of their experiences (i.e. mental illness) (Rabin et al.,2014).The MAS-A includes four subscales; *self-reflectivity-* which assesses the ability to recognise one's own mental states. *Understanding of others minds-* which assesses the ability to recognise other individuals' mental states*. Decentration-* which assesses an individual's ability to view the world in which they exist as understandable from a number of different perspectives. *Mastery-* which assesses an individual's ability to use their

own mental states to respond to real world psychological dilemmas (Lysaker et al., 2014). Only one study has explored synthetic metacognition in schizotypy, and they had to modify the IPII to ask participants about important life challenges rather than ask about psychiatric illness (Rabin et al., 2014). Good inter-rater reliability, validity and intraclass correlations have been reported for the MAS-A subscales in individuals with psychotic disorders (Lysaker et al., 2005; Lysaker et al., 2013; Lysaker et al., 2018). A main limitation of the MAS-A is that it requires a narrative to be fully transcribed using the IPII, which is a time demanding procedure. Furthermore, researchers require training to be able to rate the MAS-A (Luther et al., 2016).

The most widely used measure of discrete metacognitive abilities is the 65-item Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997) and its 30-item short form (MCQ-30; Wells & Cartwright-Hatton, 2004). The MCQ and MCQ-30 were designed to assess five domains of dysfunctional metacognitive beliefs, including positive beliefs about worry, negative beliefs about uncontrollability of thoughts and corresponding danger, lack of cognitive confidence, cognitive self-consciousness and negative beliefs about need to control thoughts (Wells & Cartwright-Hatton, 2004). The questionnaires have frequently been used to assess metacognition across the psychosis continuum. Limitations of the original MCQ was that it had restricted use due to its length, and participants found some of the items unclear (Wells & Cartwright, 2004). The internal reliability of the MCQ-30 subscales were reported to be better than the original MCQ, which makes the MCQ-30 the best available measure for metacognitive beliefs (Bright et al., 2018). The focus of the current thesis was on dysfunctional metacognitive beliefs, therefore the MCQ-30 was utilised. Within non-clinical samples, chronbach alphas have ranged from 0.83 to 0.89 for the five metacognitive belief domains (Sellers et al., 2018). Research has also consistently found a five-factor structure of the MCQ-30 (Spada et al., 2008; Tosun & Irak, 2008; Yilmaz, Genecoz, & Wells, 2008) and

demonstrated good validity and acceptable test–retest reliability (Wells & Cartwright-Hatton, 2004; Cho et al., 2012).

The focus of the current thesis was not on synthetic metacognition, but rather dysfunctional metacognitive beliefs given the suggestion that they are potential vulnerability markers for psychotic disorders. The MCQ-30 was chosen to measure dysfunctional metacognitive in the current thesis because it takes considerably less time to complete than the original MCQ and demonstrates excellent psychometric properties.

3.7 Measuring Neurocognition

A strength of the current thesis was that it aimed to comprehensively assess associations between schizotypy and neurocognition domains, using a standardised battery of tasks, designed to specifically assess cognitive domains that are reliably impaired in psychotic disorders, to determine whether there are similarities or discontinuities across the psychosis continuum. The MATRICS Consensus Cognitive Battery (MCCB; Neuchterlein et al., 2006) the Brief Assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004) and the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 1998), have been widely used within the psychosis literature to observe neurocognitive impairments. These cognition batteries have also been used in studies of schizotypy (Chun et al., 2013; Korponay et al., 2014; Martin-Santiago et al., 2016).

The MCCB compromises 10 standardised cognitive measures that assess Speed of Processing, Attention/Vigilance, Working Memory, Verbal Learning, Visual Learning, Reasoning/Problem-solving, and Social Cognition. The MCCB is suggested to be the gold standard cognitive battery in schizophrenia (Bismark et al., 2018). The MCCB has demonstrated excellent reliability, and significant correlations with functional capacity measures (Neuchterlein, et al., 2008; Green, et al., 2011). The MCCB has been translated into

many different languages and normative data has been obtained for different countries (Kern et al., 2011; Rodriguez-Jimenez et al., 2012; Shi et al., 2015). However, potential limitations of the MCCB have been suggested including the demands of administration (60-90 minutes), possible practice effects and cost of purchase (£1000) (Pietrzak et al., 2009; Lees et al, 2015).

The RBANS compromises 12 standardised measures which assesses immediate memory, visuospatial/constructional, language, attention, delayed memory. The RBANS has demonstrated good internal consistency, efficient administration (30 minutes), reasonable test-retest reliability and sensitivity in identifying cognitive impairments in schizophrenia (Loughland et al., 2007; Chun et al., 2013). However, limitations of the RBANS include that it was originally developed to screen elderly subjects, there are ceiling effects in some domains, and it lacks measures of motor functioning, executive functioning and working memory, all of which are important cognitive domains in schizophrenia (Keefe et al., 2004).

The BACS include 6 standardised tests to assess verbal memory, working memory, motor speed, verbal fluency, attention and reasoning and problem solving, and takes under 30 minutes to administer. The BACS has demonstrated high test-rest reliability, is sensitive to cognitive deficits in individuals with schizophrenia and predicts functional outcomes (Keefe et al., 2004; Keefe et al., 2006). The BACS has been translated into different languages, normative data has been obtained for different countries, and results in fewer missing data compared to longer standard batteries (e.g. Keefe et al., 2008; Wang et al., 2016). Furthermore, the BACS tests which measure speed of processing, working memory, verbal learning and reasoning and problem-solving are highly correlated with the subtests of the MCCB (Kaneda et al, 2013). Limitations of the BACS include that it needs to be administered by a researcher or clinician, and the cost of purchase (£1000).

As previously mentioned, a strength of the current thesis was that it aimed to comprehensively assess associations between schizotypy and neurocognition domains, using a standardised battery of tasks. The BACS was chosen to measure neurocognition in the current thesis, as whilst there was a cost to purchase, the BACS domains correlate well with the "gold standard" MCCB, (Kaneda et al., 2013) yet takes less time to administer, and measures more cognition domains than the RBANS.

3.8 Measuring Social Cognition

The initial Social Cognition Psychometric Evaluation for schizophrenia (SCOPE) study addressed the need to establish a complete gold-standard battery of social cognition measures (Pinkham et al., 2013). A strength of the current thesis was that it aimed to explore the associations between schizotypy, and the four social cognition domains highlighted as relevant to schizophrenia spectrum disorders. The below measures were identified by the SCOPE expert panel, as the best existing social cognition measures, which were put forward for further evaluation and validation (Pinkham et al., 2013).

3.8.1 Theory of Mind

The Hinting Task (Corcoran et al., 1995) includes 10 short vignettes involving two people in a conversation, which are read aloud by an interviewer to a participant. The Hinting Task assesses an individual's ability to correctly infer what a person is indirectly implying. The Hinting Task has been found to be a psychometrically good social cognition measure in schizophrenia and healthy controls (Pinkham et al., 2017) and first episode psychosis (Ludwig et al., 2017), demonstrated by acceptable internal consistencies, criterion validity and incremental validity. Limitations to the hinting task, include ceiling effects (Lindgren et al., 2018). Furthermore, the Hinting Task, is interviewer rated and therefore cannot be assessed in

online surveys. Justification for using an online survey will be discussed later in the methods chapter.

The Awareness of Social Inferences Test—Part III (TASIT-Part III, McDonald et al., 2003) assesses participants abilities to detect lies and sarcasm. Participants watch short videos of every day social interactions and answer 4 standard questions for each video, which assess individuals understanding of the intentions, beliefs and meanings of the speaker and their exchanges (Pinkham et al., 2013). The TASIT has demonstrated good internal reliability in individuals with schizophrenia and healthy controls and demonstrates significant differences between groups (Pinkham et al., 2017). However, it demonstrates poor test-retest reliability in healthy controls, and no correlations with functional outcomes in individuals with schizophrenia (Pinkham et al., 2017). Limitations of the TASIT include a purchase cost and its length administration time (15-20 minutes).

The Reading the Mind in the Eyes task (Eyes; Baron-Cohen et al., 2001), assesses individuals' abilities to identify the mental state of others based on in the eye region of the face. The Eyes task has demonstrated adequate internal consistency and test-retest reliability in individuals with schizophrenia and healthy controls (Pinkham et al., 2016; Pinkham et al., 2017). However, a limitation to the Eyes is that failed to predict functional outcomes in individuals with schizophrenia (Pinkham et al., 2017).

The Hinting Task and the TASIT are measures of cognitive Theory of Mind, whereas the Eyes task a measure of affective Theory of Mind. The Eyes task is a relatively quick measure to administer (5 minutes) and can be administered in an online survey. The previous literature has consistently found associations between schizotypy and cognitive Theory of Mind, however the literature has remained inconsistent regarding affective Theory of Mind. Therefore, an aim

of the current thesis was to explore whether affective theory of mind was also associated with schizotypy. Thus, the Eyes Task was chosen to measure affective Theory of Mind.

3.8.2 Emotion processing

The Bell Lysaker Emotion Recognition Task (BLERT; Bryson et al., 1997) and the Penn Emotion Recognition Task (ER-40; Gur et al., 2002), are measures of emotion processing and assess individuals' abilities to recognise facial affect. The BLERT, includes participants viewing 21 ten-second video clips of a male actor's dynamic facial, vocal-tonal and upper-body movement cues (Pinkham et al., 2013). After viewing each video, the tape is paused, and participants identify the expressed emotion (happiness, sadness, fear, disgust, surprise, anger, or no emotion). SCOPE schizophrenia validation studies have found that the BLERT demonstrated adequate internal consistency, test-retest reliability, utility as a repeated measure, relationships with functional outcome, sensitivity to group, and has been recommended for implementation in clinical trials (Pinkham et al., 2015; Pinkham et al., 2017). The BLERT is administered in laboratory-based settings and given that online survey respondents require related browser plug-ins to correctly view videos, it is suggested that this would not be the most suitable measure to use in an online survey.

The ER-40 is an emotion processing task that assesses facial affect recognition ability, using 40 colour photographs of static faces expressing 4 basic emotions. The ER-40 allows for testing in laboratory settings or through the internet (Pinkham et al., 2013). Like the BLERT, validation studies in individuals with schizophrenia revealed that the ER-40 demonstrated adequate internal consistency, test-retest reliability, utility as a repeated measure, relationships with functional outcome, sensitivity to group, and has been recommended for implementation in clinical trials (Pinkham et al., 2015; Pinkham et al., 2017).

The ER-40 and the BLERT have both demonstrated adequate psychometric properties and have been recommended for use in clinical trials to measure emotion processing (Pinkham et al., 2017). However, the BLERT is administered in laboratory-based settings as it is a video-based task whereas the ER-40 can be administered in both laboratory-based settings and online surveys. In the current thesis social cognition will be assessed in an online survey and will be justified later in the methods chapter. Therefore, the ER-40 was chosen to measure emotion processing.

3.8.3 Social Perception

In the initial SCOPE study, only one measure of social perception was identified as being recommended for further evaluation, named the Relationships Across Domains-abbreviated (RAD; Sergi et al., 2009). The RAD is based on the relational model's theory, which proposes that individuals use their implicit knowledge of the 4 relational models (Fiske, 1992) (communal sharing, authority ranking, quality matching and market pricing) to understand social relations and to be able to make inferences about the behaviours of others in future interactions. The RAD has demonstrated acceptable test-retest reliability and internal consistency in schizophrenia, first episode psychosis and healthy controls (Pinkham et al., 2015; Ludwig et al., 2017). However, the RAD was not deemed as an acceptable measure for clinical trials in schizophrenia due to a high proportion of individuals with schizophrenia performing at chance levels, and due to a lack of association with functional outcomes (Pinkham et al., 2016). On the contrary Ludwig et al., (2017) found a significant association with functional outcome and limited floor/ceiling effects in individuals with first episode psychosis. Additionally, studies have also identified that individuals at ultra-high risk of psychosis perform significantly worse on the RAD, in comparison to healthy controls (Green et al., 2011; Piskulic et al., 2016).

Whilst the utility of the RAD has been questioned regarding its use in clinical trials, it may be suggested that it is sensitive enough to detect differences across the psychosis continuum. Therefore, the RAD was chosen to measure social perception.

3.8.4 Attribution Bias/Style

In parallel with social perception, only one measure of attribution was identified as being recommended for further evaluation in the initial SCOPE study (Pinkham et al., 2013). The Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al., 2007) evaluates hostile social cognitive biases for perceived negative social situations, including hostile bias (i.e. an explanation for why the event occurred), aggression bias (i.e. how an individual would react to the event) and blame bias (i.e. how intentional the event was, how angry the even would make the participant and how much the participant would blame the individual in the negative social event). Psychometric validation studies revealed that the AIHQ aggression bias and hostility bias are not recommended for use in clinical trials, as they have weak test-retest reliability, researchers require additional training as they are rater-scored items and they do not provide any additional information beyond the self-report blame scores (Pinkham et al., 2016; Buck et al., 2017). On the contrary the AIHQ Blame score for ambiguous items, demonstrated adequate internal consistency, test-retest reliability, was related with functional outcomes and distinguished between individuals with schizophrenia and healthy controls (Buck et al., 2016). Therefore, it is suggested that the AIHQ blame score has utility and will be assessed in the current thesis to measure attribution bias/style.

3.9 Description of psychometric measures used in the thesis

The below section provides detailed description of each of the measures used in the current thesis.

3.9.1 The Oxford-Liverpool Inventory of Feelings and Experiences-short version (sO-LIFE;

Mason, Linney & Claridge, 2005).

The sO-LIFE (Mason et al., 2005) has a yes/no format and measures unusual experiences (12 items), introvertive anhedonia (10 items), cognitive disorganisation (11 items) and impulsive non-conformity (10 items). The unusual experiences subscale includes questions of perceptual aberrations and magical ideation (e.g. "Can some people make you aware of them just by thinking about you?", "When in the dark do you often see shapes and forms even though there is nothing there?"). The introvertive anhedonia subscale includes questions of social avoidance and lack of pleasure in social and physical activities (e.g. "Are there very few things that you have ever enjoyed doing?", "Are you much too independent to get involved with other people?"). The cognitive disorganisation subscale includes questions of cognitive slippage and social anxiety (e.g. "Do you dread going into a room by yourself where other people have already gathered and are talking?", "Are you easily confused if too much happens at the same time?"). The impulsive non-conformity subscale includes questions of impulsive, antisocial and eccentric behaviour (e.g. "Do you often feel the impulse to spend money which you know you can't afford?", "Would you like other people to be afraid of you?"). There are 5 items on the introvertive anhedonia subscale and 3 items on the impulsive non-conformity subscale which are reverse coded. Items are summed for each of the subscales, and a total score can be computed by summing all 43 items. Higher scores indicate higher levels of schizotypy traits. Scores can range from 0-12 for unusual experiences, 0-10 for introvertive anhedonia, 0-11 for cognitive disorganisation, 0-10 for impulsive non-conformity and 0-43 for total schizotypy. Internal consistencies for the sO-LIFE have ranged from 0.62 to 0.80 for Cronbach alphas (Mason et al., 2005) and from 0.78 to 0.87 for ordinal alphas (Fonseca-Pedrero et al., 2015b). The four sO-LIFE subscales and total schizotypy score were used in the current thesis to measure schizotypy.

3.9.2 The Becks Cognitive Insight Scale (BCIS; Beck et al., 2004).

The BCIS is a 15-item instrument rated on a 4-point Likert scale (0=Do not agree at all to 3=Agree completely) that consists of two subscales (i.e. self-reflectiveness and self-certainty). The 9-item self-reflectiveness subscale is defined as the ability to consider the possibility that one's beliefs could be false, by being objective, reflective and open to feedback (e.g. "At times I have misunderstood other people's attitudes towards me"). The 6-item self-certainty subscale is defined as an overconfidence in the accuracy of one's current beliefs (e.g. "I cannot trust other people's opinion about my experiences"). Scores can range from 0-27 for the self-reflectiveness scale with higher scores indicating higher cognitive insight. Scores can range from 0-18 for self-certainty, with higher scores indicating lower cognitive insight. A cognitive insight composite score can also be obtained by subtracting the self-certainty score from the self-reflectiveness score. This was originally designed because higher levels of self-certainty in individuals with psychosis can diminish the ability to be self-reflective (Beck et al., 2004; Van Camp et al., 2017). However, Van Camp et al., (2017) recommended that the subcomponents of cognitive insight should be studied separately as they may have differential relationships with other factors (e.g. wellbeing, depression, neurocognition). Therefore, the current thesis will consider the subcomponents of cognitive insight, separately. Cronbach alphas have ranged from 0.73 to 0.74 for the self-reflectiveness subscale and ranged from 0.63-0.75 for the self-certainty subscale, in healthy control samples (Engh et al., 2007; Martin et al.., 2010).

3.9.3 21 item Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995).

The DASS-21 includes three subscales that measure the three related negative emotional states of anxiety (e.g. "I felt I was close to panic"), depression (e.g. "I couldn't seem to experience any positive feeling at all") and general tension and coping (e.g. "I found it hard to wind

down"). Participants are asked to what extent each of the items applied to them over the past week using a 4-point Likert scale from '0=did not apply to me at all' to 3=Applied to me very much or most of the time'. 7 items each make up the depression, anxiety and stress subscales, and all 21 items can be summed to create a total score that captures negative affect. Higher scores on the subscales and total scale indicate greater levels of anxiety, depression, stress and general negative affect. The DASS-21 total score can range from 0-63 and was used in the current thesis to assess negative affect. Previous studies have reported Cronbach alphas ranging from 0.90- 0.93 to for the DASS-21 total score (Henry & Crawford, 2005; Bottesi et al., 2015).

3.9.4 54 item Ryff scales of Psychological wellbeing (SPWB-54; Ryff, 1989)

The SPWB-54 (Ryff, 1989) includes 6 subscales that assess; autonomy (e.g., "My decisions are not usually influenced by what everyone else is doing", environmental mastery (e.g., "I am good at juggling my time so that I can fit everything in that needs to get done", personal growth (e.g., "I have the sense that I have developed a lot as a person over time"), positive relations with others (e.g., "I enjoy personal and mutual conversations with family members or friends"), purpose in life (e.g., "I enjoy making plans for the future and working to make them a reality") and self-acceptance (e.g., "I like most aspects of my personality"). Each item is rated on a 6-point Likert scale (1=strongly disagree to 6=strongly agree), with 9 items each making up the six subscales. Half of the items are reverse coded prior to summing the subscales and total score. The total SPWB-54 score was used in the current thesis and is derived by summing the scores on the six factors. The total SPWB-54 score can range from 54 to 324, with higher scores indicating greater PWB. A recent meta-analyses revealed a Cronbach alpha of 0.91 for the 54 item SPWB total score (Crouch et al., 2017).

3.9.5 Self-Stigma of Seeking Help (SSOSH; Vogel et al., 2006)

The SSOSH (Vogel et al., 2006) is a 10-item instrument that assesses anticipated self-stigma about seeking psychological help, whereby a personally held belief that potentially seeking psychological help would make one undesirable and socially unacceptable (e.g." I would feel inadequate if I went to a therapist for psychological help", "I would feel worse about myself if I could not solve my own problems"). The 10 items are measured on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), with 5 of the items reverse scored prior to summing the 10 items. Total scores range from 10-50, with higher scores indicating greater anticipated self-stigma towards seeking help, therefore, viewing seeking help as a greater threat to one's self-esteem and self-confidence. As previously mentioned, chronbach alphas for the SSOSH have ranged from 0.86- 0.91 (Vogel et al., 2006; Jennings et al., 2015; Stanley et al., 2018).

3.9.6 30 Item Meta-Cognitions Questionnaire (MCQ-30; Wells & Cartwright-Hatton, 2004).

The MCQ-30 (Wells & Cartwright 2004) is rated on a four-point Likert scale (1=do not agree to 4=agree very much) and includes five related but conceptually distinct subscales. (1) *Positive beliefs about worry* (POS), include 6 items reflecting beliefs that worry can help solve problems (e.g. Worrying helps me cope"). (2) *Negative beliefs about the uncontrollability of thoughts and corresponding danger* (NEG), includes 6 items reflecting beliefs that thoughts must be controlled to function well (e.g. "I could make myself sick with worrying"). (3) *Cognitive confidence* (CC) includes 6 items reflecting concerns with perceived lack of self-confidence in one's memory and attentional capacities (e.g. "I do not trust my memory"). (4) N*egative beliefs about need to control thoughts* (NC) includes 6 items reflecting superstitious themes that certain thoughts can cause negative outcomes and feelings of responsibility for preventing such outcomes (e.g. "I will be punished for not controlling certain thoughts"). (5) *Cognitive self-consciousness* (CSC) which includes 6 items reflecting the extent to which individuals engage

in monitoring their own thought processes (e.g. "I constantly examine my thoughts"). Scores for each of the five subscales can range from 6-24, with higher scores indicating a greater endorsement of dysfunctional metacognitive beliefs. All five MCQ-30 subscales were used in the current thesis to measure dysfunctional metacognitive beliefs. As previously mentioned, the following Cronbach alphas have been reported for the MQC-30 subscales: POS (0.89) NEG (0.87) CC (0.88) NC (0.83) CSC (0.86) (Sellers et al., 2018).

3.9.7 Brief Assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004)

The following is a description of the six subtests of the BACS (Keefe et al., 2004). In accordance with the BACS manual, the order in which they are described, is the order in which the tests are completed.

List learning (Verbal memory). Participants are read a list of 15 words and asked to recall back as many of these words as possible. This is repeated 5 times and the total score of words recalled ranges from 0-75 (Keefe et al., 2004).

Digit sequencing task (working memory). Participants are read a randomly ordered cluster of numbers that increase in length. Participants are asked to report the numbers back to the researcher in order lowest to highest. The outcome measure is the total number of trials with all items in the correct order with scores ranging from 0-28 (Keefe et al., 2004).

Token motor task (Motor speed). Participants are given 100 plastic tokens and are given 60 seconds to pick up one token with each hand simultaneously and place the tokens in a container. The outcome measure is the total number of tokens placed within the container within 60 seconds with scoring ranging from 0-100 (Keefe et al., 2004).

Symbol Coding (attention and processing speed). Participants are given 90 seconds to write down numeral 1-9 as matches to symbols on a response sheet, based on a key provided to them. Participants are asked to write the responses as quickly as possible. The measure is designed

to assess attention and processing speed, and the outcome measure is the total number of correct responses, with scores ranging from 0-110 (Keefe et al., 2004).

Category and letter fluency (Verbal fluency). Category fluency- Participants are given 60 seconds to produce as many different words as possible within a certainty category (e.g. animals). Letter fluency- In two separate trials, participants are given 60 seconds to produce as many different words as possible that begin with a particular letter (e.g. F and S). The outcome measure is the total number of words generated from the three trials (Keefe et al., 2004).

Tower of London (Executive function/ reasoning and problem solving). Participants are asked to look at two pictures simultaneously, which shows 3 different coloured balls arranged on three pegs, with the balls in a unique arrangement in each picture (Keefe et al., 2004). The participant needs to accurately report the total number of times the balls in one picture would have to be moved to make the arrangement of balls identical to the opposing image. Participants are told the standard rules prior to the trial (i.e. balls are moved one at a time and balls on top of other balls must be moved first). The measure is designed to assess executive and problem-solving abilities. The outcome measure is the correct number of trials, where the correct number of moves is the response, with scores ranging from 0-22 (Keefe et al., 2004).

3.9.8 The Reading the Mind in the Eyes Task-Abbreviated (Eyes; Baron-Cohen et al., 2001).

The Eyes task (Baron-Cohen et al., 2001), assesses individuals' abilities to identify the mental state of others based on in the eye region of the face and is a measure of affective theory of mind. 36 photographs are presented to participants which represent an eye region of the face expressing a complex mental state, including 19 male faces and 17 female faces. Participants are asked to determine what mental state is being depicted, with four different options presented with each photograph (e.g., playful, comforting, irritated or bored). Scores on the Eyes task range from 0-36 with higher scores indicating a greater number of mental states correctly

identified. Previous studies have reported chronbach alphas ranging from 0.64 to 0.75 (Pinkham et al., 2017).

3.9.9 Penn Emotion Recognition Task (ER-40; Gur et al., 2002).

The ER-40 (Gur et al., 2002) is an emotion processing task that assesses facial affect recognition ability. Participants are presented with 40 colour photographs of static faces expressing 4 basic emotions (i.e. happiness, sadness, anger and fear) and neutral expressions. The 40 photographs are balanced for gender, age, ethnicity and intensity of expressions (i.e. four high intensity and four low intensity expressions) for each basic emotion. Participants choose the correct emotion label for each face. Accuracy scores range from 0-40 with higher scores indicating greater emotion processing. Previous studies have reported chronbach alphas ranging from 0.59- 0.75 (Gur et al., 2010; Pinkham et al., 2017).

3.9.10 The relationships Across domains-abbreviated (RAD; Sergi et al., 2009).

The RAD (Sergi et al., 2009) is a measure based on the relational model's theory (Fiske, 1992) which proposes that individuals use their implicit knowledge of the 4 relational models (communal sharing, authority ranking, quality matching and market pricing ; Fiske, 1992) to understand social relations and to be able to make inferences about the behaviours of others in future interactions (Sergi et al., 2009). In communal sharing, members are equivalent, sharing resources without counting and groups seek consensus decisions. Authority ranking involves legitimate hierarchies. Equality matching involves balanced relationship in which members keep track of turn-taking or in-kind reciprocity. Market pricing involves relationships which are based on people being compensated or punished based on the proportion of their effort or wrong doing (Sergi et al., 2009). The RAD-abbreviated, compromises 15 vignettes which involve different male-female dyads which represent one of the four relational models. Participants read each vignette and answers 3 yes/no questions about whether a future

behaviour is likely to happen based on the described relationship vignette. The total number of correct responses range from 0-45 and higher scores indicate greater social perception. Previous studies have reported chronbach alphas ranging from 0.70-0.72 (Pinkham et al., 2015).

3.9.11 Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al., 2007).

The AIHQ (Combs et al., 2007) evaluates hostile social cognitive biases and includes 15 second-person vignettes of negative social situations with varied intentions; 5 intentional, 5 ambiguous and 5 accidental scenarios (e.g., "You are supposed to meet a new friend for lunch at a restaurant, but she/he never shows up"). Participants are asked to imagine the situation happening to them and provide two open ended responses for each vignette; an explanation for why the event occurred (hostility bias) and what they would do in response to the event (aggression bias). These 2 open ended responses are evaluated by trained raters on a 1 to 5 scale. For each vignette participants also rate the following Likert scales; The intentionality of the other's actions (1 to 6), how angry that would make them feel (1 to 5) and how much they would blame the other person (1-5). A composite blame score is calculated by averaging these three Likert scales. Higher scores indicate greater hostility bias, aggression bias and blame bias. All 15 items are administered, because the ambiguous items need to be scored in the context of the accidental and intentional scenarios. However, only the five ambiguous items tend to be used in analysis in accordance with the strategies of previous studies (Combs et al., 2007, Combs et al., 2009). Only the blame bias subscale for ambiguous situations was utilised as a measure of attribution bias as the other two subscales have weak test-retest reliability and do not provide any additional information beyond the self-report blame scores (Pinkham et al., 2016; Buck et al., 2017). Chronbach alphas for the composite blame bias scale have ranged from 0.74 to 0.86 (Ludwig et al., 2017).

3.10 Procedural Overview

The methods of data collection are reported in section 3.9.1. All procedures in the thesis were ethically approved by the NTU College of Business, Law and Social Sciences Research Ethics Committee (No. 2016/183 and No. 2016/195). Data was collected from November 2016 to December 2017.

3.10.1 Data Collection Methods

In this thesis, data collection for all five empirical studies were collected concurrently, using a convenience sampling approach. Data was collected from two online surveys using Qualtrics Online Software and one face to face survey. All three surveys included measures of schizotypy, cognitive insight, negative affect and PWB. Online survey 1 also included measures of metacognitive beliefs, and self-stigma for seeking psychological help, online survey 2 included measures of social cognition, and the face to face survey included measures of neurocognition. The methods of data collection in this thesis are demonstrated in Figure 3.1.

Online Survey one Time taken to complete: 15 to 20 minutes	Online Survey two Time taken to complete: 45 to 60 minutes	Face to Face survey one Time taken to complete: 45 to 60 minutes
1. Information sheet, 2. Consent, 3. Demographics, 4. Measures provided in a randomised order: sO-LIFE, BCIS, DASS-21, SPWB, SSOSH and MCQ-30 5. Debrief, Option to enter prize draw of 20X£10 gift vouchers and Question to ask whether they had participated in online survey two or the face to face study	1. Information sheet, 2. Consent, 3. Demographics, 4. Measures provided in a randomised order: sO-LIFE, BCIS, DASS-21, SPWB, Eyes Task, ER-40, RAD and AIHQ. 5. Debrief, Option to enter prize draw of 20X£10 gift vouchers and Question to ask whether they had participated in online survey one or the face to face study	1. Information sheet, 2. Consent, 3. Demographics, 4. Measures. The order of administration was counterbalanced regarding whether participants completed the BACS or the psychometric questionnaires first: sO-LIFE, BCIS, DASS-21, SPWB and BACS. 5. Debrief, psychology students awarded research credits, other students given the option to enter prize draw of 20x£10 gift vouchers and Question to ask whether they had participated in online survey one or online survey two

Figure 3.1. Data Collection Methods

As previously mentioned, a large proportion of schizotypy research focuses on psychology undergraduate students. The present research aimed to collect data from a more diverse sample. An advantage to using internet-based surveys is that it allows researchers to reach a large

proportion of the general population with relative ease (Wright, 2017). Therefore, most of the data for the project was collected using the two online surveys. The authors decision to collect data using two online surveys, rather than one was due to the length of administration, as research indicates dropout rates increase during lengthy and time-consuming online surveys (Hoerger et al., 2010). A limitation of the online survey two was that it took on average 45 minutes to 60 minutes to complete. However, this was due to four different social cognition measures being included, which could not be split into more than one survey. The two online surveys were advertised to the public, via social media sites such as Facebook and twitter, and email distributions to Nottingham Trent university students. One of the measures included in this thesis (i.e. BACS), cannot be used in an online survey because it must be administered by a researcher, thus the inclusion of the face to face survey. The face to face survey was only advertised to students at Nottingham Trent University, due to time and monetary restrictions.

3.10.2 Procedure

For all three data collection processes participants read an information sheet and provided informed consent, before completing demographics (i.e. age, gender, ethnicity and occupation). Following demographics, participants were administered the measures used in the present thesis. The measures in online survey 1 and 2 were presented in a randomised order. In the face to face study the order of administration was counterbalanced regarding whether participants completed the BACS or the psychometric questionnaires first. In line with ethical guidelines at Nottingham Trent University, apart from informed consent, answers to the demographic questions and measures were non-obligatory. Upon completion of the measures, participants were provided with a debrief and the option to enter prize draws. For the face to face survey, psychology students were awarded research credits, rather than entering the prize draw. In each survey, participants were asked whether they had completed one of the other thesis survey processes. Chapter 4. Study 1. used data extracted from all three surveys, therefore this question

was asked to ensure that repeat responses were not included within study 1. The author attempted to advertise the three surveys to different people to reduce the repeat responses across the data collection processes (e.g. face to face survey to psychology students, and differential email distributions and social media platforms for the online surveys).

Across the three data collection processes, participants had the option to enter prize draws to win gift vouchers. In the face to face survey, psychology students were either offered the option to enter the prize draw or obtain research credits through Nottingham Trent University research participation scheme. Incentives are frequently used in research to facilitate recruitment and to motivate participants (Robb et al., 2017). Some researchers suggest that incentives may attract particular types of respondents, introducing sample bias (Groves & Peytcheva, 2008), and may influence whether one decides to participate in the research or not (Singer & Couper, 2008). However, studies exploring the effectiveness of incentives, shows that prize draws seem to be no more effective than receiving no incentive in recruiting participants (Robb et al., 2017). Therefore, the inclusion of incentives in the current thesis was primarily a gesture of gratitude for individuals whom were willing to take part in the studies.

3.10.3 Data Extraction

Table 3.1. demonstrates how data was utilised from the three data collection processes, to examine the aims of each of the empirical chapters.

Table 3.1. Data Extraction

Empirical Study Chapters	Data Extraction	Measures included in each Empirical Study Chapter
Chapter 4. Study 1. Associations between schizotypy, cognitive insight, negative affect and psychological wellbeing.	Data collated from both online surveys and the face to face survey.	sO-LIFE, BCIS, DASS-21 and SPWB.
Chapter 5. Study 2. Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and self-stigma for seeking psychological help.	Data extracted from online survey one.	sO-LIFE, BCIS, DASS-21, SPWB and SSOSH.
Chapter 6. Study 3. Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and metacognitive beliefs.	Data extracted from online survey one.	sO-LIFE, BCIS, DASS-21, SPWB and MCQ-30.
Chapter 7. Study 4. Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and neurocognition.	Data extracted from Face to Face survey.	sO-LIFE, BCIS, DASS-21, SPWB and BACS.
Chapter 8. Study 5. Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and social cognition.	Data extracted from online survey two.	sO-LIFE, BCIS, DASS-21, SPWB, Eyes task, ER-40, RAD and AIHQ.

3.11 Statistical Analyses

A series of analyses methods were used to address the thesis aims and hypotheses. As mentioned in section 3.1.4, the thesis aimed to use statistical methods which complement the fully dimensional approach of schizotypy. Statistical analyses packages used include SPSS version 24.0 to analyse Cronbach Alphas, descriptive statistics, Pearson's Correlations and Multiple Regression Models. R Version 3.5.1 (R Core Team, 2018) was used to analyse ordinal alphas. Hayes Process Macro (version 3.0, Hayes, 2018) was used to assess mediation models.

3.11.1 Internal Reliability of Measures

Internal consistency for the following measures; BCIS, DASS-21, SPWB, SSOSH, MCQ-30, Eyes task, ER-40, RAD and AIHQ were assessed using Cronbach alphas. Internal consistency for the sO-LIFE subscales and total score were assessed using Ordinal alphas, because it

performs well for dichotomous data (Zumbo et al., 2007). A Cronbach alpha coefficient of 0.6-0.7 is considered as minimally acceptable, 0.7 to 0.8 is considered good and >0.8 deemed as excellent internal reliability (George and Mallery, 2003). To the authors knowledge there are no rules of thumb to follow for ordinal alphas.

3.11.2 Descriptive Statistics

Descriptive statistics were reported for all measures (e.g., mean, SD and sample range). Visual inspection of the descriptive statistics reported in the thesis empirical study chapters, were compared with previous research, for explanatory purposes. All key variables were examined for normality by assessing skewness and kurtosis. Values for skewness and kurtosis which are between -2 and +2 are considered an acceptable range for indicating normality of distributions (George & Mallery, 2003). All key variables were also inspected for extreme outliers using boxplots. Extreme outliers can introduce bias into statistical estimates, resulting in under or overestimated values (Kwak & Kim, 2017). Therefore, any extreme outliers would be reported in the empirical study chapters and would be removed from subsequent analysis.

3.11.3 Pearson's correlations

Pearson's correlation tests were performed in all five study empirical chapters for exploratory purposes. Cohen (1988) provide a rule of thumb for interpreting correlation coefficients as; $r = \pm.1$ weak relationship, $r = \pm.3$ moderate relationship, $r = \pm.5$ strong relationship.

3.11.4 Multiple Regression

In accordance with the present thesis research aims, simultaneous regression analyses were expected to be performed in all five study empirical chapters. The schizotypy dimensions were entered as predictor variables, and the following variables entered as outcome variables; cognitive insight subcomponents, self-stigma of seeking psychological help, metacognitive beliefs, neurocognition and social cognition. The advantage of entering the schizotypy

dimensions as predictor variables is that the unique contribution of each schizotypy facet to the outcome variables could be explored, whilst holding the other schizotypy facets constant. In doing so may help clarify the inconsistencies of previous studies that have found differential relationships between schizotypy and some of the aforementioned factors when utilising Pearson's correlations or including the individual schizotypy dimensions as outcome variables in multiple regression analyses.

The correct use of multiple regression models require that the following assumptions are satisfied; linearity, independence of errors, homoscedasticity, multicollinearity and normality (Osborne & Waters, 2002). In the present thesis, linearity was assessed by scatterplots, independence of errors assessed by boxplots, homoscedasticity by examining a plot of the standardised residuals by the regression standardised predicted value, multicollinearity by assessing Variance Inflation Factors (VIFS) and normality by assessing skewness and kurtosis. As a general rule of thumb VIF factors exceeding 5 or 10 imply that multicollinearity may be problem (Montgomery, Peck & Vining, 2001).

3.11.5 Mediation Analyses

Hayes Process Macro (version 3.0, Hayes, 2018) in SPSS version 24.0 was used to perform mediation analysis. Mediation analysis is used to test whether an explanatory variable (X) exerts an effect on an outcome variable (Y) via a mediating variable (M) (Hayes, 2009). The most commonly used approach to mediation is the causal steps approach, which posits that an explanatory variable must be correlated with the outcome variable (step 1), the explanatory variable must be associated with the mediator (step 2), the mediator variable must be correlated with the outcome variable (step 3), and the path from the explanatory variable to the outcome variable decreases substantially when controlling for the mediator variable (step 4) (Baron & Kenny, 1986). However, recent research, have argued that step 1, a significant effect of the

explanatory variable on the outcome variable, is not necessary for mediation to occur (Hayes, 2009; Zhao, Lynch, & Chen, 2010). More simply, the explanatory variable can exert an indirect effect on the outcome variable through the mediator, even if there is no direct association between the explanatory variable and the outcome variable. The mediation analyses in the present thesis therefore considers that there does not have to be an association between an explanatory variable and an outcome variable to test for mediation.

Figure 3.2A represents the simplest mediation model, which has a single mediating variable (M1). More complex models include parallel mediation and serial mediation. Figure 3.2B represents a parallel mediation model, which proposes that two or more variables (M1 and M2 in the figure) mediate the relationship between an explanatory variable and an outcome variable. Serial mediation on the other hand assumes that multiple mediators can be linked in serial, whereby mediator 1 influences mediator 2 (Figure 3.2C, with mediating variables M1 and M2) (Hayes, 2012). Parallel and serial mediation models are extremely useful because they allow for a more complex assessment of the processes through which an explanatory variable affects an outcome variable (Kane & Ashbaugh, 2017). Process Macro Models 4 (simple and parallel mediation) and Model 6 (serial mediation) were employed to address the current thesis research questions.

B

C
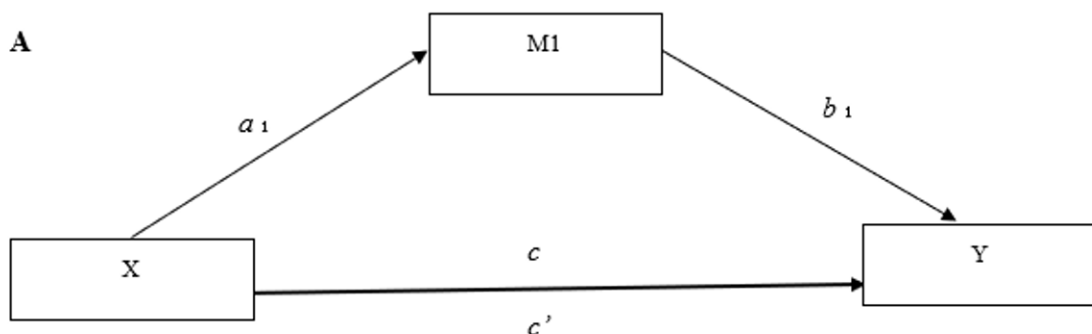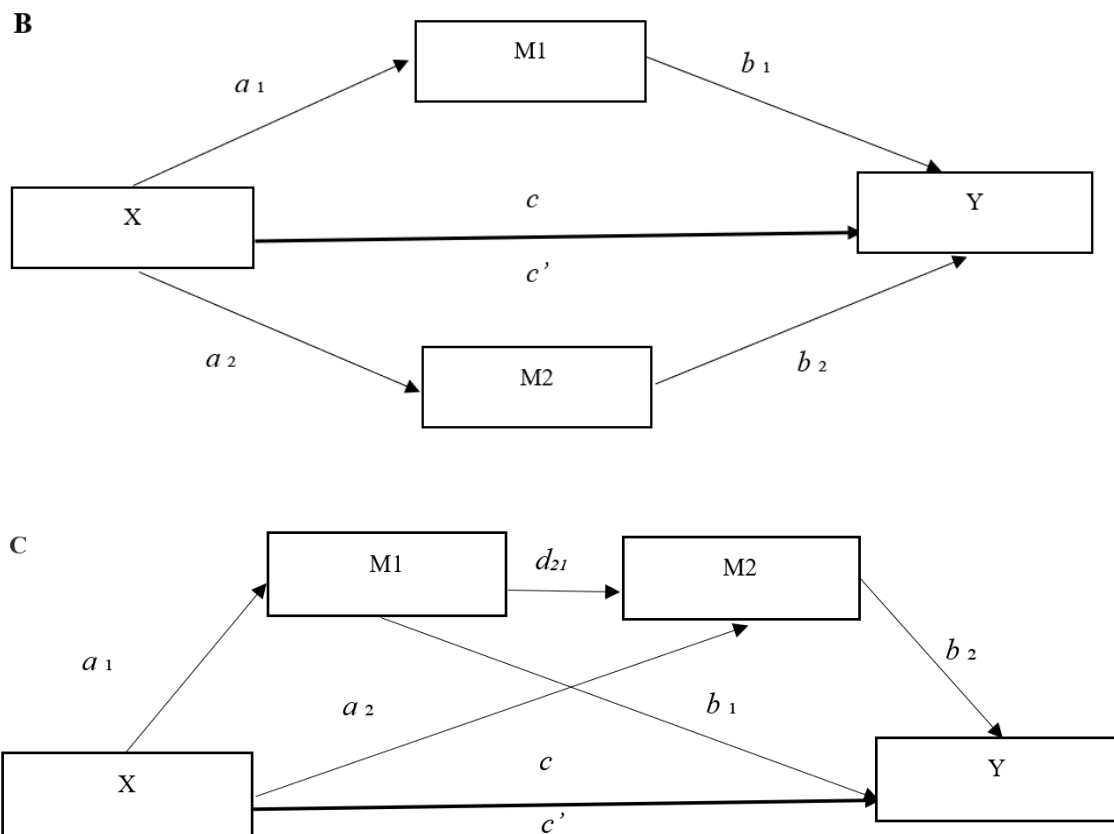
Figure 3.2 (A) Simple mediation model (B) Parallel mediation model (C) Serial mediation model.

In all the mediation models present in Figure 3.2, the total effect (c) is the direct effect + indirect effect (c'+ ab). In Figure 3.2A, ab would be derived from a1 and b1; in Figures 3.2B and 3.2C it would be derived from a1, a2, b1, and b2. The *direct* effect (c') is defined as the effect of the explanatory variable on the outcome variable, whilst controlling for the mediator variables. The *indirect* effect (ab) is the measure of the amount of mediation. In parallel and serial mediation models there are specific indirect effects for each of the mediator variables (e.g. a_1,b_1 and a_2,b_2). In serial mediation models there is a further specific indirect effect to support serial mediation (a_1,d_{21},b_1) (See Figure 3.2). Percentile-based 95% confidence intervals (95% CI) of the indirect effects were generated using 5000 bootstrapped samples. This method provides point estimates and confidence intervals to assess the significance or non-significance of the

indirect effect. A significant indirect effect (mediation) is inferred if the 95% confidence interval does not include zero. Specifically, the indirect effects can be interpreted as significantly positive if bootstrap confidence intervals are entirely above 0 and significantly negative if bootstrap confidence intervals are entirely below 0. Hayes (2009) recommends at least 5000 bootstrap samples, with the percentile bootstrap method less prone to constraints of sample size bias and one of the more valid and powerful methods for testing indirect effects (MacKinnon, Lockwood & Williams, 2004; Preacher & Hayes, 2008; Williams & MacKinnon, 2008). Process Macro produces regression/path coefficients in unstandardised form.

3.11.6 Excluding responses and Missing Data

Participants who missed one or more of the measures were excluded before any statistical analyses. Tabachnick, Fidell and Ullman (2007) suggest that less than 5% of missing data would be inconsequential, in large samples, and that deletion of all these cases would lead to a loss of statistical power. In these instances, single imputation using the Expectation Maximisation algorithm (EM) is recommended to maintain the structure of the data (Mamun et al., 2016). Within all the empirical study chapters, missing data was less than 5%, therefore EM was utilised to maintain the structure of the data in the current thesis analyses.

3.12 Methods Summary

Chapter 3 provides a comprehensive review of the measures, data collection and statistical analyses utilised to address the current thesis research aims.

To summarise the measures used in the current study included: the sO-LIFE (Mason et al., 2005) to measure multidimensional schizotypy traits, the BCIS (Beck et al., 2004) to measure cognitive insight, the DASS-21 (Lovibond & Lovibond, 1995) to measure negative affect, the SPWB-54 (Ryff, 1989) to measure PWB, the SSOSH (Vogel et al., 2006) to measure self-stigma of seeking help, the MCQ-30 (Wells & Cartwright, 2004) to measure dysfunctional

metacognitive beliefs, the BACS (Keefe et al., 2004) to measure neurocognition, the Eyes task (Baron-Cohen et al., 2001) to measure affective theory of mind, the ER-40 (Gur et al., 2002) to measure emotion processing, the RAD (Sergi et al., 2009) to measure social perception and the AIHQ (Combs et al., 2007) to measure attribution bias.

The broad aims of the current thesis included: examining the unique contributions of multidimensional schizotypy traits and their associations with cognitive insight (self-reflectiveness and self-certainty), self-stigma of seeking help, metacognitive beliefs, neurocognition and social cognition. Furthermore, examining factors that may contribute or be a consequence of the relationship between schizotypy and cognitive insight, negative affect and PWB. Therefore, the main statistical analyses for current thesis included multiple regression analyses and simple, parallel and serial mediation models.

Chapter 4. Study 1: Associations between schizotypy, cognitive insight, negative affect and psychological wellbeing.

4.1 Overview

4.1.1 Cognitive insight

One potential risk factor for transition to clinically significant psychotic disorders is cognitive insight. Cognitive insight refers to the capability to reflect on anomalous experiences and revaluate these experiences using external feedback from others (Beck et al., 2004). Cognitive insight compromises two distinct but related concepts: self-reflectiveness (i.e. ability to consider different perspectives and openness to feedback to make thoughtful conclusions) and self-certainty (i.e. overconfidence in accuracy of one's beliefs and resistance to correction; Beck et al., 2004). Lower scores on self-reflectiveness and higher scores on self-certainty represent lower cognitive insight; hypothesised to contribute to the formation and maintenance of psychotic symptoms (Beck et al., 2004). A preponderance of research has supported this hypothesis, with individuals with psychotic disorders displaying lower cognitive insight compared to control groups, with positive, negative and disorganised symptoms inversely associated with self-reflectiveness and positively associated with self-certainty (Bora et al., 2007; Kimhy et al., 2014; Lysaker et al., 2011; Martin et al., 2010; Pedrelli et al., 2004; Vohs et al., 2015; Warman et al., 2007).

The two subcomponents that contribute to the overall construct of cognitive insight have also demonstrated interesting patterns in individuals with At Risk Mental States (ARMS), which may impact upon people's transition or protection from clinical levels of psychosis. Research has found self-reflectiveness scores to be comparable in individuals with ARMS when compared with healthy controls (Kihmy et al., 2014; Uchida et al., 2014). However, when considering specific symptom profiles, Kihmy et al., (2014) reported that individuals with

ARMS with marked unusual thought content had significantly lower self-reflectiveness when compared to a group of arms with moderate/low/no unusual thought content, with rate of transition significantly greater in those with severe unusual thought content. Furthermore, individuals with ARMS reported significantly higher self-certainty when compared with healthy controls, with a slight tendency towards greater self-certainty in those individuals who transitioned to psychosis (Uchida et al., 2014). Therefore, when considering the ARMS literature, self-certainty may be a risk factor for transition to psychosis (Uchida et al., 2014). Whereas, self-reflectiveness may be a risk factor only for individuals with specific symptoms profiles but a potential protective factor in the ARMS risk cohort as a whole (Kihmy et al., 2014).

Studies exploring the relationships between cognitive insight and schizotypy have also demonstrated interesting patterns and consistent with the aforementioned research, higher self-certainty has been associated with positive schizotypy (Sacks et al., 2012; Barron et al., 2018). However, contrary to expectations delusion proneness (a feature of positive schizotypy) has been associated with higher self-certainty scores but also with *higher* self-reflectiveness scores in undergraduate university samples (Warman & Martin, 2006; Carse & Langdon, 2013). These findings have been interpreted as greater self-reflectiveness having a potential protective role in preventing the development of a psychotic disorder, whereas greater self-certainty a potential risk factor for the transition to psychosis (Warman and Martin, 2006). Importantly, Carse & Langdon, (2013) found that rumination contributed to the relationship between delusional proneness and self-reflectiveness. Therefore, suggesting that self-reflectiveness could share commonalities with rumination (Carse & Langdon, 2013). Furthermore, in undergraduate students, greater self-certainty has also been associated with negative schizotypy and impulsive non-conformity, whereas lower self-certainty associated with cognitive disorganisation (Sacks et al., 2012), replicating observed patterns across the psychosis continuum.

Previous literature examining the relationships between cognitive insight and schizotypy have either focused on self-certainty or on specific schizotypy features i.e. delusional proneness. However, focus on both components of cognitive insight as measured by the Becks Cognitive Insight Scale (BCIS; Beck et al., 2004) is important given that self-reflectiveness and self-certainty may serve differently as potential protective and risk factors in the transition to psychotic disorders. Equally, consideration of the full range of schizotypy traits is important because current work has suggested a link between both cognitive insight subcomponents and delusional proneness, but we are unaware how both self-certainty and self-reflectiveness relates to other features of schizotypy.

4.1.2 The relationship between cognitive insight, negative affect and wellbeing

There is an additional complication within the cognitive insight literature. The current view on cognitive insight, is that higher cognitive insight is associated with fewer psychotic symptoms (Beck et al., 2004). However, higher self-reflectiveness does not necessarily lead to better psychological outcomes – referred to as the "insight paradox" (Belvederi Murri et al., 2016; Van Camp et al., 2017). For example, higher scores on the self-reflectiveness subcomponent have been associated with greater depression (Palmer et al., 2015) and lower quality of life (Kim et al., 2015) in individuals with schizophrenia spectrum disorders. Therefore, self-reflective behaviour has the potential to take on a ruminative quality. For example, individuals who reflect and try to understand their unusual experiences, gain cognitive insight, which may result in distress as they lose confidence in their previous 'incorrect beliefs' (Palmer et al., 2015).

Multidimensional schizotypy traits have been closely associated with both negative affect e.g. depression and anxiety and lower subjective and psychological wellbeing (Lewandowski et al, 2006; Abbott & Bryne, 2012; Tabak & de Mamani, 2013; Kemp et al., 2018). Findings from

additional studies have indicated that negative affect may partially explain the relationship between schizotypy and lower wellbeing (Abbott et al., 2012a) and based on the aforementioned research one potential additional contribution to this relationship could be cognitive insight. Weintraub and de Mamani (2015) found that higher cognitive insight (composite score) was associated with poorer wellbeing in undergraduate students. However, cognitive insight did not moderate the relationship between schizotypy and wellbeing. The authors of the latter study reported that elevated schizotypy traits were positively related to cognitive insight, therefore it was difficult to see moderation when the two variables were strongly correlated (Weintraub & de Mamani, 2015). Therefore, it is also plausible that research utilising mediation analysis may better explain the relationship between schizotypy, cognitive insight, negative affect and wellbeing. Based on the prior psychotic disorder research, it is suggested that the cognitive insight subcomponent self-reflectiveness rather than self-certainty is more closely related to negative affect and wellbeing. I am unaware of any prior research exploring the complex interplay between schizotypy traits, self-reflectiveness, negative affect and wellbeing using serial mediation analyses. However, given that self-reflective behaviour has the potential to take on a ruminative quality (Carse & Langdon, 2013), it may be that self-reflectiveness and negative affect mediate the relation between schizotypy and psychological wellbeing (PWB) in serial. In summary greater schizotypy traits could predict higher self-reflectiveness, which in turn could predict greater negative affect, that in turn could predict lower PWB.

4.1.3 Study 1 Aims and Hypotheses

The aim of the current study is twofold. First, to examine the associations between multidimensional schizotypy traits and both cognitive insight subcomponents, given the evidence that self-certainty and self-reflectiveness may serve differentially as risk and protective factors in psychosis. Second, to examine the "insight paradox" in terms of the extent to which established links between schizotypy and PWB may be accounted for by a serial route involving schizotypy → self-reflectiveness → negative affect → PWB. The hypotheses are as follows:

1) Greater schizotypy traits (unusual experiences, introvertive anhedonia and impulsive non-conformity) will predict higher levels of both self-certainty and self-reflectiveness; whereas greater cognitive disorganisation will predict higher levels of self-reflectiveness and lower levels of self-certainty.

2) Self-reflectiveness and negative affect will mediate the relationship between schizotypy traits and PWB in serial.
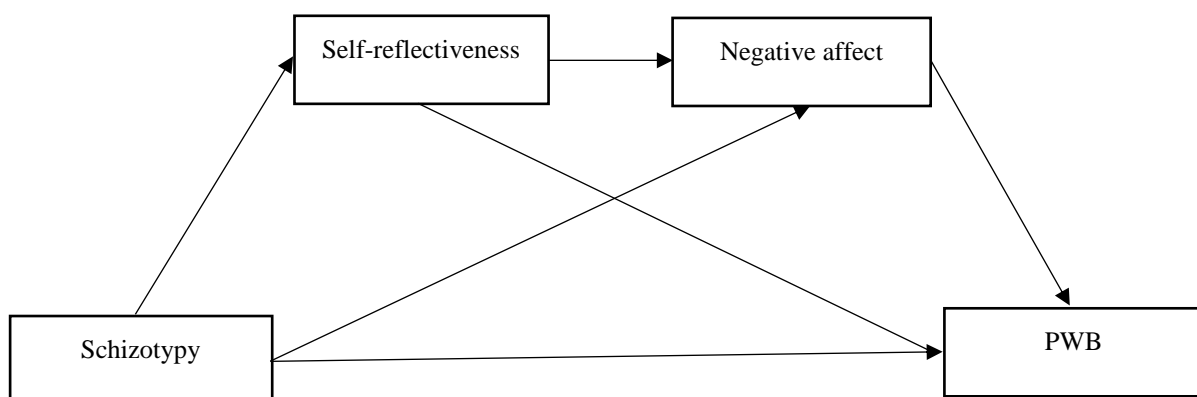
Figure 4.1. The hypothesised serial mediation model from schizotypy to PWB via self-reflectiveness and negative affect.

4.2 Methods

4.2.1 Participants

This study used a convenience sample of 667 participants (mean=20.82, SD=2.97 years), who were predominantly female (79.9%). Participants were 81.1% White, 8.2% Asian, 4.0% Black/African/Caribbean and 6.6% other. In terms of occupation, 89.4% of participants were students, 9.1% employed and 1.5% unemployed.

4.2.2 Psychometric measures

The Oxford-Liverpool Inventory of Feelings and Experiences short form (sO-LIFE; Mason et al., 2005), measuring unusual experiences, introvertive anhedonia, cognitive disorganisation, impulsive non-conformity and total schizotypy. The 21 item Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) utilising the total score to measure negative affect. The Becks Cognitive Insight Scale (BCIS; Beck et al., 2004), measuring the cognitive insight subcomponents- self-reflectiveness and self-certainty. The 54-item Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989), utilising the total score to measure PWB. Refer to chapter 3 for a detailed description of each of these measures.

4.2.3 Procedure

Participants read an information sheet and provided consent, before completing all abovementioned measures. There were 769 initial responses recorded across two online surveys and one face-to-face survey. Care was taken to ensure no participant contributed data the current study more than once. In this instance if participants answered yes to completing more than one of the surveys, only their scores from the first survey they completed were included in the current study. Furthermore, all three data collection processes were screened to try and identify whether there were duplicate responses within each of the three surveys. This was done by screening participants unique ID codes, demographic details and responses across

the study measures. In this instance duplicate responses were excluded before any statistical analyses. Participants who missed one or more of the measures were also excluded before any statistical analyses. After exclusion criteria, the final sample of 667 participants ($n= 311$, online survey one; $n=192$, online survey two; $n=164$, face to face survey) were included for further analysis.

4.2.4 Missing data

There were 0.16% missing responses from the sample for the 133 items. There were 39 responses missing for the sO-LIFE items, 9 responses missing for the BCIS items, 31 responses missing for the DASS-21 items, and 64 responses missing for the SPWB items. The Expectation Maximization (EM) algorithm was utilised to maintain the structure of the data in analysis.

4.3 Results

4.3.1 Preliminary Analyses

A series of ANOVA's were conducted to examine whether mean scores on study variables were comparable across the three data collection processes (Appendix A, Table A.1.). When ANOVAs were significant, Bonferroni post hoc tests were conducted. The results revealed no significant differences between online survey one and online survey two for any of the study variables. However, for face to face survey one; mean scores on total schizotypy, unusual experiences and impulsive non-conformity were significantly lower than online survey two. Furthermore, mean scores on introvertive anhedonia and negative affect were significantly lower and PWB significantly higher, in the face to face survey when compared with both online surveys. Multiple regression and serial mediation analyses were run excluding data from the face to face survey, in order to see whether it may have confounded the final results of the current study. No differences were observed, therefore, data from all three data collection

processes were included in the final analyses. The differences observed in the face to face survey when compared with the two online surveys, may be a consequence of the sample utilised. For example, the face to face survey utilised a student sample and most participants were undergraduate psychology students. On the other hand, the two online surveys included more diverse mixed student/community samples.

4.3.2 Descriptive characteristics

Skewness and kurtosis fell within the acceptable range of +/-2 for all study variables, suggesting data was normally distributed (Table 4.1). The current sample's mean scores for the each of the studies variables were visually inspected and compared with previous published studies that have used large community and university samples (Table 4.1). In the current sample, mean scores that were within 10% of the mean scores of previously published studies, included the BCIS subscales; self-reflectiveness and self-certainty (Warman & Martin, 2006) the SPWB total score (Singleton et al., 2014) and the sO-LIFE subscales; unusual experiences and impulsive non-conformity (Fonseca-Pedrero et al., 2015b). In the current sample, the mean scores were higher when compared with previous studies for the sO-LIFE total schizotypy score (Dagnall et al., 2016), the sO-LIFE subscales; cognitive disorganisation and introvertive anhedonia (Fonseca-Pedrero et al., 2015b) and the mean DASS-21 total score (Carrigan & Barkus, 2017).

Table 4.1. Sample descriptive statistics

	Mean (SD)	Skewness	Kurtosis	Range	Alpha	Prior published studies Mean (SD)
SO-LIFE						
Total Schizotypy	16.61 (7.36)	0.26	-0.28	0-38	0.91	14.93 (7.73)
Unusual experiences	3.56 (2.70)	0.62	-0.21	0-12	0.88	3.48 (2.76)
Cognitive disorganisation	6.28 (3.05)	-0.23	-0.90	0-11	0.88	5.15 (2.94)
Introvertive anhedonia	2.97 (2.28)	0.65	-0.28	0-10	0.80	2.03 (1.86)
Impulsive non-conformity	3.80 (2.21)	0.20	-0.70	0-10	0.75	3.59 (2.11)
BCIS						
Self-reflectiveness	13.52 (4.20)	0.25	-0.11	2-27	0.70	13.74 (3.38)
Self-certainty	6.96 (2.99)	0.40	0.08	0-18	0.65	6.70 (2.71)
DASS-21						
Negative affect	19.83 (13.15)	0.64	-0.38	0-63	0.93	15.54 (11.50)
SPWB-54						
Total PWB	215.92 (38.41)	-0.15	-0.21	104-311	0.95	224.64 (28.62)

4.3.3. Correlations between study variables

Correlations for all primary variables are presented in Table 4.2. As expected, the four schizotypy dimensions and total schizotypy were positively associated with self-reflectiveness and negative affect. All of these variables were negatively associated with PWB. Total schizotypy and the schizotypy dimensions of unusual experiences and impulsive non-conformity were also positively related to self-certainty. These associations ranged from weak to strong (r=0.08, $p<0.05$ to r=0.66, $p<0.001$).

Table 4.2. Pearson's correlations between schizotypy, cognitive insight, negative affect and PWB.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.Total schizotypy	1.00								
2.Unusual experiences	0.75**	1.00							
3.Cognitive disorganisation	0.81**	0.45**	1.00						
4.Introvertive anhedonia	0.57**	0.19**	0.30**	1.00					
5.Impulsive non-conformity	0.72**	0.45**	0.45**	0.22**	1.00				
6.Self-reflectiveness	0.37**	0.30**	0.37**	0.08*	0.26**	1.00			
7.Self-certainty	0.14**	0.17**	0.01	0.05	0.17**	-0.03	1.00		
8.Negative affect	0.66**	0.44**	0.54**	0.39**	0.52**	0.41**	0.10*	1.00	
9.PWB	-0.61**	-0.23**	-0.57**	-0.56**	-0.40**	-0.25**	0.004	-0.63**	1.00

*$p < 0.05$, ** $p < 0.001$

4.3.4. Predictors of cognitive insight dimensions.

To explore the first hypothesis, two regression analyses were conducted (Table 4.3.) using the four schizotypy dimensions as simultaneous predictor variables and either self-reflectiveness or self-certainty as outcome variables. Multicollinearity assumptions were met for both regression models. The schizotypy dimensions accounted for 16% of the variance in self-reflectiveness. Greater unusual experiences and cognitive disorganisation significantly predicted higher self-reflectiveness. Introvertive anhedonia and impulsive non-conformity were not significant predictors.

The schizotypy dimensions also accounted for 5% of the variance in self-certainty. Greater unusual experiences and impulsive non-conformity significantly predicted higher self-certainty

whereas greater cognitive disorganisation significantly predicted lower-self-certainty. Introvertive anhedonia was not a significant predictor.

The regression results are broadly consistent with hypothesis one: Unusual experiences predicted higher levels of both self-certainty and self-reflectiveness and impulsive non-conformity predicted higher levels of self-certainty; whereas greater cognitive disorganisation predicted higher levels of self-reflectiveness and lower levels of self-certainty.

Table 4.3.   Simultaneous regressions between schizotypy dimensions (predictors) and cognitive insight dimensions; self-reflectiveness and self-certainty (outcome variables).

Outcome	Self-reflectiveness		Self-certainty	
Predictor	B(SE)	β	B (SE)	β
Unusual experiences	0.24** (.07)	0.15	0.18** (.05)	0.16
Cognitive disorganisation	0.38** (.06)	0.28	-0.14* (.05)	-0.14
Introvertive anhedonia	-0.09 (.07)	-0.05	0.04 (.05)	0.03
Impulsive non-conformity	0.15 (.08)	0.08	0.21** (.06)	0.16
F	32.54**		9.36**	
R^2	0.16		0.05	

*$p <0.01$, ** $p <0.001$

4.3.4 Mediators between schizotypy and PWB

To explore the second hypothesis, five serial mediation analyses were conducted, with total schizotypy and the four schizotypy dimensions as predictor variables, self-reflectiveness as mediator 1, negative affect as mediator 2 and PWB as the outcome variable.

4.3.4.1 Serial Mediation: Total schizotypy, self-reflectiveness, negative affect and PWB.

The serial multiple mediation model involving total schizotypy (Figure 4.2) indicated a significant total effect with greater total schizotypy significantly predicting lower PWB (= -

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3.20, $p<0.001$), explaining 38% variance in PWB. In support of the second hypothesis, the indirect effect of total schizotypy on PWB via self-reflectiveness and negative affect was significant (a_1, d_{21}, b_2; = -0.15, 95% CI = -0.22, -0.09). There was also a significant indirect effect of total schizotypy on PWB via negative affect (a_2, b_2; = -1.29, 95% CI = -1.58, -1.03). However, the indirect effect via self-reflectiveness was not significant (a_1, b_1; = 0.09, 95% CI = -0.05, 0.22). Importantly, the direct effect of total schizotypy on PWB remained significant after controlling for the mediators (= -1.84, $p<0.001$). Total schizotypy and the mediators together explained 47% variance in PWB.

Figure 4.2. Regression path from total schizotypy to PWB mediated in serial by self-reflectiveness and negative affect. a=effect of total schizotypy on mediators, d_{21}= the effect of self-reflectiveness on negative affect; b=effect of mediators on PWB; c= total effect of total schizotypy on PWB; c'= direct effect of total on PWB. Values are unstandardised coefficients. * $p<0.05$, ** $p< 0.001$, ns $p> 0.05$

4.3.4.2 Serial Mediation: Unusual experiences, self-reflectiveness, negative affect and PWB.

The serial multiple mediation model involving unusual experiences (Figure 4.3) indicated a significant total effect with greater unusual experiences significantly predicting lower PWB (= -3.28, $p<0.001$) and explaining 5% of the variance in PWB. In support of the second hypothesis, the indirect effect of unusual experiences on PWB via self-reflectiveness and negative affect was significant (a_1, d_{21}, b_2; = -0.85, 95% CI = -1.17, -0.56). There was also a significant indirect effect of unusual experiences on PWB via negative affect (a_2, b_2; = -3.25, 95% CI = -4.02,

-2.55). However, the indirect effect via self-reflectiveness was not significant (a_1, b_1; = -0.02, 95% CI = -0.34, 0.30). Importantly, the direct effect of unusual experiences on PWB was not significant after controlling for the mediators (= 0.84, $p > 0.05$). Unusual experiences and the mediators together explained 40% variance in PWB.
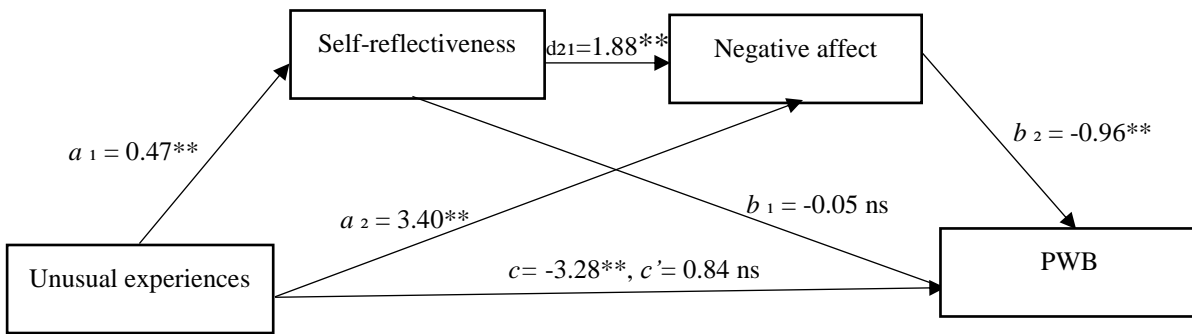
Figure 4.3. Regression path from unusual experiences to PWB mediated in serial by self-reflectiveness and negative affect. a=effect of unusual experiences on mediators, d_{21}= the effect of self-reflectiveness on negative affect; b=effect of mediators on PWB; c= total effect of unusual experiences on PWB; c'= direct effect of unusual experiences on PWB. Values are unstandardised coefficients. * $p < 0.05$, ** $p < 0.001$, ns $p > 0.05$

4.3.4.3 Serial Mediation: Cognitive disorganisation, self-reflectiveness, negative affect and PWB.

The serial multiple mediation model involving cognitive disorganisation (Figure 4.4) indicated a significant total effect with greater cognitive disorganisation significantly predicting lower PWB (= -7.12, $p < 0.001$), explaining 32% of the variance in PWB. In support of the second hypothesis, the indirect effect of cognitive disorganisation on PWB via self-reflectiveness and negative affect was significant (a_1, d_{21}, b_2; = -0.53, 95% CI = -0.75, -0.34). There was also a significant indirect effect of cognitive disorganisation on PWB via negative affect (a_2, b_2; = -2.74, 95% CI = -3.29, -2.22). However, the indirect effect via self-reflectiveness was not significant (a_1, b_1; = 0.28, 95% CI = -0.02, 0.61). Importantly, the direct effect of cognitive disorganisation on PWB remained significant after controlling for the mediators (= -4.14,

$p<0.001$). Cognitive disorganisation and the mediators together explained 47% variance in PWB.
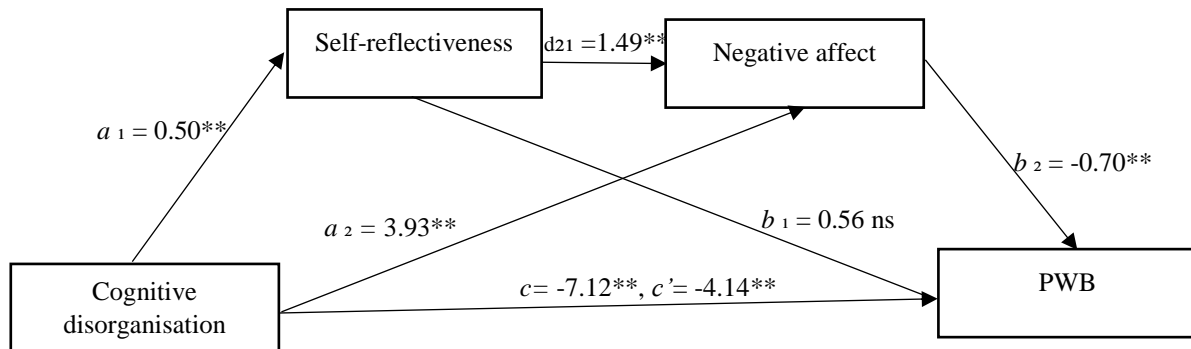
Figure 4.4. Regression path from cognitive disorganisation to PWB, mediated in serial by self-reflectiveness and negative affect. a=effect cognitive disorganisation on mediators, d_{21}= the effect of self-reflectiveness on negative affect; b=effect of mediators on PWB; c= total effect of cognitive disorganisation on PWB; c'= direct effect of cognitive disorganisation on PWB. Values are unstandardised coefficients. *$p<0.05$, ** $p<0.001$, ns $p>0.05$

4.3.4.4 Serial Mediation: Introvertive anhedonia, self-reflectiveness, negative affect and PWB.

The serial multiple mediation model involving introvertive anhedonia (Figure 4.5) indicated a significant total effect with greater introvertive anhedonia significantly predicting lower PWB (= -9.47, $p<0.001$), explaining 32% variance in PWB. In support of the second hypothesis, the indirect effect of introvertive anhedonia on PWB via self-reflectiveness and negative affect was significant (a_1, d_{21}, b_2; = -0.25, 95% CI = -0.50, -0.01). There was also a significant indirect effect of introvertive anhedonia on PWB via negative affect (a_2, b_2; = -2.84, 95% CI = -3.53, -2.24). However, the indirect effect via self-reflectiveness was not significant (a_1, b_1; = -0.04, 95% CI = -0.17, 0.04). Importantly, the direct effect of introvertive anhedonia on PWB remained significant after controlling for the mediators (= -6.34, $p<0.001$). Introvertive anhedonia and the mediators together explained 52% variance in PWB.
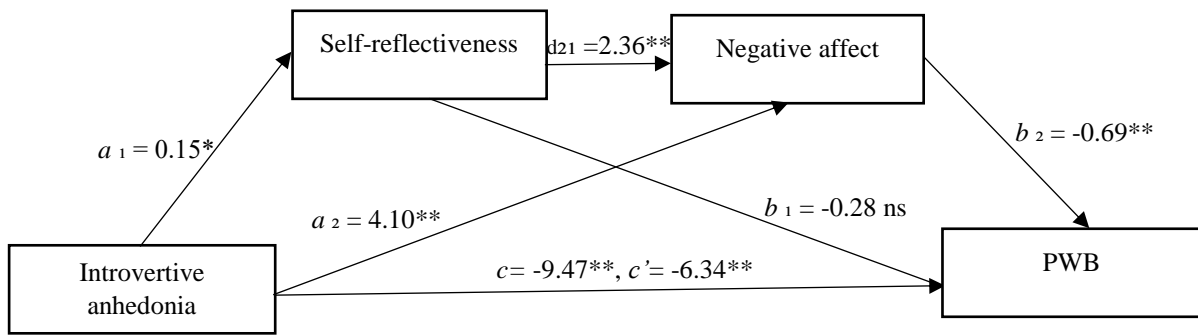
Figure 4.5. Regression path from introvertive anhedonia to PWB, mediated in serial by self-reflectiveness and negative affect. a=effect introvertive anhedonia on mediators, d_{21}= the effect of self-reflectiveness on negative affect; b=effect of mediators on PWB; c= total effect of introvertive anhedonia on PWB; c'= direct effect of introvertive anhedonia on PWB. Values are unstandardised coefficients. $*p<0.05$, $** p< 0.001$, ns $p> 0.05$

4.3.4.5 Serial Mediation: Impulsive non-conformity, self-reflectiveness, negative affect and PWB.

The serial multiple mediation model involving impulsive non-conformity (Figure 4.6) indicated a significant total effect with greater impulsive non-conformity significantly predicting lower PWB (= -6.93, $p<0.001$), explaining 16% variance in PWB. In support of the second hypothesis, the indirect effect of impulsive non-conformity on PWB via self-reflectiveness and negative affect was significant (a_1, d_{21}, b_2; = -0.77, 95% CI = -1.08, -0.49). There was also a significant indirect effect of impulsive non-conformity on PWB via negative affect (a_2, b_2; = -4.55, 95% CI = -5.43, -3.71). However, the indirect effect via self-reflectiveness was not significant (a_1, b_1; = 0.04, 95% CI = -0.28, 0.38). Importantly, the direct effect of impulsive non-conformity on PWB remained significant after controlling for the mediators (= -1.65, $p<0.001$). Impulsive non-conformity and the mediators together explained 41% variance in PWB.
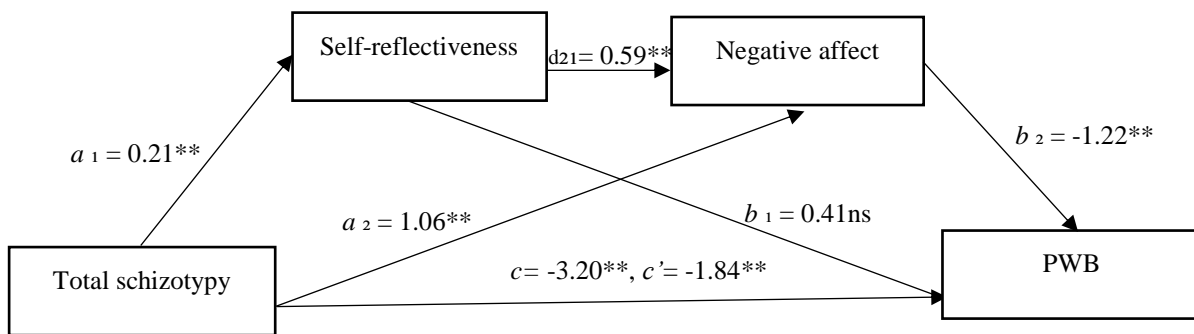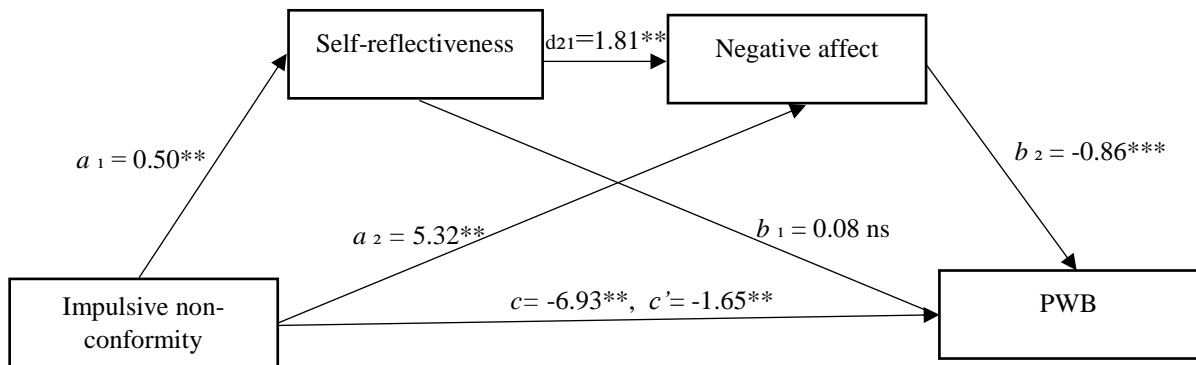
Figure 4.6. Regression path from impulsive non-conformity to PWB, mediated in serial by self-reflectiveness and negative affect. a=effect impulsive non-conformity on mediators, d_{21}= the effect of self-reflectiveness on negative affect; b=effect of mediators on PWB; c= total effect of impulsive non-conformity on PWB; c'= direct effect of impulsive non-conformity on PWB. Values are unstandardised coefficients. *$p<0.05$, ** $p< 0.001$, ns $p> 0.05$

4.4 Discussion

The purpose of the current study was twofold. First, to examine whether established associations between multidimensional schizotypy traits and self-certainty can be better explained when also considering the associations between schizotypy traits and self-reflectiveness. Second, to extend our understanding of the link between greater schizotypy traits and lower wellbeing by exploring the mediating role of self-reflectiveness and negative affect. In relation to the first hypothesis, regression analyses showed self-reflectiveness and self-certainty to be each positively associated with two of the four schizotypy dimensions (unusual experiences and cognitive disorganisation, and unusual experiences and impulsive non-conformity respectively), while greater cognitive disorganisation significantly predicted lower-self-certainty. The study extends previous studies reporting associations between one feature of schizotypy (delusional proneness) and self-reflectiveness by showing there are differential patterns between multidimensional schizotypy traits and the cognitive insight subcomponents. In relation to the second hypothesis, the serial multiple mediation models revealed that self-reflectiveness and negative affect mediated the relationships between total

schizotypy and the four schizotypy dimensions and PWB in serial, providing additional support for the insight paradox across the psychosis continuum.

The finding of greater unusual experiences significantly predicting both higher self-reflectiveness and higher self-certainty is consistent with the previously established relationship between delusional proneness and cognitive insight subcomponents (Warman & Martin, 2006; Carse & Langdon, 2013). Therefore, individuals with greater unusual experiences, may have intact self-reflective behaviours, but a limited ability to reappraise and modify internal experiences. The findings lend further support to the suggestion that greater self-reflectiveness may serve as a potential protective factor in the transition to psychotic disorders whereas greater self-certainty is a risk factor (Warman & Martin, 2006; Kihmy et al., 2014). More simply, it is individuals scoring low on self-reflectiveness and high on self-certainty who would be at particular risk for developing a psychotic disorder (Warman & Martin, 2006).

Furthermore, Sacks et al. (2012) found that greater cognitive disorganisation was associated with lower self-certainty, in addition to confirming this, the current study also showed that greater cognitive disorganisation significantly predicted higher self-reflectiveness. The findings suggest that individuals who experience cognitive difficulties and are socially anxious may be less confident in the accuracy of their own beliefs and may focus more on other people's perspectives to make thoughtful conclusions. Consistent with Sacks et al. (2012), the current study also found that greater impulsive non-conformity was associated with higher self-certainty. The regression analyses revealed that impulsive non-conformity did not however predict self-reflectiveness. The findings may suggest individuals with impulsive asocial behaviour and a lack of self-control may have a rigid reasoning style, and give little attention to others' feedback, resulting in an overconfidence of one's own thoughts. Interestingly, whilst there were significant correlations between introvertive anhedonia and self-reflectiveness, the

regression analyses revealed no association between introvertive anhedonia and either cognitive insight subcomponent. A review on cognitive insight in psychosis proposed that negative symptoms are not obvious correlates of cognitive insight (Riggs et al., 2010). Based on the current study's findings, negative schizotypy traits may only be associated with cognitive insight when there are elevated levels of other schizotypy traits.

The current study's serial mediation models revealed that greater levels of total schizotypy and all four schizotypy dimensions significantly predicted lower PWB, consistent with previous literature (Abbott & Bryne, 2012; Tabak & de Mamani, 2013). In support of the second hypothesis, these relations were mediated in serial by self-reflectiveness and negative affect. The findings suggest individuals have a better awareness of their schizotypy traits because of their self-reflective abilities; in turn recognising their schizotypy traits as being unusual or not normal, causing distress and negatively affecting wellbeing (Weintraub and de Mamani, 2015). The findings provide further evidence that higher self-reflectiveness may not always be associated with good psychological outcomes across the psychosis continuum. Furthermore, the current findings revealed that negative affect mediated the relationship between all four schizotypy dimensions and PWB. The finding lends further support to the suggestion that negative affect plays a key role in diminished wellbeing in individuals with schizotypy traits (Abbott et al., 2012a). It is important to note that unusual experiences no longer significantly predicted PWB, after controlling for self-reflectiveness and negative affect, although a direct relationship remained for the other 3 schizotypy dimensions and total schizotypy. It is plausible to suggest that unusual experiences in the absence of negative affect may potentially be associated with adaptive functioning, most closely aligning with the theoretical "benign/happy" schizotypy. Furthermore, the indirect effect via self-reflectiveness for all four serial mediation models was not significant. Whilst greater cognitive insight has previously been associated with lower wellbeing in an undergraduate sample, their latent wellbeing

variable was created from measures of negative affect, PWB and quality of life (Weintraub & de Mamani, 2015). Since self-reflective behaviour may share similarities with rumination (Carse & Langdon, 2013), it may be that self-reflectiveness is more closely related to negative affect than PWB in individuals with schizotypy traits, thus supporting the serial mediation model.

4.4.1 Implications

The results indicate that higher self-reflectiveness may be a potential protective factor against the transition to psychosis, when there are also concurrent levels of high self-certainty, yet paradoxically linked with poor psychological outcomes, in individuals with schizotypy traits. Interventions such as psychoeducation and cognitive therapy have shown to be effective in individuals with ARMS, associated with reduced psychotic symptoms, and better quality of life and functioning (O-Brien et al., 2007; Van der Gaag et al., 2013). Furthermore, cognitive behavioural therapy has been shown to be more effective in individuals with psychosis whom had higher levels of self-reflectiveness prior to treatment (Perivoliotis et al. 2010). Consequently, psychoeducation interventions that target young adults in general (e.g. workshops provided for university or college students), may be particularly helpful for educating young people of the commonality of unusual experiences, and may be beneficial for individuals with schizotypy traits who are distressed by their experiences, with the potential to reduce the negative consequences that arise from heightened insight.

4.4.2 Limitations and future research

There are a few limitations to the current study which should be born in mind. First, the cross-sectional nature of the study means caution should be exercised when drawing inferences about causal links between the study variables. Given the evidence that self-certainty and self-reflectiveness may serve differentially as risk and protective factors in psychosis, future

research should potentially look to examine longitudinal changes in cognitive insight in individuals with schizotypy. Second, the author did not assess other functional outcomes. For example, research has shown that greater cognitive insight is positively associated with social functioning in individuals with schizophrenia (Sumiyoshi et al., 2016). Consequently, it remains to be seen whether similar patterns are also observed in individuals with schizotypy traits, or whether greater self-reflectiveness is only associated with poorer outcomes at the lower end of the psychosis continuum.

4.4.3 Conclusions

Nevertheless, it is important to understand what factors may be contributing to or be a consequence of cognitive insight, negative affect and PWB in individuals with schizotypy traits. In psychotic disorders, emerging research has begun to uncover associations between self-stigma, neurocognition, social cognition and metacognition and both cognitive insight and wellbeing in individuals with schizophrenia spectrum disorders (Mak & Wu, 2006; Lysaker et al., 2011; Valiente et al., 2012; Park et al., 2013; Tas et al., 2013; Urbach et al., 2013; Popolo et al., 2016). Therefore, future research may consider exploring the associations between schizotypy traits, cognitive insight and wellbeing and the abovementioned factors, to elucidate whether these patterns are occurring across the psychosis continuum. Studies 2-5 will therefore extend the current study, by exploring the interplay between schizotypy, cognitive insight, wellbeing and self-stigma for seeking psychological help, metacognitive beliefs, neurocognition and social cognition.

Chapter 5. Study 2: Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and self-stigma for seeking psychological help.

5.1 Overview

5.1.1 Self-stigma and the psychosis continuum

Self-stigma of having a mental illness and self-stigma for seeking psychological help are related but distinct constructs. There is a plethora of evidence demonstrating the detrimental impact self-stigma of having a mental illness has on individuals with psychotic disorders, for example, regarding clinical outcome, coping, treatment adherence and demoralisation (Fung et al.,2008). I am unaware of any research to date that has explored the association between schizotypy and self-stigma in a general population sample. The psychosis literature has focused on self-stigma of mental illness, however, this is not a feasible measure to use in schizotypy research utilising general population samples, as whilst individuals may feel that their experiences are unusual or strange, they are unlikely to endorse self-stigma of mental illness questions (e.g. "Because I have a mental illness, I am unpredictable").

Anticipated self-stigma for seeking psychological help predicts negative attitudes and intentions towards help seeking intentions (Vogel et al., 2006) and has been identified as a major barrier that prevents individuals with mental health concerns, from seeking help (Lannin et al., 2016). This has important implications given that prolonged durations of untreated psychosis have been associated with detrimental long-term outcomes (Pentilla et al., 2014). In addition, schizotypy research has identified that higher levels of negative and disorganised schizotypy traits are associated with poorer mental health (Ödéhn & Goulding, 2018). Therefore, based on the aforementioned research, exploring the associations between self-stigma for seeking psychological help and schizotypy may have important implications,

particularly if individuals may come to a possible critical juncture (i.e. seeking mental health services) in the future.

Labels that define mental illness such as symptoms and clinical diagnosis are suggested to play an important role in self-stigma (Corrigan, 2007). For example, psychotic symptoms may attract negative attention and result in self-stigmatising beliefs (e.g. "I am dangerous" and "I am afraid of myself"; Horssenlenberg et al., 2016; Hofer et al., 2019). In support of this proposition, greater positive and negative symptoms have been associated with increased self-stigma of mental illness, in individuals with schizophrenia spectrum disorders (Mak & Wu, 2006; Lysaker et al., 2007; Yanos et al., 2008; Lysaker et al., 2009; Hill & Startup, 2013; Chan et al., 2017; Vrbova et al., 2018). Furthermore, Denenny et al., (2015) found that subthreshold psychotic symptom distress was associated with greater self-stigma of mental illness, in university students with past or present mental health diagnoses.

Based on the previous literature, it is plausible to suggest that a similar pattern may be observed between schizotypy traits and self-stigma for seeking psychological help. For example, some individuals with greater schizotypy traits, may feel that their experiences are unusual or strange, and may consider seeking psychological help. However, if individuals internalise the publics negative stereotyping of mental health and seeking help, they may self-label this help seeking as socially unacceptable.

5.1.2 The relationship between self-stigma and cognitive insight

Self-stigma has been identified as being especially relevant to individuals whom are aware of their experiences, symptoms and diagnoses (Corrigan & Rao, 2012). Several studies have found that greater levels of the cognitive insight composite score (self-reflectiveness-self-certainty) and higher self-reflectiveness scores are related to greater self-stigma of having a mental illness in schizophrenia spectrum disorders (Mak & Wu, 2006; Grover et al., 2018; Lien

et al., 2018). Therefore, those who are more self-reflective and consider different perspectives, may be better aware of the stigmatised status of mental illness, which could lead to internalisation of stigma (Mak & Wu, 2006). Interestingly, one study also reported that higher self-certainty is associated with greater self-stigma of mental illness (Grover et al., 2018). Whilst the authors did not provide an explanation for this latter finding, individuals whom are overconfident in the accuracy of their beliefs may view the label of having a mental illness as a threat one's self-esteem and self-confidence, thus leading to greater self-stigma towards mental illness.

I am unaware of any research to date that has explored the associations between cognitive insight and self-stigma for seeking psychological help. However, based on the previous literature, it is plausible that cognitive insight could also contribute to self-stigma for seeking psychological help. Study 1 revealed associations between schizotypy and both self-reflectiveness and self-certainty. Therefore, the current study will explore the mediating role of cognitive insight in the relationship between schizotypy and self-stigma for seeking psychological help.

5.1.3 The relationship between self-stigma, negative affect and wellbeing

Lysaker et al., (2007) proposes that once a person is labelled as having a mental illness, negative public attitudes (self-stigma) become self-relevant, which is potentially distressing and threatens one's feelings of wellbeing. In support of this, research has found that greater general psychopathology i.e. depression and anxiety and lower wellbeing has been associated with self-stigma of having a mental illness in individuals with psychotic disorders (Park et al., 2013; Mosanya et al., 2014; Holubuova et al., 2016; Vrbova et al., 2017).

Research has also found that greater psychological distress is associated with higher self-stigma for seeking psychological help in university and community samples (Kim & Zane, 2016;

Talebi et al., 2016; Surapeni et al., 2018). Heath et al., (2017) and Surapeni et al., (2018) have interpreted these findings as individuals experiencing distress may be particularly vulnerable to internalising stigmatising beliefs about seeking help, because help-seeking decisions may have become personally relevant.

Research has yet to explore the relationship between PWB and self-stigma for seeking psychological help. However, it is plausible that individuals whom are not content with certain aspects of their life may be particularly vulnerable to internalising negative public attitudes and may view hypothetically seeking help as a threat to one's self esteem and self-confidence. Study 1 revealed that schizotypy was associated with greater negative affect and poorer PWB. Therefore, the current study will explore the mediating role of negative affect and PWB in the relationship between schizotypy and self-stigma for seeking psychological help.

5.1.4 Study 2 Aims and Hypotheses

The aim of the current study is twofold. First, given the evidence that psychosis symptoms in clinical disorders is associated with greater self-stigma of having a mental illness, the author extends this literature by exploring whether schizotypy traits in the general population may also be associated with the related but distinct construct of self-stigma for seeking psychological help. Second, taking into consideration that cognitive insight, negative affect and wellbeing are associated with greater self-stigma of having a mental illness in psychotic disorders, the study will explore whether these factors may account for the potential link between schizotypy and self-stigma for seeking psychological help. The current study hypotheses are as follows:

1) Greater schizotypy traits will predict higher levels of self-stigma for seeking psychological help.

2) Cognitive insight subcomponents: self-reflectiveness and self-certainty, negative affect and PWB will mediate the relationship between schizotypy and self-stigma for seeking psychological help.
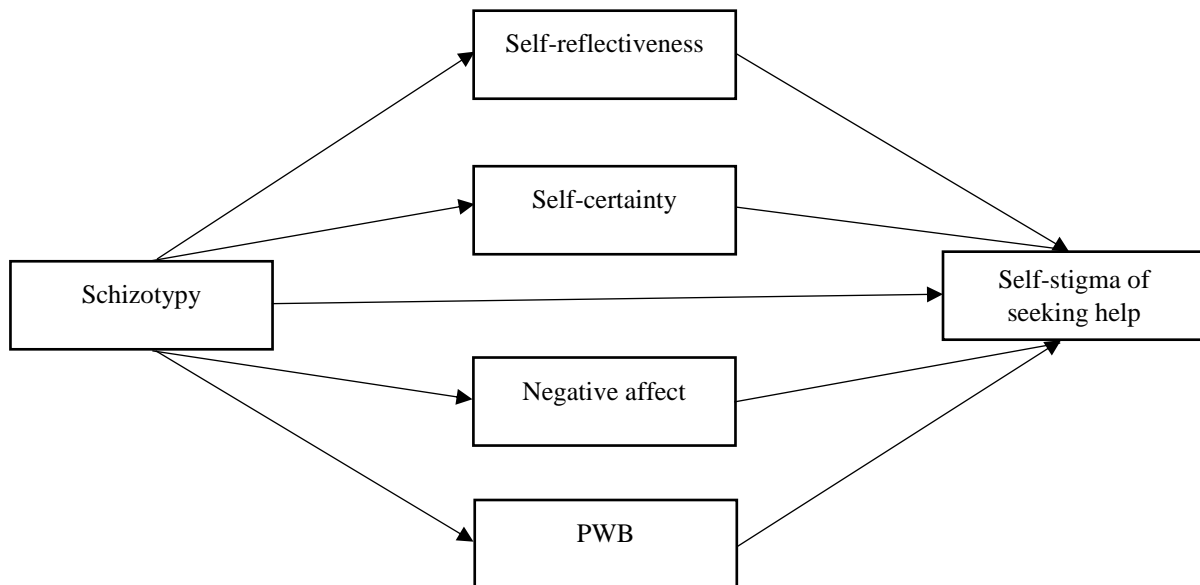
Figure 5.1. The hypothesised parallel mediation model from schizotypy to self-stigma for seeking psychological help via self-reflectiveness, self-certainty, negative affect and PWB.

5.2 Methods

5.2.1 Participants

This study used a convenience sample of 338 participants (mean=21.19, SD=3.16 years), who were predominantly female (78.7%). Participants were 78.4% White, 11.2% Asian, 3.3% Black/African/Caribbean and 7.1% other. In terms of occupation, 84.6% of participants were students, 13.3% were employed and 2.1% unemployed.

5.2.2 Psychometric measures

The sO-LIFE (Mason et al., 2005), measuring unusual experiences, introvertive anhedonia, cognitive disorganisation, impulsive non-conformity and total schizotypy. The DASS-21

(Lovibond & Lovibond, 1995) utilising the total score to measure negative affect. The BCIS (Beck et al., 2004), measuring the cognitive insight subcomponents- self-reflectiveness and self-certainty. The 54-item Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989), utilising the total score to measure PWB. The Self-stigma of Seeking Help (SSOSH; Vogel et al., 2006) to measure anticipated self-stigma of seeking psychological help. Refer to chapter 3 for a detailed description of each of those measures.

5.2.3 Procedure

Participants read an information sheet and provided consent before completing demographics and all abovementioned measures, in Qualtrics software. After demographics, the psychometric measures were presented to participants in a randomised order. There were 375 initial responses recorded. However, 11 responses were excluded for repeat data and 26 responses were excluded for missing one or more psychometric measures. After exclusion criteria, the final sample of 338 participants were included for further analysis.

5.2.4 Missing data

There were 0.21% missing responses across the study variables. There were 24 values missing for items for the sO-LIFE, 6 values for the BCIS, 7 values for the SSOSH, 21 values for the DASS-21 and 34 items for the SPWB-54. The Expectation Maximization (EM) algorithm was utilised to maintain the structure of the data in analysis.

5.3 Results

5.3.1 Descriptive characteristics

Skewness and kurtosis fell within the acceptable range of +/- 2 for all study variables, suggesting data was normally distributed (Table 5.1). The current sample's mean scores for the each of the studies variables were visually inspected and compared with previous published

studies that have used large community and university samples (Table 5.1). In the current sample, mean scores that were within 10% of the mean scores of previously published studies, included the SSOSH; self-stigma of seeking help (Vogel et al., 2006), the BCIS subscales; self-reflectiveness and self-certainty (Warman & Martin, 2006) the SPWB total score (Singleton et al., 2014) and the sO-LIFE subscales; unusual experiences and impulsive non-conformity (Fonseca-Pedrero et al., 2015b). In the current sample, the mean scores were higher when compared with previous studies for the sO-LIFE total schizotypy score (Dagnall et al., 2016), the sO-LIFE subscales; cognitive disorganisation and introvertive anhedonia (Fonseca-Pedrero et al., 2015b) and the mean DASS-21 total score (Carrigan & Barkus, 2017).

Table 5.1. Sample descriptive statistics.

	Mean (SD)	Skewness	Kurtosis	Range	Alpha	Prior published studies Mean (SD)
SO-LIFE						
Total schizotypy	16.87 (7.60)	0.22	-0.31	1-38	0.92	14.93 (7.73)
Unusual experiences	3.49 (2.82)	0.68	-0.32	0-11	0.89	3.48 (2.76)
Cognitive disorganisation	6.32 (3.06)	-0.33	-0.87	0-11	0.89	5.15 (2.94)
Introvertive anhedonia	3.24 (2.34)	0.57	-0.45	0-10	0.80	2.03 (1.86)
Impulsive non-conformity	3.81 (2.17)	0.28	-0.50	0-10	0.73	3.59 (2.11)
BCIS						
Self-reflectiveness	13.26 (4.25)	0.23	-0.06	2-27	0.70	13.74 (3.38)
Self-certainty	7.06 (3.07)	0.47	0.22	0-18	0.66	6.70 (2.71)
SSOSH						
Self-stigma of Seeking Help	25.80 (7.51)	0.39	-0.12	10-49	0.85	27.20 (7.20)
DASS-21						
Negative affect	20.37 (13.52)	0.72	-0.24	0-63	0.94	15.54 (11.50)
SPWB-54						
Total PWB	212.70 (39.77)	0.02	-0.31	110-311	0.95	224.64 (28.62)

5.3.2 Correlations between study variables

Pearson's correlations between self-stigma of seeking help and other primary variables are presented in Table 5.2. As expected self-stigma of seeking help was positively associated with the four schizotypy dimensions, total schizotypy, self-certainty and negative affect, and was inversely associated with PWB. These associations ranged from weak to moderate *(r=0.12, p<0.05* to *r= -0.33, p<0.001)*. No significant association was found between self-reflectiveness and self-stigma of seeking help. Correlations between schizotypy, cognitive insight, negative affect and PWB are reported in Appendix B, Table B.1.

Table 5.2. Pearson's correlations between self-stigma of seeking help and schizotypy, cognitive insight, negative affect and PWB.

	Self-stigma for seeking help
Total schizotypy	0.24***
Unusual experiences	0.12*
Cognitive disorganisation	0.23***
Introvertive anhedonia	0.16**
Impulsive non-conformity	0.18**
Self-reflectiveness	0.01
Self-certainty	0.12*
Negative affect	0.17**
PWB	-0.33***

*p<0.05, **p <0.01, ***p<0.001

5.3.3 Predictors of self-stigma of help

To explore the first hypothesis, a regression analysis was conducted to explore the unique contribution of each of the four schizotypy dimensions (simultaneous predictor variables) on the outcome variable- self-stigma of seeking help (Table 5.3). Multicollinearity assumptions

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were met, and the regression model accounted for 6.5% of the variance in self-stigma of seeking help. In support of hypothesis one: Greater cognitive disorganisation significantly predicted higher self-stigma of seeking help. Unexpectedly no other schizotypy dimension significantly predicted self-stigma of seeking help.

Table 5.3. Simultaneous regression between schizotypy dimensions (predictors) and self-stigma of seeking help (outcome variable).

	Self-stigma of seeking psychological help	
	B(SE)	*β*
Unusual experiences	-0.06 (0.17)	-0.02
Cognitive disorganisation	0.41* (0.16)	0.17
Introvertive anhedonia	0.24 (0.18)	0.07
Impulsive non-conformity	0.35 (0.22)	0.10
F	5.83***	
R²	0.065	

*p<0.05 **p<0.01 ***p<0.001

5.3.4 Mediators between schizotypy and self-stigma of seeking help.

To explore the second hypothesis, five parallel mediation analyses were conducted, with total schizotypy and the four schizotypy dimensions as predictor variables, self-certainty, negative affect and PWB as the mediator variables and self-stigma of seeking help as the outcome variable. Self-reflectiveness was not included as a mediator variable as Pearson's correlations showed no significant association with self-stigma of seeking help.

5.3.4.1 Parallel mediation: Total schizotypy, self-certainty, negative affect, PWB and self-stigma of seeking help.

The parallel multiple mediation model involving total schizotypy (Figure 5.2.) indicated a significant total effect with greater total schizotypy significantly predicting higher self-stigma

of seeking help ($=0.23$, $p<0.001$), accounting for 5.6%. In support of the second hypothesis the indirect effects via self-certainty (a_1, b_1; $= 0.02$, 95% CI= 0.0004, 0.04) and via PWB (a_2, b_2; $= 0.23$, 95% CI= 0.13, 0.34) were significant, indicating that self-certainty and PWB mediated the relationship between total schizotypy and self-stigma of seeking help. The indirect effect via negative affect was not significant (a_3, $b_3 = -0.05$, 95% CI= -0.14, 0.03). Importantly, the direct effect of total schizotypy on self-stigma of seeking help was not significant after controlling for the mediators ($=0.04$, $p>0.05$). Total schizotypy and the mediators together explained 12.8% variance in self-stigma of seeking help.

Figure 5.2. Regression path from total schizotypy to self-stigma of seeking help mediated by self-certainty, PWB and negative affect. a=effect of total schizotypy on mediators; b=effect of mediators on self-stigma of seeking help; c= total effect of total schizotypy on self-stigma of seeking help; c'= direct effect of total schizotypy on self-stigma of seeking help. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

5.3.4.2 Parallel mediation: Unusual experiences, self-certainty, negative affect, PWB and self-stigma of seeking help.

The parallel multiple mediation model involving unusual experiences (Figure 5.3.) indicated a significant total effect with greater unusual experiences significantly predicting higher self-stigma of seeking help ($=0.31$, $p<0.05$), accounting for 1.4% variance. In support of the second hypothesis: there were significant indirect effects via self-certainty (a_1, b_1; $=0.07$, 95% CI=

0.01, 0.15) and via PWB (a_2, b_2; =0.26 95% CI= 0.12, 0.42), indicating that self-certainty and

PWB mediated the relationship between unusual experiences and self-stigma of seeking help.

The indirect effect via negative affect was not significant (a_3, b_3 = -0.09, 95% CI= -0.25, 0.06).

The direct effect of unusual experiences on self-stigma of seeking help was not significant after

controlling for the mediators (=0.08, $p>0.05$) Unusual experiences and the mediators together

explained 12.8% variance in self-stigma of seeking psychological help.
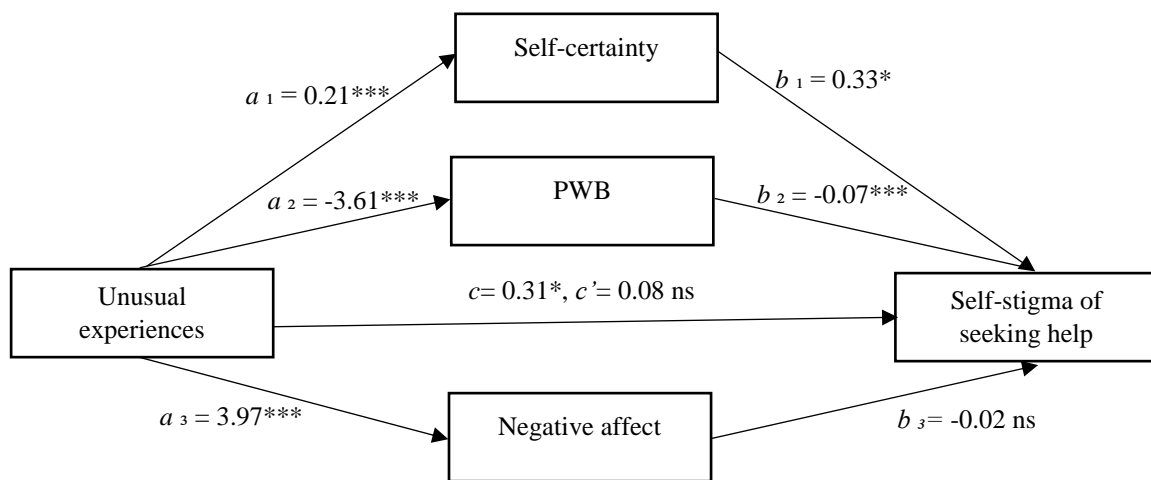
Figure 5.3. Regression path from unusual experiences to self-stigma of seeking help mediated
by self-certainty, PWB and negative affect. a=effect of unusual experiences on mediators;
b=effect of mediators on self-stigma of seeking help; c= total effect of unusual experiences on
self-stigma of seeking help; c'= direct effect of unusual experiences on self-stigma of seeking
help. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

5.3.4.3 Parallel mediation: Cognitive disorganisation, self-certainty, negative affect, PWB and

self-stigma of seeking help.

The parallel multiple mediation model involving cognitive disorganisation (Figure 5.4.)

indicated a significant total effect with greater cognitive disorganisation significantly

predicting higher self-stigma of seeking help (=0.56, $p<0.001$), accounting for 5.3% variance.

In support of the second hypothesis: the indirect effect via PWB was significant (a_2, b_2; =0.53,

95% CI= 0.29, 0.79) indicating that PWB mediated the relationship between cognitive

disorganisation and self-stigma of seeking help. The indirect effects via self-certainty (a_1, b_1;

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= -0.001, 95% CI= -0.05, 0.04) and negative affect (a_3, b_3 = -0.11, 95% CI= -0.29, 0.07) were not significant. The direct effect of cognitive disorganisation on self-stigma of seeking help was not significant after controlling for the mediators (=0.14, $p>0.05$). Cognitive disorganisation and the mediators together explained 12.9% variance in self-stigma of seeking psychological help.
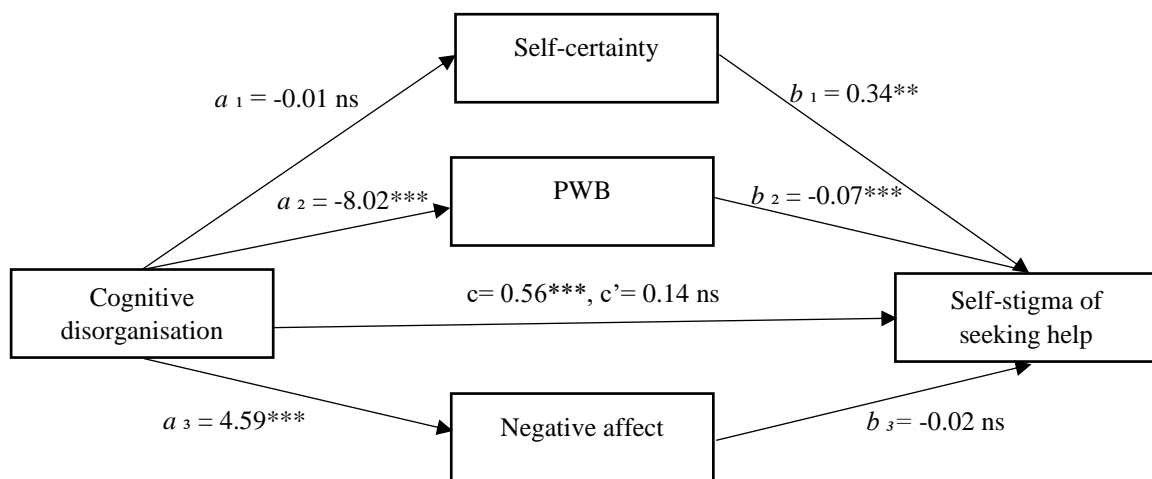
Figure 5.4. Regression path from cognitive disorganisation to self-stigma of seeking help mediated by self-certainty, PWB and negative affect. a=effect of cognitive disorganisation on mediators; b=effect of mediators on self-stigma of seeking help; c= total effect of cognitive disorganisation on self-stigma of seeking help; c'= direct effect of cognitive disorganisation on self-stigma of seeking help. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

5.3.4.4 Parallel mediation: Introvertive anhedonia, self-certainty, negative affect, PWB and self-stigma of seeking help.

The parallel multiple mediation model involving introvertive anhedonia (Figure 5.5.) indicated a significant total effect with greater introvertive anhedonia significantly predicting higher self-stigma of seeking help (=0.50, $p<0.01$) accounting for 2.4% variance. In support of the second hypothesis: the indirect effect via PWB was significant (a_2, b_2; = 0.81, 95% CI= 0.48, 1.14), indicating that PWB mediated the relationship between introvertive anhedonia and self-stigma of seeking help. The indirect effects via self-certainty (a_1, b_1; = 0.02, 95% CI= -0.03, 0.09) and

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negative affect (a_3, b_3 = -0.09, 95 % CI= -0.28, 0.08) were not significant. The direct effect of introvertive anhedonia on self-stigma of seeking help was no longer significant after controlling for the mediators (= -0.24, $p>0.05$). Introvertive anhedonia and the mediators together explained 13.1% variance in self-stigma of seeking psychological help.
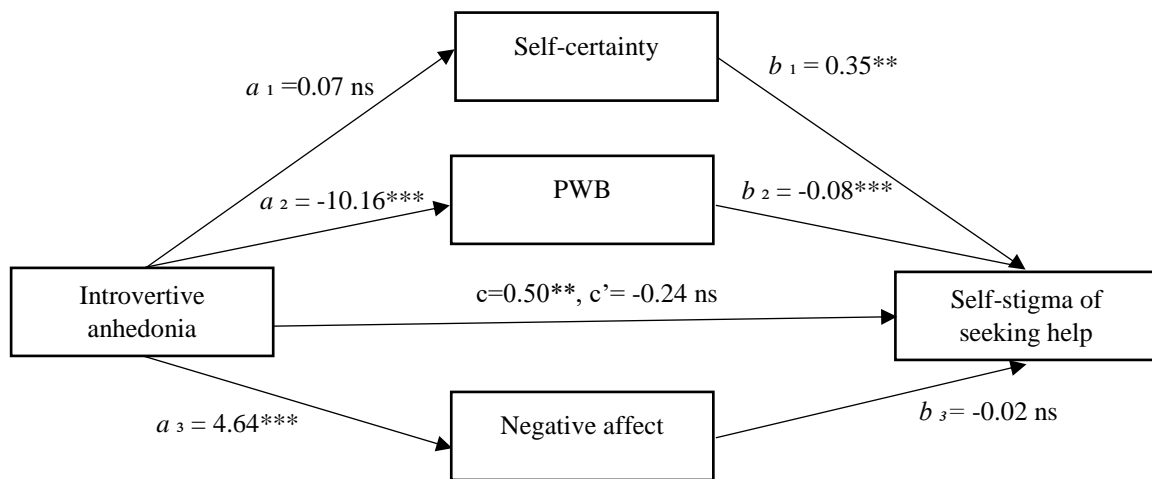
Figure 5.5. Regression path from introvertive anhedonia to self-stigma of seeking help mediated by self-certainty, PWB and negative affect. a=effect of introvertive anhedonia on mediators; b=effect of mediators on self-stigma of seeking help; c= total effect of introvertive anhedonia on self-stigma of seeking help; c'= direct effect of introvertive anhedonia on self-stigma of seeking help. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

5.3.4.5 Parallel mediation: Impulsive non-conformity, self-certainty, negative affect, PWB and self-stigma of seeking help.

The parallel multiple mediation model involving impulsive non-conformity (Figure 5.6.) indicated a significant total effect with greater impulsive non-conformity significantly predicting higher self-stigma of seeking help (=0.63, $p<0.001$) accounting for 3.4% variance. In support of the second hypothesis: significant indirect effects via self-certainty (a_1, b_1; =0.09, 95% CI= 0.01, 0.19) and via PWB (a_2, b_2; =0.52, 95% CI= 0.29, 0.77), indicated that self-certainty and PWB mediated the relationship between impulsive non-conformity and self-stigma of seeking help. The indirect effect via negative affect was not significant (a_3, b_3 = -0.16, 95% CI = -0.41, 0.09). The direct effect of impulsive non-conformity on self-stigma of

seeking help was no longer significant after controlling for the mediators (=0.19, $p>0.05$).

Impulsive non-conformity and the mediators together explained 12.9% variance in self-stigma of seeking help.
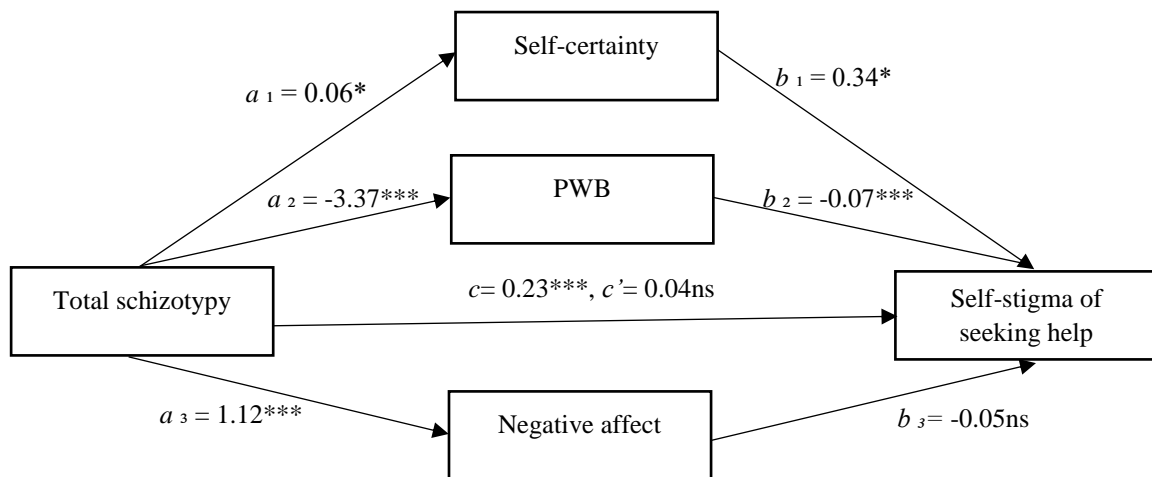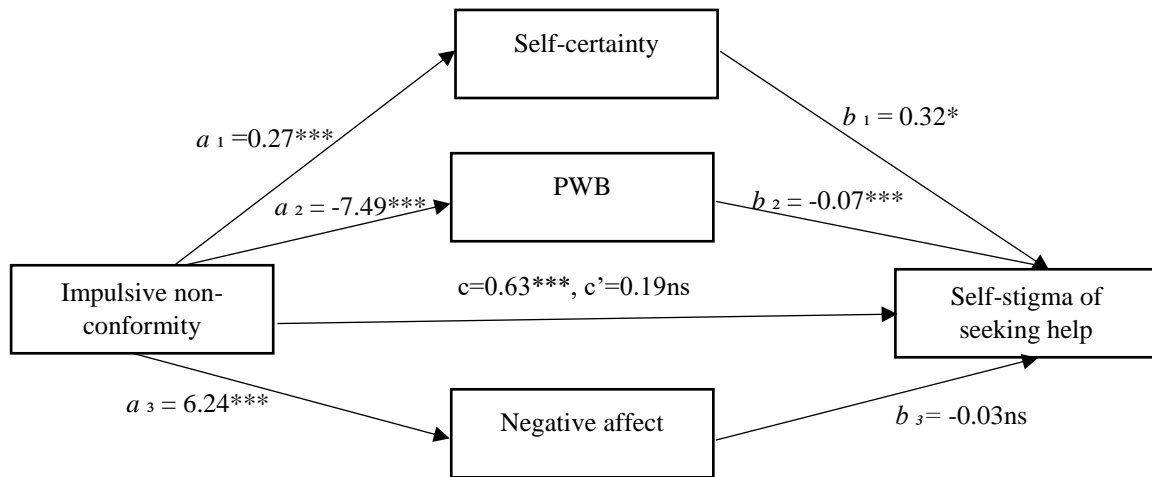

Figure 5.6. Regression path from impulsive non-conformity to self-stigma of seeking help mediated by self-certainty, PWB and negative affect. a=effect of impulsive non-conformity on mediators; b=effect of mediators on self-stigma of seeking help; c= total effect of impulsive non-conformity on self-stigma of seeking help; c'= direct effect of impulsive non-conformity on self-stigma of seeking help. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

5.4 Discussion

The purpose of the current study was to elucidate whether self-stigma of seeking help could be implicated in the psychosis continuum. First, by examining whether multidimensional schizotypy traits were associated with self-stigma of seeking help. Second, to add to the well-established psychosis literature reporting associations between self-stigma of mental illness and cognitive insight, negative affect and PWB, by exploring whether these aforementioned variables may also account for the potential relationship between schizotypy and self-stigma of seeking help. In relation to the first hypothesis, regression analyses showed that when controlling for other schizotypy traits, greater cognitive disorganisation significantly predicted higher self-stigma of seeking help. The finding extends previous studies reporting associations

between psychotic symptoms and self-stigma of mental illness in individuals with psychotic disorders. In relation to the second hypothesis, the parallel mediation models revealed the mediating roles of self-certainty and PWB in the relationships between total schizotypy and the schizotypy dimensions and self-stigma of seeking help, demonstrating that these factors may be linked with different self-stigma constructs.

The multiple regression model revealed that when controlling for the other schizotypy dimensions, greater cognitive disorganisation was the only significant predictor of higher self-stigma of seeking help. Related but distinct research has also found that subthreshold psychotic symptom distress is positively associated with self-stigma of having a mental illness, in students with mental health concerns (Denenny et al., 2015). The findings of the current study suggest that individuals who are socially anxious and experience cognitive difficulties, may feel as though their self-esteem and self-confidence would be affected if they were to ever seek psychological help. This may be a consequence of interpreting their experiences as being unusual or not normal, as well as having greater awareness of public negative stereotypes associated with mental illness. Support for this suggestion, comes from prior research which found that greater perceived public stigma towards mental illness was associated with less favourable attitudes towards seeking psychological help in a general population sample (Rayan & Jaradat, 2016). Therefore, research may look to explore whether public perceived stigma towards mental illness may mediate the relationship between schizotypy traits and self-stigma for seeking psychological help.

There were some results that were inconsistent with the first hypothesis as the multiple regression analyses revealed that unusual experiences, impulsive non-conformity and introvertive anhedonia were not significant predictors of self-stigma of seeking help. On the other hand, parallel mediation models showed significant total effects between all four schizotypy dimensions and self-stigma of seeking help, albeit only accounting for very small

variance in the outcome variable. These results potentially suggesting that certain schizotypy traits may only be associated with self-stigma when there are also elevated levels of other schizotypy traits. It is important to note that in the current sample, the mean score for cognitive disorganisation was higher than previous published studies, whereas the mean scores for the schizotypy dimensions unusual experiences and impulsive non-conformity were more in line with previous studies (Fonseca-Pedrero et al., 2015b). Therefore, the higher scores for cognitive disorganisation seen in the current sample, may have influenced why this was the only schizotypy dimension to significantly predict self-stigma of seeking help.

The current study also revealed that greater self-certainty mediated the relationships between total schizotypy, the schizotypy dimensions- unusual experiences and impulsive nonconformity and self-stigma of seeking help. The findings somewhat parallel the positive association observed between self-stigma of mental illness and self-certainty in individuals with psychotic disorders (Grover et al., 2018). The results may suggest that individuals with schizotypy traits, who are overconfident in the accuracy of their beliefs, would view seeking help as a threat to their self-esteem and self-confidence. This explanation is not too distant from the proposition that some individuals with psychotic disorders who have higher self-certainty may have a socially naïve self-appraisal (i.e. positive beliefs about the self which are unchecked by social norms) that leads to more self-confidence (Guerrero & Lysaker, 2013). Pearson's correlations revealed no significant associations between self-certainty and the schizotypy dimensions- introvertive anhedonia and cognitive disorganisation, which may have influenced why the indirect effect via self-certainty was not significant in the relationship between these two schizotypy dimensions and self-stigma of seeking help.

Unexpectedly, the current study did not find an association between self-reflectiveness and self-stigma of seeking help. This perhaps indicates that the cognitive insight subcomponents have differential relationships with different self-stigma constructs. It may be of interest for

future research to explore whether patterns observed in individuals with psychotic disorders regarding self-reflectiveness, would also be found in individuals with schizotypy traits, if a different self-stigma scale was used. Future research may utilise measures that assess negative beliefs or appraisals about psychotic experiences such as the Personal Beliefs about Experiences Questionnaire (Pyle et al., 2015), or alternatively adapt scales of self-stigma of having a mental illness, such as the "gold star" Internalized Stigma of Mental Illness scale (Ritscher et al., 2003) to be relevant to the general population.

In support of the second hypothesis; the parallel mediation analyses revealed that lower PWB mediated the relationships between total schizotypy, the four schizotypy dimensions and self-stigma of seeking help. The findings may suggest that individuals with elevated schizotypy traits who are not particularly content or satisfied with elements of their life, would have feelings of diminished self-esteem and feelings of inferiority if they were to hypothetically seek psychological help. Unexpectedly, negative affect did not mediate the relationship between schizotypy and self-stigma of seeking help. However, consistent with previous studies, the correlation analysis revealed weak associations between negative affect and self-stigma of seeking help (Kim & Zane, 2016; Talebi et al., 2016; Surapeni et al., 2018). Because negative affect and PWB are strongly correlated with one another, this may have diminished any mediating effect that negative affect may have had. Alternatively, it may be that some individuals with increased schizotypy traits and greater negative affect would have higher self-stigma for seeking help, whereas others would have lower self-stigma for seeking psychological help. For example, it has been suggested that some individuals with greater distress would feel that seeking help would be beneficial whereby the potential benefits of seeking psychological help (i.e. reduce distress) could outweigh the potential risks (i.e. experiencing stigmatisation). On the other hand, some individuals with greater negative

distress may perceive stigmatising conceptions about mental illness and seeking help may apply to themselves (Surapaneni et al., 2018).

5.4.1 Implications

Based on the findings of the current study, educational interventions focusing on improving public and self-stigma towards mental illness and seeking help may be beneficial for the general population and individuals with increased schizotypy traits. Interventions focused on informing university samples about the causes of stigma associated with psychotic disorders, and myths and facts associated with mental illness, has been shown to reduce peoples public stereotyping of individuals with mental illness (Lincoln et al., 2007). Since previous literature has found that greater self-stigma of seeking help is associated with poorer help-seeking attitudes and less intention to seek help (Vogel et al., 2006), interventions that reduce one's self-stigma towards seeking help, may help improve people's willingness to use mental health services if they are required.

5.4.2 Limitations and Future Research

There are a few limitations to the current study which should be born in mind. First, the author focused on self-stigma of seeking help, and did not assess self-stigma of mental illness. Therefore, it is difficult to draw direct comparison between the current study results and research in psychotic disorders. As previously mentioned future research may look to utilise measures that assess negative beliefs or appraisals about psychotic experiences or adapted measures of self-stigma of mental illness and explore their relationships with schizotypy dimensions. Second, only weak associations were found between self-stigma of seeking help and the other study variables. Therefore, the findings of the study should be interpreted with caution. Future research may look to investigate the role self-stigma of seeking help, longitudinally in individuals with schizotypy traits, and to explore whether this would impact

on help-seeking behaviours and intentions, particularly in individuals that may come to a possible critical juncture (i.e. seeking mental health services) in the future.

5.4.3 Conclusions

The unique contribution of this study was two-fold. First in identifying associations between schizotypy traits and self-stigma of seeking help. Second by identifying that the path from schizotypy to self-stigma of seeking help features self-certainty and PWB. Therefore, the study extends the previous literature in psychotic disorders, which has found associations between self-stigma of mental illness and cognitive insight, negative affect and wellbeing. Self-stigma of seeking help may have important implications regarding individuals' intentions to seek psychological help. Accordingly, future studies should look to explore what factors may be contributing to the relationship between schizotypy, and cognitive insight and wellbeing. Study 3 of the thesis will therefore explore the interrelationships between metacognitive beliefs, and schizotypy, cognitive insight, negative affect and PWB.

Chapter 6. Study 3: Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and metacognitive beliefs.

6.1 Overview

6.1.1 Metacognition and the psychosis continuum

Metacognition involves a continuum of activities from recognising discrete acts (thoughts and emotions) to integrating these elements into a synthetic representation of self and others (Lysaker et al., 2013). Discrete dysfunctional metacognitive beliefs have been identified as potential risk factors in the development and persistence of psychological disorders, including psychotic disorders. The Self-Regulatory Executive Functioning (S-REF) model proposes that a core Cognitive Attentional Syndrome (CAS) is associated with unhelpful self-focussed attention and ruminative processes, that are underpinned by dysfunctional metacognitive beliefs, which may result in the maintenance of symptoms and distress (Wells & Matthews, 1996; Sellers et al., 2016). The Meta-Cognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997), measures five broad dimensions of dysfunctional metacognitive beliefs*; positive beliefs about worry* e.g. "focussing on danger will keep me safe", *negative beliefs about uncontrollability of thoughts* e.g. "my worrying could make me go mad", *negative beliefs about danger, importance and meaning of thoughts* e.g. "I should be in control of my thoughts all of the time", *lack of cognitive confidence* e.g." I do not trust my memory" and *cognitive self-consciousness* e.g. "I constantly examine my thoughts" (Wells, 2009). The S-REF model proposes that the co-occurrence of dysfunctional positive and negative metacognitive beliefs relates to greater pathology (Wells, 2009).

The application of the metacognitive model to psychosis has received substantial investigation. Morrison (2001) built upon the S-REF model, proposing that positive metacognitive beliefs contributed to more frequent and severe positive symptomology (e.g. suspiciousness is good

and keeps an individual safe) whereas negative beliefs about these thoughts (e.g. they are uncontrollable or dangerous) leads to arousal and help-seeking behaviour, which then lead to the occurrence of more positive symptoms (Morrison, 2001). In support of the S-REF model, recent meta-analyses have found that individuals with psychosis scored significantly higher on all five domains of dysfunctional metacognitive beliefs (Sellers et al., 2017) and individuals with ARMS scoring significantly higher on all dysfunctional metacognitive beliefs, with the exception of the positive belief about worry domain when compared with healthy controls (Cotter et al., 2017). Longitudinal studies have found that individuals with ARMS who converted to a psychotic disorder had significantly greater dysfunctional negative metacognitive beliefs at baseline when compared with individuals with ARMS who did not transition (Barbato et al., 2014; Austin et al., 2015). The overall research suggesting that dysfunctional metacognitive beliefs are a potential vulnerability marker for conversion to psychosis.

Correlational studies have also explored the relationships between psychotic symptoms and dysfunctional metacognitive beliefs. In further support of the S-REF model, studies have found that positive psychotic symptoms (i.e. hallucinations and delusions) are positively associated with dysfunctional positive beliefs about worry, negative beliefs and cognitive-confidence in individuals with psychotic disorders (Fraser et al., 2006; Varese & Bentall, 2011). Negative beliefs have also been associated with positive psychotic symptoms in individuals with first episode psychosis and individuals with ARMS (McLeod et al., 2014; Welsh et al., 2014; Sellers et al., 2016). Importantly, a number of studies have found limited associations between dysfunctional metacognitive beliefs and both hallucinations and delusions after controlling for comorbid symptoms (Brett et al., 2009; Varese & Bentall, 2011; Goldstone et al., 2013; Cotter et al., 2017). Additional studies have also reported that dysfunctional metacognitive beliefs are associated with negative symptoms in individuals with psychotic disorders (Østefjells et al.,

2015) and manic symptoms and cognitive difficulties in individuals with ARMS (Brett et al., 2009; Welsh et al., 2014; Bright et al., 2018). Therefore, there is an emerging consensus that dysfunctional metacognitive beliefs do not underlie specific symptoms (i.e. hallucinations and delusions) but are rather a general vulnerability marker for influencing symptom maintenance and distress (Brett et al., 2009; Hill et al., 2012; Varese et al., 2011; Cotter et al., 2017).

Dysfunctional metacognitive beliefs have also been observed in individuals with schizotypy traits. For example, studies have found that individuals with high schizotypy scored significantly higher on all five dysfunctional metacognitive belief domains when compared to a low schizotypy group (Chan et al., 2015). In addition, studies have found that dysfunctional metacognitive beliefs were similar in individuals with high schizotypy when compared with individuals with ARMS (Barkus et al., 2010). However, correlational studies that have explored how the five dysfunctional metacognitive beliefs are associated with schizotypy traits have remained mixed. A largely consistent finding is that negative beliefs are significantly associated with greater total schizotypy, positive schizotypy, hallucination and delusional proneness (Larøi & Van der Linden, 2005; García-Montes et al., 2006; Stirling et al., 2007; Reeder et al., 2010; Debbané et al, 2012; Goldstone et al., 2013). However, only one of these studies found that positive beliefs about worry was associated with specific features of positive schizotypy (Larøi & Van der Linden, 2005). In addition, some studies have reported significant relationships between specific features of positive schizotypy and lower cognitive confidence (García-Montes et al., 2006; Goldstone et al., 2013) and greater cognitive self-consciousness (Larøi & Van der Linden 2005). Whereas, other studies have found no associations between these metacognitive beliefs and positive schizotypy traits (e.g. Stirling et al., 2007; Reeder et al., 2010; Debbané et al., 2012). Therefore, whilst it is expected that positive schizotypy traits would be associated with greater negative beliefs, it remains unclear whether this schizotypy

dimension is also associated with positive beliefs about worry, cognitive confidence and cognitive self-consciousness.

The aforementioned studies have focused on positive schizotypy or specific features of positive schizotypy and did not control for other schizotypy traits, which may have contributed to the inconsistent findings. I am unaware of any research exploring how dysfunctional metacognitive beliefs are associated with schizotypy dimensions other than positive schizotypy. However, the psychosis literature has provided evidence that negative, disorganised and manic symptoms have also been associated with dysfunctional metacognitive beliefs. Therefore, it is plausible that dysfunctional metacognitive beliefs are related to differential schizotypy traits other than just positive schizotypy. Focus on the full range of schizotypy traits is important given that it is the co-occurrence of high values in all schizotypy traits which is predictive of psychosis (Mason et al., 2004) and that dysfunctional metacognitive beliefs are a potential risk factor for transition to psychosis. Based on the previous literature it is expected that cognitive disorganisation, introvertive anhedonia and impulsive non-conformity will significantly predict greater dysfunctional metacognitive beliefs. However, it is unclear which of the specific dysfunctional metacognitive beliefs will be significantly associated with these schizotypy traits.

6.1.2 The relationship between metacognition and cognitive insight

In psychotic disorders, research has begun to explore the relationships between synthetic metacognition and both cognitive insight and clinical insight. Van Camp et al., (2017) propose that cognitive insight fits within the broader conceptualisation of metacognition as it also requires self-appraisal and is likely based on similar "higher-level" cognitive processes. Correlational studies have found that lower clinical insight and lower cognitive insight have been associated with poorer synthetic metacognitive abilities in psychosis (Lysaker et al., 2011;

Nicolo et al., 2012; Chan et al., 2016; Mahour et al., 2018). Lysaker et al., (2011) suggest that the ability to consider different perspectives and evaluate alternate hypotheses may be reliant on the ability to produce complex representations of one's own mental states. Therefore, synthetic metacognitive abilities may be a potential barrier to insight in psychosis. I am unaware of any research that has explored the relationships between dysfunctional metacognitive beliefs and cognitive insight in psychotic disorders. Thus, future research is required to elucidate how the different facets of metacognition are associated with cognitive insight across the psychosis continuum.

Recent studies have begun to explore the relationships between dysfunctional metacognitive beliefs and cognitive insight in individuals with Obsessive Compulsive Disorder (OCD). Eckini & Eckini (2016) found that greater endorsement of dysfunctional metacognitive beliefs (i.e. greater cognitive self-consciousness and lack of cognitive confidence) were associated with higher self-reflectiveness in individuals with OCD. These findings are counterintuitive to the hypothesis that poorer metacognitive abilities are associated with lower cognitive insight and provide additional support for the "insight paradox", whereby higher self-reflectiveness may not always be beneficial. Studies have found similarities in dysfunctional metacognitive beliefs in individuals with OCD and schizophrenia, suggesting that these two diagnoses share a common metacognitive pathway (Moritz et al., 2010). Therefore, taking into consideration the previous literature it is plausible that different metacognition facets/constructs may have differential relationships with cognitive insight. However, future research is required to explore how cognitive insight relates to discrete metacognitive beliefs across the psychosis continuum. Study one of the thesis revealed associations between schizotypy traits and the cognitive insight subcomponents self-reflectiveness and self-certainty. Therefore, the current study will extend on this by exploring whether dysfunctional metacognitive beliefs, may play a mediating role in these relationships. Based on the previous literature, it is expected that the dysfunctional

metacognitive beliefs- cognitive confidence and cognitive self-consciousness will mediate these relationships.

6.1.3 The relationship between metacognition and negative affect and wellbeing.

As previously discussed, a core assumption of the SREF model is that negative metacognitive beliefs are associated with enduring negative affect (i.e. depression and anxiety) because they guide unhelpful coping strategies such as worry and rumination (Wells, 2009). It has since been proposed that metacognitive beliefs may play an important role in psychological distress in psychotic disorders, as dysfunctional metacognitive beliefs could mediate or moderate the affective response (i.e. depression and anxiety) to psychotic symptomology (van Oosterhout et al., 2013). In support of the S-REF model, dysfunctional negative beliefs have been associated with greater negative affect, often over and above psychotic symptom severity in individuals with psychotic disorders (Brett et al., 2009; Hill et al., 2012; Barbato et al., 2013; Van Oosterhout et al., 2013; Sellers et al., 2016). In addition, some of the aforementioned studies also found that the dysfunctional metacognitive beliefs- cognitive self-consciousness and cognitive confidence were associated with greater negative affect (Brett et al., 2009; Barbato et al., 2013), whereas others did not find this relationship (Hill et al., 2012; Van Oosterhout et al., 2013; Sellers et al., 2016). Therefore, dysfunctional metacognitive beliefs- in particular negative beliefs, cognitive confidence and cognitive self-consciousness may play a contributing role to negative affect in individuals with psychotic disorders.

Despite knowledge that dysfunctional metacognitive beliefs contribute to negative affect in psychotic disorders, their associations with negative affect in individuals with schizotypy traits has remained sparse. Debbané et al., (2012) found that dysfunctional metacognitive beliefs were independently associated with both anxiety and positive schizotypy in an adolescence sample. In addition, Sellers et al., (2018) also found that dysfunctional metacognitive beliefs

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moderated the relationship between non-clinical paranoid ideation and negative affect. However, the authors of the latter study proposed that future investigation that allows for tests of mediation as well as moderation is warranted. I am unaware of any research to date that explored the contributing role of metacognitive beliefs to the well-established relationship between the full range of schizotypy traits and negative affect. However, based on the aforementioned research it is plausible that the dysfunctional metacognitive beliefs, with the exception of positive beliefs about worry, will mediate the relationship between schizotypy and negative affect.

Furthermore, despite emerging evidence implicating metacognitive beliefs in the development and maintenance of psychotic symptoms and associated distress, only one study has explored the link between dysfunctional metacognitive beliefs and psychological wellbeing (PWB) in psychosis. Valiente et al., (2012) found PWB to be compromised in psychotic individuals who have high levels of persecutory thinking when they have lower cognitive self-consciousness. The authors of the research suggested that individuals with persecutory thinking use cognitive self-consciousness as a strategy to maintain a sense of wellness, however the impact of metacognitive beliefs on PWB may depend upon the type of psychopathology experienced (Valiente et al., 2012). For example, in individuals with OCD, greater negative metacognitive beliefs significantly predicted poorer quality of life, yet greater cognitive self-consciousness predicted greater quality of life (Barahmand et al., 2014). The relationship between metacognitive beliefs and PWB in schizotypy has remained unexplored. However, dysfunctional metacognitive beliefs in particular negative beliefs and cognitive self-consciousness could play an important role in the well-established relationship between schizotypy and PWB.

6.1.4 Study 3 Aims and Hypotheses

The aim of the current study is twofold. First to examine the associations between multidimensional schizotypy traits and metacognitive beliefs, given the evidence that metacognitive beliefs may be a risk factor in psychosis. Second to examine whether the established relationships between schizotypy and cognitive insight, negative affect and PWB may be accounted for by metacognitive beliefs. The hypotheses are as follows:

1) Greater schizotypy traits will significantly predict higher levels of all five dysfunctional metacognitive beliefs.

2) Cognitive confidence and cognitive self-consciousness will mediate the relationships between schizotypy and cognitive insight subcomponents- self-reflectiveness and self-certainty.

3) Negative beliefs and cognitive self-consciousness will mediate the relationships between schizotypy and both negative affect and PWB. In addition, lack of cognitive confidence will also mediate the relationship between schizotypy and negative affect.
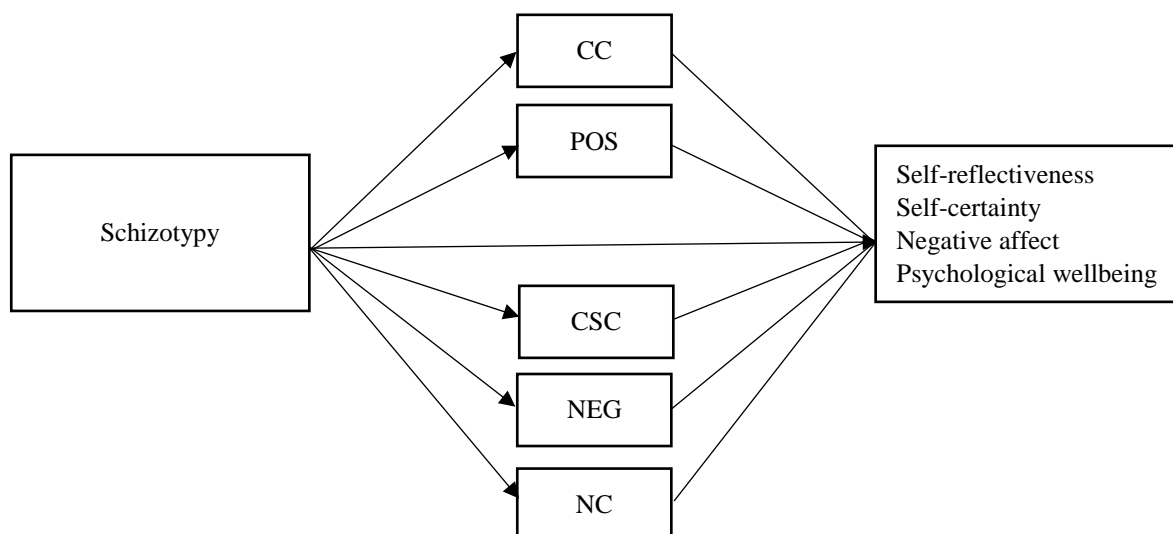
Figure 6.1. The hypothesised parallel mediation model from schizotypy to self-reflectiveness, self-certainty, negative affect and PWB via dysfunctional metacognitive beliefs.

CC=cognitive confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.2. Methods

6.2.1 Participants

This study used a convenience sample of 344 participants (mean=21.17, SD=3.13 years), who were predominantly female (79.2%). Participants were 78.8% White, 11% Asian, 3.2% Black/African/Caribbean and 7% other. In terms of occupation, 85.2% of participants were students, 12.8% employed and 2% unemployed.

6.2.2 Psychometric measures

The sO-LIFE (Mason et al., 2005), measuring unusual experiences, introvertive anhedonia, cognitive disorganisation, impulsive non-conformity and total schizotypy. The DASS-21 (Lovibond & Lovibond, 1995) utilising the total score to measure negative affect. The BCIS (Beck et al., 2004), measuring the cognitive insight subcomponents- self-reflectiveness and self-certainty. The 54-item Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989), utilising the total score to measure PWB. The Metacognitions Questionnaire-30 (MCQ-30;

Wells & Cartwright-Hatton, 2004), measuring lack of cognitive confidence, positive beliefs about worry, cognitive self-consciousness, negative beliefs about the uncontrollability of thoughts and corresponding danger and negative beliefs about need to control thoughts. Refer to chapter 3 for a detailed description of each of these measures.

6.2.3 Procedure

Participants read an information sheet and provided consent before completing demographics and all abovementioned measures in Qualtrics software. After demographics, the psychometric measures were presented to participants in a randomised order. There were 375 initial responses recorded. However, before any analysis, 11 responses were excluded for repeat data and 20 responses were excluded for missing one or more of the current study's psychometric measures. After exclusion criteria the final sample of 344 participants were included for further analysis.

6.2.4 Missing Data

There were 0.23% missing responses across the current study's measures. There were 33 values missing for the sO-LIFE, 6 values for the BCIS, 37 values for the MCQ-30, 21 values for the DASS-21 and 34 values for the SPWB. Expectation Maximization (EM) algorithm was utilised to maintain the structure of the data in the analysis.

6.3 Results

6.3.1 Descriptive Characteristics

Skewness and kurtosis fell within the acceptable range of +/- 2 for all study variables suggesting data was normally distributed (Table 6.1). The current sample's mean scores for the each of the studies variables were visually inspected and compared with previous published studies that have used large community and university samples (Table 6.1). In the current

sample, mean scores for the metacognitive belief subscales- positive beliefs about worry, cognitive self-consciousness and negative beliefs about need to control thoughts were within 10% of the mean scores of previously published studies, however mean scores on the cognitive confidence and negative beliefs about the uncontrollability of thoughts and corresponding danger subscales were higher in the current sample than previous studies (Quattropani et al., 2014). Furthermore, in the current sample, mean scores on other study variables that were within 10% of mean scores of previous published studies included the BCIS subscales; self-reflectiveness and self-certainty (Warman & Martin, 2006) the SPWB total score (Singleton et al., 2014) and the sO-LIFE subscales; unusual experiences and impulsive non-conformity (Fonseca-Pedrero et al., 2015b). In the current sample, the mean scores were higher when compared with previous studies for the sO-LIFE total schizotypy score (Dagnall et al., 2016), the sO-LIFE subscales; cognitive disorganisation and introvertive anhedonia (Fonseca-Pedrero et al., 2015b) and the mean DASS-21 total score (Carrigan & Barkus, 2017).

Table 6.1. Sample descriptive statistics.

	Mean (SD)	Skewness	Kurtosis	Range	Alpha	Prior published studies Mean (SD)
sO-LIFE						
Total schizotypy	17.06 (7.70)	0.22	-0.33	1-38	0.92	14.93 (7.73)
Unusual experiences	3.54 (2.82)	0.66	-0.35	0-11	0.89	3.48 (2.76)
Cognitive disorganisation	6.39 (3.08)	-0.34	-0.87	0-11	0.89	5.15 (2.94)
Introvertive anhedonia	3.27 (2.35)	0.56	-0.47	0-10	0.80	2.03 (1.86)
Impulsive non-conformity	3.86 (2.19)	0.26	-0.52	0-10	0.73	3.59 (2.11)
BCIS						
Self-reflectiveness	13.30 (4.27)	0.22	-0.10	2-27	0.70	13.74 (3.38)
Self-certainty	7.10 (3.09)	0.45	0.14	0-18	0.67	6.70 (2.71)
MCQ-30						
CC	11.83 (4.78)	0.84	0.05	6-24	0.89	9.94 (3.73)
POS	11.36 (4.36)	0.69	-0.17	6-24	0.89	10.49 (3.92)
CSC	15.43 (4.41)	0.07	-0.72	6-24	0.85	16.65 (3.19)
NEG	14.19 (5.54)	0.19	-1.21	6-24	0.91	11.55 (3.97)
NC	12.29 (4.01)	0.50	-0.31	6-24	0.77	11.71 (3.26)
DASS-21						
Negative affect	20.61 (13.62)	0.71	-0.26	0-63	0.94	15.54 (11.50)
SPWB-54						
Total PWB	212.35 (39.73)	0.02	-0.29	110-311	0.95	224.64 (28.62)

CC= cognitive confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.3.2 Correlations between study variables

Correlations between metacognitive beliefs and the other study three variables are presented in Table 6.2. As expected, significant positive associations ranging from weak to strong were observed between the metacognitive belief subscales and all four schizotypy dimensions, total schizotypy, the cognitive insight subcomponents- self-reflectiveness, self-certainty and negative affect ($r=0.12$, $p<0.05$ to $r=0.67$, $p<0.001$); apart from non-significant associations between self-certainty and the metacognitive belief subscales; cognitive confidence and negative beliefs about the uncontrollability of thoughts and corresponding danger ($r=-0.03$,

p>0.05 and *r*=0.10, *p*>0.05) respectively, and a non-significant association between introvertive anhedonia and cognitive self-consciousness (*r*=0.09, *p*>0.05). All five metacognitive belief subscales were inversely associated with PWB. Intercorrelations between the metacognitive belief subscales and correlations between the other study variables are presented in Appendix C, Table C.1 and Table C.2.

Table 6.2. Pearson's correlations between metacognitive beliefs and schizotypy traits, self-reflectiveness, self-certainty, negative affect and PWB.

	CC	POS	CSC	NEG	NC
Total schizotypy	0.42***	0.23***	0.27***	0.53***	0.46***
Unusual experiences	0.27***	0.21***	0.29***	0.33***	0.39***
Cognitive disorganisation	0.42***	0.19***	0.19***	0.53***	0.32***
Introvertive anhedonia	0.22***	0.16**	0.09	0.29***	0.21***
Impulsive non-conformity	0.32***	0.11*	0.22***	0.38***	0.44***
Self-reflectiveness	0.31***	0.22***	0.34***	0.39***	0.32***
Self-certainty	-0.03	0.12*	0.20***	0.10	0.21***
Negative affect	0.35***	0.28***	0.45***	0.67***	0.48***
PWB	-0.31***	-0.18**	-0.12*	-0.48***	-0.31***

p<0.05, **p*<0.01, ***p*<0.001. CC= cognitive confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.3.3 Schizotypy and Metacognitive beliefs

To explore the first hypothesis, five regression analyses were conducted to explore the unique contribution of each of the four schizotypy dimensions (simultaneous predictor variables) on each of the five metacognitive belief subscales (outcome variables) (Table 6.3). Multicollinearity assumptions were met for all regression analyses.

The results of the multiple regressions indicated that greater cognitive disorganisation and impulsive non-conformity significantly predicted higher greater negative beliefs about the uncontrollability of thoughts and corresponding danger, with the model explaining 32% of the variance. Higher unusual experiences and impulsive non-conformity significantly predicted greater negative beliefs about need to control thoughts, with the model explaining 24% of the variance. Higher cognitive disorganisation and impulsive non-conformity significantly predicted lower cognitive confidence, with the model explaining 20% of the variance. In addition, higher unusual experiences predicted greater cognitive self-consciousness and greater positive beliefs about worry, with the models explaining 9% and 6% of the variance respectively. Introvertive anhedonia was not a significant predictor of any metacognitive belief subscale. Therefore, as hypothesised the results identified that higher schizotypy traits significantly predicted greater levels of all five dysfunctional metacognitive beliefs, with differential relationship observed for each of the four schizotypy dimensions.

Table 6.3. Simultaneous regressions between schizotypy dimensions (predictors) and metacognitive beliefs subscales (outcome variables).

	CC		POS		CSC		NEG		NC	
	B	β	B	β	B	β	B	β	B	β
Unusual Experiences	0.06	0.04	0.24*	0.16	0.34**	0.22	0.10	0.05	0.28**	0.20
Cognitive Disorganisation	0.49***	0.32	0.14	0.10	0.06	0.04	0.73***	0.41	0.09	0.07
Introvertive Anhedonia	0.11	0.06	0.17	0.09	0.001	0.001	0.21	0.09	0.10	0.06
Impulsive non-conformity	0.30*	0.14	-0.07	-0.03	0.19	0.09	0.37**	0.14	0.55***	0.30
F	21.10***		5.52***		8.56***		38.97***		27.31***	
R^2	0.20		0.06		0.09		0.32		0.24	

*$p<0.05$, **$p<0.01$, ***$p<0.001$. CC= cognitive confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

To explore the second and third hypotheses, parallel mediation analyses were conducted, with the schizotypy total score as the predictor variable, metacognitive beliefs subscales as the mediators and self-reflectiveness, self-certainty, negative affect and PWB as the outcome variables. The current study uses the total schizotypy score, as the predictor variable for the sake of clarity, as using individual schizotypy subscales as predictor variables would have resulted in 16 mediation models. Only significant indirect effects will be reported.

Secondary analyses were also run using the individual schizotypy dimensions as predictor variables. Whilst significant indirect effects were largely comparable with the final study analyses, there were some differences in significant indirect effects for each of the individual schizotypy dimensions, which are presented in Appendix C, Figure C.1 to Figure C.4 and Table C.3 to Table C.6.

6.3.4.1 Schizotypy, metacognitive beliefs and cognitive insight.

Parallel mediation (Figure 6.2) indicated a significant total effect with greater total schizotypy significantly predicting higher self-reflectiveness (=0.20, *p*<0.001), accounting for 13% variance. Furthermore, poorer cognitive confidence and greater cognitive self-consciousness and negative beliefs about the uncontrollability of thoughts and corresponding danger significantly predicted higher self-reflectiveness. In support of the second hypothesis, significant indirect effects showed that cognitive confidence (a_1, b_1; =0.03, 95% CI= 0.01, 0.06) and cognitive self-consciousness (a_3, b_3 =0.03, 95% CI= 0.01, 0.05) significantly mediated the relationship between total schizotypy and self-reflectiveness. Furthermore, significant indirect effects revealed that negative beliefs about the uncontrollability of thoughts and corresponding danger (a_4, b_4; =0.04, 95% CI= 0.01, 0.08) also mediated the relationship between schizotypy and self-reflectiveness. The direct effect of total schizotypy on self-

reflectiveness remained significant after controlling for the mediators (=0.09, $p<0.01$), with total schizotypy and the mediators together explaining 23% variance in self-reflectiveness.
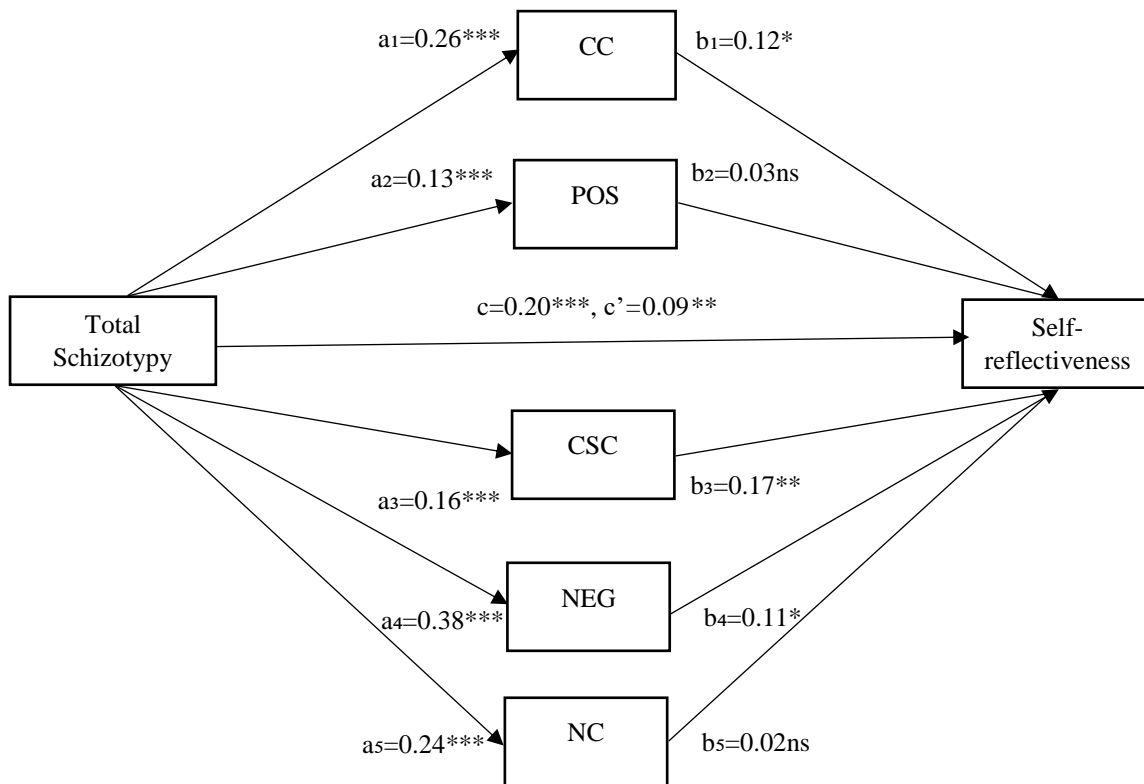
Figure 6.2. Regression path from total schizotypy to self-reflectiveness mediated by metacognitive beliefs dimensions. a=effect of total schizotypy on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on self-reflectiveness; c=total effect of total schizotypy on self-reflectiveness; c'= direct effect of total schizotypy on self-reflectiveness. Values are unstandardised coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

Parallel mediation (Figure 6.3) indicated a significant total effect with greater total schizotypy significantly predicting higher self-certainty (=0.06, $p<0.001$), accounting for 3% variance. Furthermore, poorer cognitive confidence significantly predicted lower self-certainty, whereas greater cognitive self-consciousness and negative beliefs about need to control thoughts significantly predicted higher self-certainty. In support of the second hypothesis, significant indirect effects revealed that cognitive confidence (a_1, b_1; = -0.03, 95% CI= -0.05, -0.01) and

cognitive self-consciousness (a $_3$, b $_3$; = 0.02, 95% CI= 0.002, 0.03) mediated the relationship between total schizotypy and self-certainty. Furthermore, significant indirect effects revealed that negative beliefs about need to control thoughts (a $_5$, b $_5$; = 0.03, 95% CI= 0.003, 0.06) also mediated the relationship between total schizotypy and self-certainty. The direct effect of total on self-certainty schizotypy remained significant after controlling for metacognitive beliefs (=0.07, $p<0.05$), with total schizotypy and the mediators together explaining 9% variance in self-certainty. The findings overall demonstrate that the metacognitive beliefs dimensions-cognitive confidence, cognitive self-consciousness and negative beliefs may play a specific role in the relationship between schizotypy and cognitive insight.
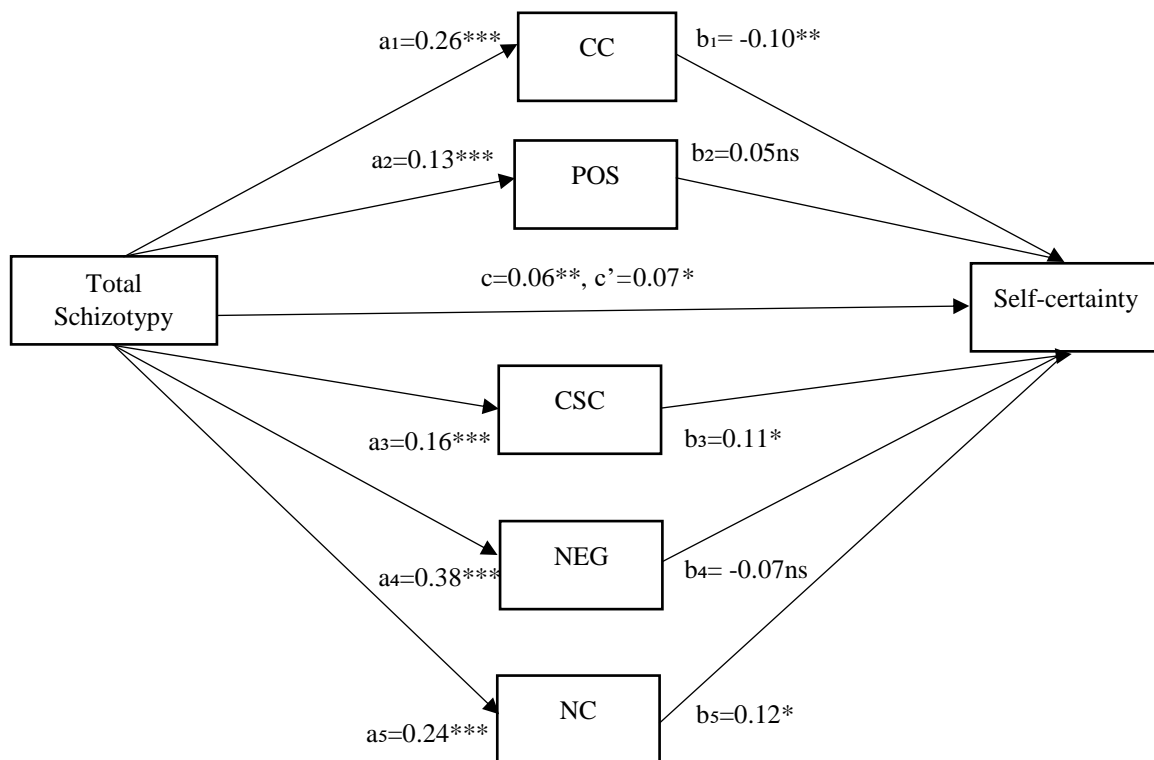
Figure 6.3. Regression path from total schizotypy to self-certainty mediated by metacognitive beliefs dimensions. a=effect of total schizotypy on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on self-certainty; c=total effect of total schizotypy on self-certainty; c'= direct effect of total schizotypy on self-certainty. Values are unstandardised coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.3.4.2 Schizotypy, metacognitive beliefs and negative affect.

Parallel mediation (Figure 6.4) revealed a significant total effect with greater total schizotypy significantly predicted higher negative affect (=1.14, *p*<0.001), accounting for 41% variance. Furthermore, greater cognitive self-consciousness and negative beliefs about the uncontrollability of thoughts and corresponding danger significantly predicted greater negative affect. In support of the third hypothesis, significant indirect effects revealed that cognitive self-consciousness (a $_3$, b $_3$; =0.07, 95% CI= 0.02, 0.12) and negative beliefs about uncontrollability of thoughts and corresponding danger (a $_4$, b $_4$; =0.36, 95% CI= 0.25, 0.47) mediated the relationship between total schizotypy and negative affect. The direct effect of total schizotypy on negative affect remained significant after controlling for metacognitive beliefs (=0.68, *p*<0.001), with total schizotypy and the mediators together explaining 58% variance in negative affect. The findings overall demonstrate that the metacognitive beliefs dimensions- cognitive self-consciousness and negative beliefs about uncontrollability of thoughts and corresponding danger, may play a specific role in the well-established relationship between schizotypy and negative affect.
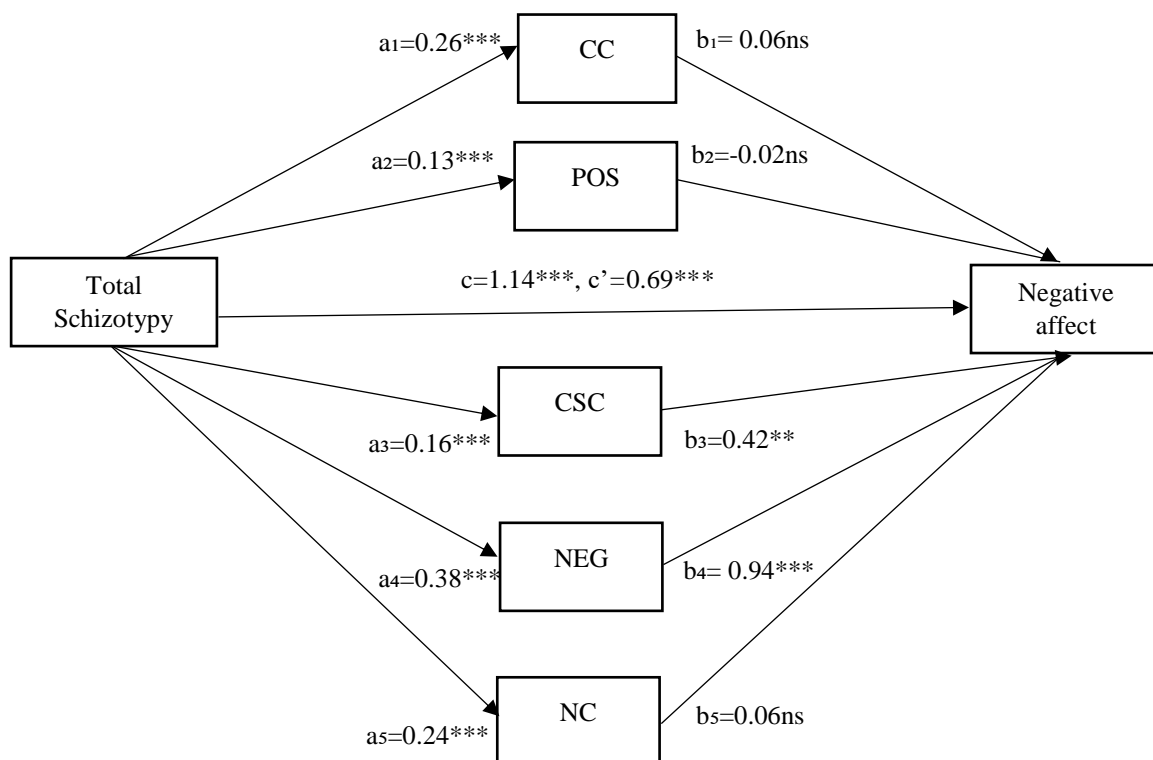
Figure 6.4. Regression path from total schizotypy to negative affect mediated by metacognitive beliefs dimensions. a=effect of total schizotypy on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on negative affect; c=total effect of total schizotypy on negative affect; c'= direct effect of total schizotypy on negative affect. Values are unstandardised coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.3.4.3 Schizotypy, metacognitive beliefs and PWB.

Parallel mediation (Figure 6.5) revealed a significant total effect with greater total schizotypy significantly predicting lower PWB (= -3.33, $p<0.001$), accounting for 42% variance. Furthermore, greater cognitive self-consciousness significantly predicted greater PWB, whereas greater negative beliefs about the uncontrollability of thoughts and corresponding danger significantly predicted lower PWB. In support of the hypothesis, significant indirect effects revealed that cognitive self-consciousness (a_3, b_3; = 0.23, 95% CI= 0.08, 0.41) and negative beliefs about the uncontrollability of thoughts and corresponding danger (a_4, b_4; = -0.77, 95% CI= -0.13, -0.46) mediated the relationship between total schizotypy and PWB. The direct effect of total schizotypy on PWB remained significant after controlling for the mediators

(= -2.78, $p<0.001$), with total schizotypy and the mediators together explaining 47% in PWB. The findings overall demonstrate that the metacognitive beliefs dimensions- cognitive self-consciousness and negative beliefs about uncontrollability of thoughts and corresponding danger, may play a specific role in the well-established relationship between schizotypy and PWB.
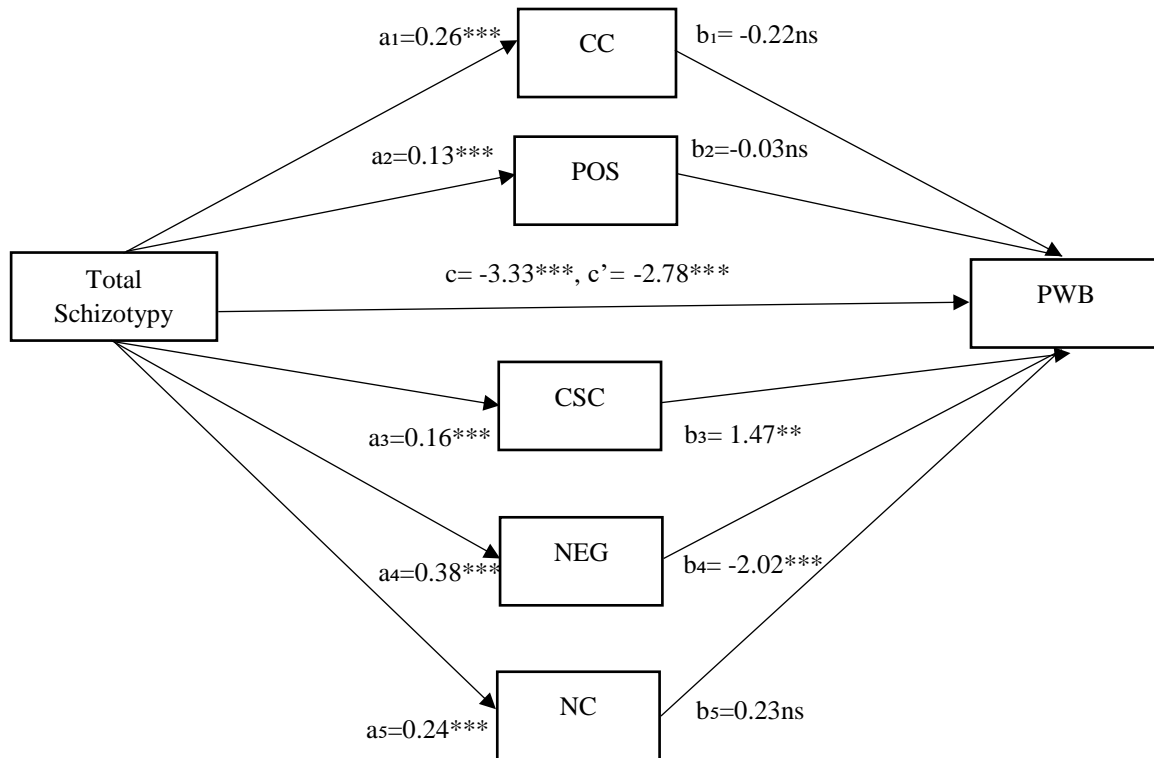
Figure 6.5. Regression path from total schizotypy to PWB mediated by metacognitive beliefs dimensions. a=effect of total schizotypy on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on PWB; c=total effect of total schizotypy on PWB; c'= direct effect of total schizotypy on PWB. Values are unstandardised coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts.

6.4 Discussion

The purpose of this study was twofold. First to explore whether the relationship between dysfunctional metacognitive beliefs and positive schizotypy also extends to other schizotypy traits. Second to extend our understanding of the links between schizotypy traits and cognitive insight, negative affect and PWB by exploring the mediating role of metacognitive beliefs.

In support of the first hypothesis, multiple regression analyses revealed that greater unusual experiences significantly predicted three dysfunctional metacognitive beliefs, specifically higher positive beliefs about worry, negative beliefs about need to control thoughts and cognitive self-consciousness. This finding supports previous literature, which has observed relationships between positive schizotypy and these three dysfunctional metacognitive beliefs. Greater impulsive non-conformity also significantly predicted three dysfunctional metacognitive beliefs, specifically higher levels of both negative belief subscales and poorer cognitive confidence. In addition, greater cognitive disorganisation significantly predicted two dysfunctional metacognitive beliefs including higher negative beliefs about the uncontrollability of thoughts and corresponding danger and poorer cognitive confidence. These latter findings, extending the prior literature by demonstrating that dysfunctional metacognitive beliefs are also associated with multidimensional schizotypy traits, with differential relationship observed for each of the four schizotypy dimensions.

In support of the second hypotheses, parallel mediation models revealed that cognitive confidence and cognitive self-consciousness mediated the relationship between total schizotypy and the cognitive insight subcomponents- self-reflectiveness and self-certainty. Furthermore, whilst not a part of the priori hypotheses, negative beliefs about the uncontrollability of thoughts and corresponding danger also mediated the relationship between total schizotypy and self-reflectiveness and negative beliefs about need to control thoughts mediated the relationship between schizotypy and self-certainty. In relation to the third hypotheses, parallel mediation models also revealed that negative beliefs about the uncontrollability of thoughts and corresponding danger and cognitive self-consciousness mediated the relationships between total schizotypy and both negative affect and PWB. The parallel mediation models, providing evidence that certain metacognitive beliefs are potentially

contributing to the well-established relationships between schizotypy and cognitive insight, negative affect and PWB.

The finding that greater unusual experiences significantly predicted higher positive beliefs about worry, negative beliefs about need to control thoughts and cognitive self-consciousness; is consistent with the relationship identified in individuals with hallucination and delusional proneness (Larøi & Van der Linden, 2005). Morrison et al., (2001) propose that positive psychosis symptoms are associated with stronger endorsement of positive metacognitive beliefs in the presence of firmly held negative metacognitive beliefs. Therefore, the current findings may have important implications given the suggestion that positive and negative beliefs together are a highly pathological combination, as individuals would be fearful of their intrusive thoughts (negative beliefs) but feel that they must worry to cope, a situation of paradox as this exacerbates distress and contributes to difficulties with mental control (Morrison et al., 2007).

The current study is the first to explore whether multidimensional schizotypy traits other than positive schizotypy are associated with dysfunctional metacognitive beliefs. Extending the prior literature, the current study identified that greater cognitive disorganisation and impulsive non-conformity also predicted higher dysfunctional metacognitive beliefs. The findings that, greater cognitive disorganisation predicted higher negative beliefs about uncontrollability of thoughts and corresponding danger and poorer cognitive confidence, are consistent with relationships observed between cognitive attentional difficulties and metacognitive beliefs in a combined group of individuals with psychotic disorders, ARMS, and individuals with psychotic experiences with no need for care (Brett et al., 2009). It is plausible to suggest that individuals whom experience cognitive slippage and are socially anxious, may lack self-confidence in their perceived cognitive abilities, and beliefs that their thoughts must be controlled to function well. The findings of impulsive non-conformity significantly predicting

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a greater endorsement of negative beliefs about the uncontrollability of thoughts and corresponding danger, negative beliefs about need to control thoughts and a lack of cognitive confidence, is also consistent with previous research that found positive associations between manic symptoms and dysfunctional metacognitive beliefs in individuals with ARMS (Welsh et al., 2014). Therefore, individuals whom experience impulsive antisocial and eccentric behaviours and actions, and a lack of self-control, may worry about their intrusive thoughts.

Unlike the other schizotypy traits, introvertive anhedonia was not a significant predictor of any of the dysfunctional metacognitive belief's domains. These lack of associations were not wholly unexpected given that the S-REF model for psychotic disorders, focuses on positive symptoms of psychosis (Morrison, 2001) and are in line with previous literature that found no associations between metacognitive beliefs and negative symptoms in individuals with ARMS (Barbato et al., 2014).

Overall, the findings provide evidence that differential multidimensional schizotypy traits have a unique contribution to different metacognitive beliefs. This has important implications given the suggestion that dysfunctional metacognitive beliefs are a potential vulnerability marker for transition to psychotic disorders (Barbato et al., 2014) and confirms the potential value of exploring the relationships between metacognitive beliefs and multidimensional schizotypy traits.

The current study is the first to explore the associations between metacognitive beliefs and cognitive insight in a general population sample. Consistent with the OCD literature (Eckini & Eckini, 2016); greater cognitive confidence and cognitive self-consciousness predicted higher self-reflectiveness. Furthermore, in support of the second hypotheses these dysfunctional metacognitive beliefs mediated the relationship between total schizotypy and self-reflectiveness. Unlike the OCD literature, the current study also found that greater negative

beliefs about the uncontrollability of thoughts and corresponding danger also significantly predicted higher self-reflectiveness, mediating the relationship between schizotypy and self-reflectiveness. The current findings providing further support for the "insight paradox" whereby self-reflectiveness may not always be helpful. The S-REF proposes that individuals will respond to unhelpful and intrusive metacognitive beliefs by activating cognitive styles typical of threat focused attention and ineffective coping strategies, including rumination and worry. Therefore, individuals with schizotypy traits may endorse unwanted or distressing intrusions, which calls for an ability to consider a variety of perspectives and explanations for such experiences. A paradox by which reappraising thoughts by being more open to alternative ways and explanations, may be helpful for some, but may also in fact prolong emotion distress for others (Østefjells et al, 2017).

The OCD literature only observed relationships between dysfunctional metacognitive beliefs and the cognitive insight subcomponent-self-reflectiveness (Eckini & Eckini, 2016). However, the current findings demonstrated that greater cognitive self-consciousness and negative beliefs about need to control thoughts significantly predicted higher self-certainty, whilst poorer cognitive confidence predicted lower self-certainty. In addition, these three metacognitive belief dimensions mediated the relationship between total schizotypy and self-certainty. The psychosis literature has only observed the relationship between impaired synthetic metacognition and poor insight (e.g. Lysaker et al., 2011b). However, the results of the current study suggest that more discrete dysfunctional metacognitive beliefs may also be implicated in higher self-certainty. Cognitive self-consciousness and negative beliefs about need to control thoughts, reflects a tendency to focus on one's thought processes. Therefore, it is plausible that a preoccupation in controlling these worrying thoughts may lead to a rigid reasoning style which limits the ability to reappraise and modify experiences. Furthermore, greater cognitive confidence may too be linked with self-certainty as it could result in an overconfidence in one's

own beliefs. Metacognitive beliefs and schizotypy only accounted for small variance in self-certainty, therefore the findings are interpreted with caution. Nevertheless, this study may help inform the psychosis literature of the potential role that metacognitive beliefs play in cognitive insight. Thus, future research may look to explore how metacognitive beliefs are associated with cognitive insight subcomponents in individuals with ARMS and psychotic disorders.

In accordance with the SREF model, greater negative beliefs about the uncontrollability of thoughts and corresponding danger as well as greater cognitive self-consciousness significantly predicted greater negative affect. In support of the third hypotheses, these dysfunctional metacognitive beliefs mediated the relationship between total schizotypy and negative affect, extending the schizotypy/psychosis proneness literature, which has observed that dysfunctional metacognitive beliefs moderated the relationship between non-clinical paranoid ideation and negative affect (Sellers et al., 2018). Sellers et al., (2016) found that psychotic symptoms no longer predicted negative affect when dysfunctional metacognitive beliefs were accounted for in individuals with psychotic disorders. However, on the contrary, the current study found that schizotypy traits remained significant predictors of negative affect when controlling for metacognitive beliefs, which would suggest that there are other potential factors involved in the relationship between schizotypy and negative affect. Overall the findings may suggest that individuals with schizotypy traits may experience intrusive and unhelpful thoughts which could lead to greater distress. This may have important implications giving the suggestion that negative affect may play an important role in the transition to psychotic disorders (Yung et al., 2004; Velthorst et al., 2009). Overall the current study's findings provide evidence that dysfunctional metacognitive beliefs could play an important role in distress across the psychosis continuum.

This is the first study to explore the associations between metacognitive beliefs and PWB in individuals with schizotypy traits. Interestingly, greater cognitive self-consciousness predicted

higher PWB, whereas greater negative beliefs about the uncontrollability of thoughts and corresponding danger significantly predicted lower PWB. Furthermore, both metacognitive beliefs mediated the relationship between total schizotypy and PWB. The current findings providing evidence that differential metacognitive beliefs may be playing a differential role in PWB in individuals with schizotypy traits. The current findings replicate patterns that have been observed in psychotic disorders (Valiente et al., 2012) and individuals with OCD (Barahmand et al., 2014). It may be that greater negative beliefs about the uncontrollability of thoughts and corresponding danger may contribute to a decrease in one's satisfaction and contentment in individuals with schizotypy. On the other hand, a greater tendency to be aware and monitor ones thinking (cognitive self-consciousness) in the absence of other metacognitive beliefs may help maintain a sense of wellness. Importantly, Valiente et al., (2012) propose that within the realm of psychosis, the use of cognitive self-consciousness to regulate wellbeing may have positive effects in the short term, whilst perpetuating a defensive self in the long term.

6.4.1 Implications

Dysfunctional metacognitive beliefs are believed to be a potential vulnerability marker for conversion to psychological disorders (Wells, 2009). Therefore, based on the current study's findings, interventions that modify maladaptive metacognitive beliefs may be beneficial for individuals with schizotypy traits. Metacognitive therapy focuses on developing individuals detached awareness of their thoughts and increasing voluntary control of worry/rumination and unhelpful attentional strategies (Wells, 2009). Early case studies have provided evidence that MCT is promising in the reduction of clinical symptoms in individuals with schizophrenia (Hutton et al., 2014; Morrison et al., 2014), with recent meta analyses also highlighting that MCT is effective for treating anxiety and depression (Normann et al., 2014). The current study indicates that dysfunctional metacognitive beliefs contribute to greater self-reflectiveness, self-

certainty, negative affect and poorer PWB in individuals with schizotypy traits. Consequently, such interventions may potentially reduce the negative consequences that also arise from maladaptive metacognitive beliefs in individuals with schizotypy traits.

6.4.2 Limitations and future research

There are a few limitations, specific to study 3, which should be born in mind. First the cross-sectional nature of the study means caution should be exercised when drawing inferences about causal links between study variables. Second whilst the MCQ is widely used within the psychosis research, it was originally designed to focus on metacognitive beliefs associated with anxiety disorders, therefore these types of metacognitive beliefs may not as specific to the context of psychotic anomalies (Brett et al., 2009). Finally, the study only measured discrete metacognitive beliefs and did not assess more synthetic metacognitive abilities. Therefore, it remains to be seen how more synthetic metacognition may be associated with cognitive insight, negative affect and PWB in individuals with schizotypy traits. Future research may look to investigate the role of dysfunctional metacognitive beliefs and synthetic metacognition, longitudinally in individuals with schizotypy traits, and how it may interact with negative affect, cognitive insight and PWB. Previous schizophrenia research has also found that gamma hyperactivity is associated with impaired synthetic metacognition (Vohs et al., 2015). Therefore, further avenue for future schizotypy research may be to explore how neural systems are associated with metacognitive beliefs.

6.4.3 Conclusion

The unique contribution of this study was two-fold. Where previous studies have only explored the relationship between positive schizotypy and dysfunctional metacognitive beliefs, the current study has identified that dysfunctional metacognitive beliefs are also associated with multidimensional schizotypy traits, with differential relationship observed for each of the four

schizotypy dimensions. Secondly the current study was notable for identifying that the path from schizotypy to self-reflectiveness, self-certainty, negative affect and PWB features dysfunctional metacognitive beliefs. Therefore, providing evidence that patterns observed in psychotic disorders may also be observed in individuals with schizotypy traits from the general population. The current study provided evidence that a lack of cognitive confidence was predicted by greater schizotypy traits (i.e. cognitive disorganisation and impulsive non-conformity). However, it remains unclear whether these beliefs accurately reflect cognitive performance or whether they are over estimates of cognitive impairments. Furthermore, the relationships between schizotypy and cognitive insight subcomponents, negative affect and PWB remained significant after controlling for metacognitive beliefs, therefore it remains to be seen what other factors may be accounting for these established relationships. Consequently, study 4 will look to examine the interrelationships between neurocognition and schizotypy, cognitive insight, negative affect and PWB.

Chapter 7. Study 4: Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and neurocognition.

7.1 Overview

7.1.1 Neurocognition and the psychosis continuum

Neurocognition deficits are suggested to be a core feature of schizophrenia and are central to the manifestation of the pathophysiology of the disorder (Fusar-Poli et al., 2012). The MATRICS Consensus statement for Cognition in schizophrenia indicates there are six relevant cognitive domains: Speed of Processing, Attention/Vigilance, Working Memory, Verbal Learning & Memory, Visual Learning & Memory and Reasoning and Problem Solving (Neuchterlein & Green, 2006).

However, studies examining the relationship between the individual schizotypy dimensions and neurocognitive functioning in non-clinical samples have been inconsistent. Several studies have found that negative schizotypy is associated with poorer speed of processing (Cochrane et al., 2012; Louise et al., 2015; Martín-Santiago et al., 2016), working memory (Karagiannopolou et al., 2016; Zouraki et al., 2016), attention (Louise et al., 2015; Karagiannopolou et al., 2016), visual memory (Gooding & Braun, 2004) and reasoning and problem solving (Louise et al., 2015). Positive schizotypy has also been associated with poorer speed of processing (Martín-Santiago, 2016), working memory (Zouraki et al., 2016), and attention (Kane et al., 2016). Furthermore, disorganised schizotypy has been associated with poorer working memory (Zouraki et al., 2016) and attention (Kane et al, 2016).

On the contrary several studies have found no associations between schizotypy and speed of processing (Korponay et al., 2014; Badcock et al., 2015; Karagiannopolou et al., 2016), working memory (Daly., 2012), attention (Daly, 2012; Korponay et al., 2014), visual or verbal learning and memory (Karagiannopolou et al., 2016), or reasoning and problem solving (Korponay et al., 2014; Karagiannopolou et al., 2016). To complicate the issue further, studies

of subclinical psychosis have even found have found that better performance in the domains of working memory, verbal learning and visual learning are associated with higher levels of subclinical psychotic symptoms in non-clinical samples (Korponay et al., 2014; Gagnon et al., 2018).

One possible explanation for the inconsistent findings is the samples used. Most studies utilising community samples have found poorer neurocognitive abilities in schizotypy (e.g. Martín-Santiago et al., 2016; Zouraki et al., 2016). However, studies utilising university samples have yield inconsistent findings, with some studies finding impairments (e.g. Kane et al., 2016), others reporting no differences (e.g. Xavier et al., 2014) and further studies reporting superior performance in schizotypy (Cohen et al., 2009). Badcock et al., (2015) propose that educational attainment and cognitive resources in university samples may influence these inconsistent findings. Therefore, future research is required to clarify how multidimensional schizotypy traits are related to neurocognitive abilities in university samples.

Further methodological differences may also explain the prior inconsistent findings. For example, differences in neurocognition may arise as a function of how schizotypy is defined i.e. high and low schizotypy groups or correlational studies exploring the relationships with multidimensional schizotypy traits (Chun et al, 2013). Furthermore, the majority of the correlational studies have explored the relationship between neurocognition and traditional schizotypy dimensions i.e. positive, negative and disorganised schizotypy. However, Louise et al., (2015) found that whilst impulsive non-conformity was not associated with traditional neurocognitive measures, it was significantly associated with poorer cognitive control. Therefore, it is important for future research to assess the full range of multidimensional schizotypy traits and their unique associations with neurocognition. Finally, most studies assess specific cognitive domains, with only a small number of studies measuring neurocognition using standardised batteries of cognition (e.g. Cohen et al., 2009; Korponay et al., 2014;

Badcock et al., 2015). Therefore, future research should look to utilise measures that assess the full range of cognitive domains which have typically demonstrated impairments across the psychosis continuum.

Consequently, the current study will explore the relationship between a standardised battery of neurocognitive domains and multidimensional schizotypy traits, utilising a university sample. Based on the previous inconsistent findings, it is expected that neurocognition will be associated with schizotypy traits. However, whether schizotypy is associated with better or poorer neurocognitive abilities remains unclear. Therefore, it is hypothesised that greater schizotypy traits will significantly predict neurocognitive abilities.

7.1.2 The relationship between neurocognition and cognitive insight

Recently, the relationship between cognitive insight and neurocognition in individuals with psychotic disorders has the drawn the interest of researchers. The neuropsychological model for schizophrenia, proposes that a lack of insight into illness is a result of impairments in neurocognitive functioning (Lysaker & Bell, 1994), and this should extend to the cognitive insight construct (Riggs et al., 2010).

In support of this hypothesis, research in psychotic disorders have found that greater self-certainty is associated with poorer verbal memory, visual memory, working memory, and problem solving and reasoning (Lepage et al., 2008; Cooke et al., 2010; Orfei et al., 2010; Engh et al., 2011; Kao et al., 2013). Greater self-certainty has also been linked with poorer cognitive flexibility and set-shifting ability in individuals with ARMS (Ohmuro et al., 2018). In regard to self-reflectiveness, this subcomponent of cognitive insight has been positively associated with verbal learning and memory (Buchy et al., 2009; Poyraz et al., 2016) and problem solving/reasoning in individuals with psychotic disorders (Kao et al., 2013; Gonzalez-Blanch et al., 2014). Interestingly, a recent meta-analyses in psychotic disorders revealed that

neurocognitive abilities were only associated with the cognitive insight subcomponent-self-certainty and not self-reflectiveness (Nair et al., 2014). Therefore, in psychotic disorders neurocognition may be more closely linked to self-certainty than self-reflectiveness. However, it is plausible that the lack of associations between self-reflectiveness and neurocognition in psychotic disorders, may be a consequence of self-certainty diminishing self-reflective abilities. This is supported by research in healthy participants that has found positive associations between self-reflectiveness and problem solving and reasoning, verbal memory and visual memory (Orfei et al., 2011), and research in individuals with bipolar disorder, where higher self-reflectiveness was positively associated with speed of processing, attention, memory, visual learning & problem solving and reasoning (Van Camp et al., 2016).

I am only aware of limited research that has explored the associations between cognitive insight and neurocognition in ARMS (Ohmuro et al., 2018), with no research to date exploring these associations in individuals with schizotypy traits. Therefore, the relationship between neurocognition and the cognitive insight subcomponents-self-reflectiveness and self-certainty does not appear to be conclusively determined across the psychosis continuum. This has important implications given that neurocognition and cognitive insight subcomponents may serve as potential protective and risk factors in psychosis. Study one revealed associations between schizotypy traits and the cognitive insight subcomponents. Therefore, the current study will extend on this by exploring whether neurocognition may play a mediating role in these relationships. Based on the previous literature it is hypothesised that neurocognitive abilities will mediate these relationships.

7.1.3 The relationship between neurocognition and negative affect and wellbeing.

There is a general consensus that neurocognitive impairments are associated with poor functional outcomes in psychotic disorders; however, its associations with negative affect and

wellbeing have remained inconsistent. Exploring the relationships between neurocognition and wellbeing is of great clinical and research importance and may aid the development of effective interventions which could improve the wellbeing and functional outcome of individuals with schizophrenia.

In schizophrenia spectrum disorders, depressive symptoms have been negatively associated with neurocognition (de Raykeer et al., 2019). These findings have also extended to individuals with ARMS (Ohmuro et al., 2015). However, on the contrary, better cognitive performance has also been associated with more depressive symptoms in first episode psychosis (Herniman et al., 2018). In addition, other studies have failed to find associations between depressive symptoms and neurocognitive abilities in psychotic disorders (Jepsen et al., 2013; Ohmuro et al., 2015). There is a well-established link between schizotypy and negative affective states, however, it remains to be seen whether neurocognition contributes to negative affect at the lower end of the psychosis continuum. Based on the previous literature, it is plausible that neurocognitive abilities contribute to the relationship between schizotypy and negative affect. Therefore, it was hypothesised that neurocognitive abilities will mediate these relationships.

The relationship between neurocognition and wellbeing across the psychosis continuum has also remained inconsistent, with the majority of research focusing on measures of quality of life. In psychotic disorders, some studies have found positive associations between neurocognitive abilities and quality of life (Alptekin et al., 2005; Tas et al., 2013), whereas others have found inverse associations between neurocognitive abilities and quality of life (Tolman et al., 2010). This inconsistency is perhaps a consequence of neurocognition differentially tapping into different aspects of quality of life. For example, a meta-analysis found positive associations between neurocognition and objective quality of life, and inverse associations between neurocognition and subjective quality of life (Tolman et al., 2010).

Furthermore, these inconsistent results have extended to the schizotypy literature. Xavier et al., (2015) found associations between poorer neurocognitive abilities and lower subjective quality of life in high schizotypy (Xavier et al., 2015), whereas Chun et al. (2013) found no association between neurocognition and subjective quality of life in high schizotypy. I am unaware of any research that has explored the associations between neurocognition and psychological wellbeing (PWB) measures. However, studies have found that PWB precedes both subjective wellbeing and quality of life (Joshanloo, 2019). Thus, it is plausible that neurocognition will be associated with PWB. A further limitation of the previous schizotypy literature is that is has focused on exploring the relationships between neurocognitive abilities and quality of life in high schizotypy groups. Therefore, it remains unknown whether the relationships between neurocognition and wellbeing could be linked to specific schizotypy traits. The current study will extend the previous literature by exploring the associations between neurocognition and PWB, and whether neurocognition may be contributing to the well-established relationship between schizotypy traits and lower PWB. It is hypothesised that neurocognitive abilities will mediate these relationships.

7.1.4 Study 4 Aims and Hypotheses

The aims of the current study are twofold. First to examine the associations between neurocognitive performance and multidimensional schizotypy traits. Second to explore the contribution of neurocognition to the established relationships between schizotypy and cognitive insight, negative affect and PWB. The hypotheses are as follows:

1) Greater schizotypy traits will significantly predict neurocognitive abilities.

2) Neurocognitive abilities will mediate the relationship between schizotypy and cognitive insight subcomponents- self-reflectiveness and self-certainty.

3) Neurocognitive abilities will mediate the relationship between schizotypy and both negative affect and PWB.
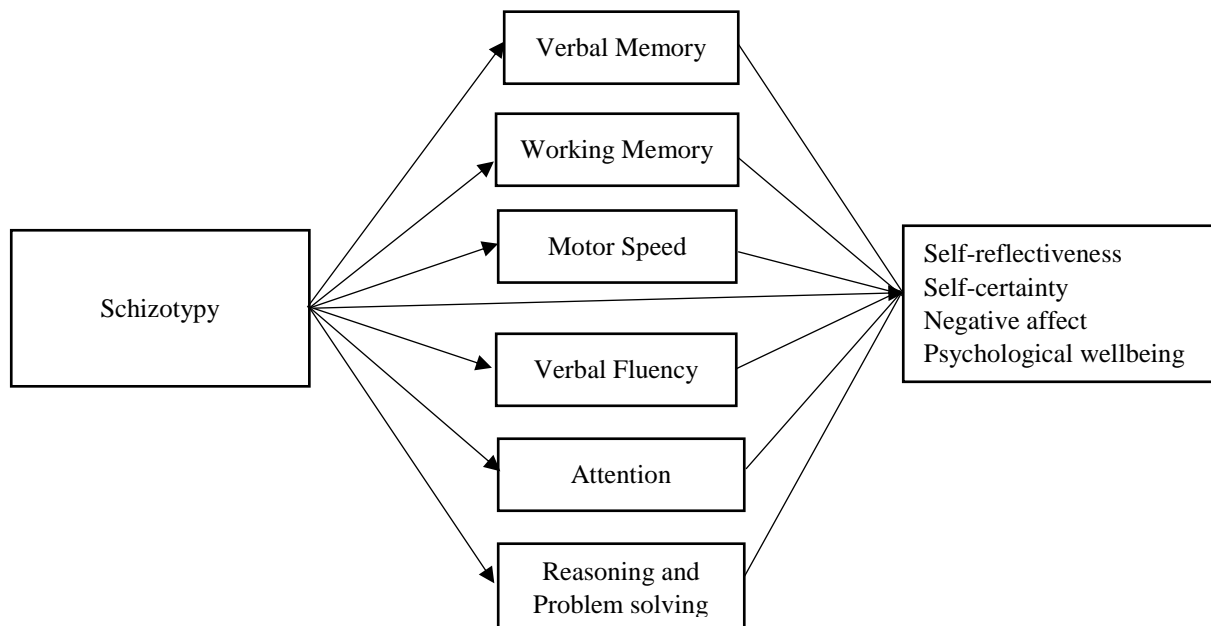
Figure 7.1. The hypothesised parallel mediation model from schizotypy to self-reflectiveness, self-certainty, negative affect and PWB via neurocognitive abilities.

7.2 Methods

7.2.1 Participants

This study used a convenience sample of 175 participants (mean=19.87, SD= 2.39 years) who were predominantly female (82.9%). Participants were 78.3% White, 5.7% Asian, 8% Black/African/Caribbean and 8% other. All participants were university students from Nottingham Trent University.

7.2.2 Psychometric Measures

The Brief assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004). The BACS include assessments of verbal memory, working memory, motor speed, verbal fluency, attention and processing speed and reasoning and problem solving. The sO-LIFE (Mason et

al., 2005), measuring unusual experiences, introvertive anhedonia, cognitive disorganisation, impulsive non-conformity and total schizotypy. The DASS-21 (Lovibond & Lovibond, 1995) utilising the total score to measure negative affect. The BCIS (Beck et al., 2004), measuring the cognitive insight subcomponents- self-reflectiveness and self-certainty. The 54-item Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989), utilising the total score to measure PWB. Refer to chapter 3 for a description of the measures.

7.2.3 Procedure

Participants read an information sheet and provided consent before completing demographics and all abovementioned measures, in a classroom setting. After demographics, the order of administration was counterbalanced regarding whether participants completed the BACS or the psychometric questionnaires first, to reduce order effects and fatigue. All 175 participants responses were included for further analysis.

7.2.4 Missing Data

There were 0.06% missing responses across the current study's measures. There were 2 values missing for the sO-LIFE, 5 values for the DASS-21, and 7 values on the SPWB. Expectation Maximization (EM) algorithm was utilised to maintain the structure of the data in analysis.

7.3 Results

7.3.1 Descriptive Characteristics

Skewness and kurtosis fell within the acceptable range of +/- 2 for all study variables suggesting data was normally distributed (Table 7.1). The current sample's mean scores for the each of the studies variables were visually inspected and compared with previous published studies that have used large community and university samples (Table 7.1). In the current sample, mean scores for the BACS neurocognition domains- verbal memory, verbal fluency,

attention and reasoning and problem solving were within 10% of the means scores of previous normative data from a general population sample (Keefe et al, 2008). However, mean scores on the BACS neurocognition domains- working memory and motor speed were higher in the current study than previous general population samples (Keefe et al, 2008). Furthermore, in the current sample, mean scores on other study variables that were within 10% of mean scores of previous published studies included the BCIS subscales; self-reflectiveness and self-certainty (Warman & Martin, 2006) the SPWB total score (Singleton et al., 2014), the DASS-21 total score (Carrigan & Barkus, 2017), the sO-LIFE total schizotypy score (Dagnall et al., 2016) and the sO-LIFE subscales; unusual experiences and impulsive non-conformity (Fonseca-Pedrero et al., 2015b). In the current sample, the mean scores were higher when compared with previous studies for the sO-LIFE subscales; cognitive disorganisation and introvertive anhedonia (Fonseca-Pedrero et al., 2015b).

Table 7.1. Sample descriptive statistics.

	Mean (SD)	Skewness	Kurtosis	Range	Alpha	Prior published studies Mean (SD)
SO-LIFE						
Total schizotypy	15.23 (6.28)	0.35	0.03	0-35	0.87	14.93 (7.73)
Unusual experiences	3.33 (2.47)	0.76	0.39	0-12	0.86	3.48 (2.76)
Cognitive disorganisation	6.31 (2.80)	-0.05	-0.90	0-11	0.84	5.15 (2.94)
Introvertive anhedonia	2.27 (1.98)	0.89	0.57	0-10	0.78	2.03 (1.86)
Impulsive non-conformity	3.32 (2.08)	0.39	-0.37	0-10	0.75	3.59 (2.11)
BCIS						
Self-reflectiveness	13.71 (3.95)	0.23	0.20	4-27	0.67	13.74 (3.38)
Self-certainty	6.62 (2.77)	0.35	-0.07	1-14	0.62	6.70 (2.71)
DASS-21						
Negative affect	16.88 (12.03)	0.83	-0.03	0-52	0.93	15.54 (11.50)
SPWB-54						
Total PWB	226.45 (36.53)	-0.58	0.41	113-298	0.95	224.64 (28.62)
BACS						
Verbal Memory	42.72 (8.06)	0.13	-0.58	22-63	-	45.7 (9.6)
Working Memory	18.69 (3.04)	0.32	-0.07	11-28	-	21.2 (3.9)
Motor Speed	76.13 (12.32)	-0.30	-0.10	36-100	-	67.8 (15.1)
Verbal Fluency	52.00 (10.84)	0.15	0.11	24-84	-	51.3 (12.2)
Attention and Processing Speed	58.97 (10.70)	0.36	0.50	34-95	-	55.7 (12.6)
Reasoning and Problem Solving	16.98 (2.40)	-0.59	0.55	10-22	-	16.7 (3.6)

7.3.2 Correlations between study variables

Correlations between neurocognitive abilities and the other study variables are presented in Table 7.2. Analyses revealed weak, significant, positive associations between impulsive non-conformity and the cognitive domains-verbal fluency and attention and processing speed. However, contrary to expectations there were non-significant associations between total schizotypy, the schizotypy dimensions; unusual experiences, cognitive disorganisation and

introvertive anhedonia, and all of the cognitive domains. In line with previous literature, weak significant positive associations were also observed between working memory and self-reflectiveness. There were non-significant associations between self-certainty and all of the cognitive domains. Interestingly, significant weak inverse associations were observed between PWB and working memory and attention and processing speed, however non-significant associations were observed between negative affect and cognitive domains.

Regression and mediation analyses were conducted in the other studies within the PhD thesis. However, in the current study, impulsive non-conformity was the only schizotypy dimension to be associated with neurocognition in the current study, and only weak significant associations were observed between neurocognition and self-reflectiveness and PWB. The lack of statistical power that results from this meant no further regression and mediation analyses were conducted. Intercorrelations between the neurocognition domains and correlations between the other study variables are presented in Appendix D, Table D.1 and Table D.2.

Table 7.2. Pearson's correlations between neurocognition domains and schizotypy traits, self-reflectiveness, self-certainty, negative affect and PWB.

	Verbal Memory	Working Memory	Motor Speed	Verbal Fluency	Attention and Processing Speed	Reasoning and Problem Solving
Total schizotypy	0.09	0.11	-0.06	0.10	0.10	0.09
Unusual experiences	0.09	0.06	0.03	0.09	-0.01	0.04
Cognitive disorganisation	0.05	0.13	-0.10	0.01	0.08	0.07
Introvertive anhedonia	0.04	-0.03	-0.09	0.01	0.06	0.12
Impulsive non-conformity	0.05	0.10	0.001	0.19*	0.15*	0.03
Self-reflectiveness	-0.05	0.16*	0.10	0.05	-0.04	-0.003
Self-certainty	0.10	-0.03	0.02	-0.01	0.06	0.10
Negative Affect	-0.03	0.11	-0.03	0.07	0.04	0.10
PWB	-0.05	-0.16*	0.09	-0.10	-0.16*	-0.15

*$p<0.05$

7.4 Discussion

The purpose of current study was twofold. First to examine the associations between 6 neurocognitive domains assessed by the BACS and multidimensional schizotypy traits. Second to explore whether these neurocognitive abilities would contribute to the established relationships between schizotypy and cognitive insight, negative affect and PWB. In relation to the first hypothesis, correlation analyses revealed weak positive associations between impulsive non-conformity and verbal fluency and attention and processing speed. No other schizotypy trait was significantly associated with neurocognitive abilities. The results are consistent with a number of other studies that have reported either enhanced cognitive performance or no difference in cognitive performance in individuals with schizotypy traits. The second aim of the study could be not be examined, due to the lack of associations observed between the study variables in the current study. Therefore, it remains to be seen whether neurocognitive abilities may be contributing to the well-established relationships between schizotypy and cognitive insight, negative affect and PWB. Despite this, correlational analyses revealed positive associations between working memory and self-reflectiveness, extending the previous psychosis, which generally only finds associations between self-certainty and neurocognitive abilities. Furthermore, inverse associations were observed between PWB and working memory and attention and processing speed, thus, extending previous research which found associations between neurocognition and measures of quality of life, across the psychosis continuum.

The current study provides evidence that neurocognition remains intact in individuals with schizotypy traits, consistent with a number of previous studies which found enhanced cognitive performance or no difference in cognitive performance in individuals with schizotypy traits (e.g. Daly, 2012; Korponay et al., 2014; Badcock et al., 2015; Karagiannopolou et al., 2016; Gagnonet et al., 2018). Ettinger et al., (2015) proposed that healthy individuals with schizotypal

personality traits may potentially be able to access compensatory mechanism to achieve intact performance across neurocognitive domains. Therefore, the lack of associations observed between schizotypy and neurocognitive performance suggest that there are potential discontinuities between schizotypy and clinical psychotic disorders, with neurocognitive abilities a potential protective mechanism at the lower end of the psychosis continuum.

It is plausible that the lack of associations found in the current study may also be attributed to all participants being university students. As previously mentioned, a number of studies have found poorer neurocognitive abilities in schizotypy, with the majority of these studies using community samples (e.g., Louise et al., 2015; Martín-Santiago et al., 2016; Zouraki et al., 2016). Therefore, educational attainment and cognitive resources in university students may obscure relationships between schizotypy and neurocognitive abilities (Badcock et al., 2015). Future research utilising community samples may better identify associations between cognitive performance and schizotypy (Aghvinian & Sergi, 2018). In addition, it may be useful to directly compare the associations between schizotypy and neurocognition in a university group and community group, to better understand the schizotypy-neurocognition relationship. In addition, it is possible that schizotypy may be associated with neurocognitive abilities, that are not assessed by the standardised cognitive battery's developed for individuals with psychotic disorders (Chun et al., 2013). For example, Chun et al., (2013) propose that higher-order cognitive abilities may yield more identifiable neurocognitive dysfunctions in individuals with schizotypy traits.

Consistent with previous non-clinical research (Orfei et al., 2011) and bipolar research (Van Camp et al., 2016), the current study found positive associations between self-reflectiveness and working memory. This finding suggests that an individual's ability to consider different perspectives and openness to feedback in order to make thoughtful conclusions, may be reliant on one's ability to remember past information, process new information rapidly and efficiently

and be able to form and follow strategies (Engh et al., 2011). Further support for this comes from brain imaging studies, which found that altered VLPFC functioning is associated with impairments in both working memory and reduced self-reflectiveness in individuals with schizophrenia (Orfei et al, 2012). Unlike the psychosis research, the current study found no associations between self-certainty and cognitive performance. This may suggest that neurocognitive abilities have differential relationships with cognitive insight subcomponents across the psychosis continuum. It is plausible that working memory is a protective mechanism for intact cognitive insight, and it is the diminishing of working memory in combination with reduced cognitive insight that would make one more vulnerable to transitioning to a psychotic disorder.

As previously discussed, I am unaware of any research that has explored the associations between neurocognition and both negative affect and PWB in a general population sample. Correlation analysis showed inverse associations between speed of processing, working memory and PWB, but non-significant associations between neurocognition domains and negative affect. A previous meta-analysis in schizophrenia found that verbal memory and processing speed were inversely associated with subjective quality of life (Tolman et al., 2010). The findings were interpreted as those individuals with psychotic disorders who have better cognitive capacity may have greater insight into their illness, detrimentally impacting on their life satisfaction (Tolman et al., 2010; Kurtz & Tolman, 2011). Within the current study, working memory was also associated with self-reflectiveness, and speed of processing was associated with impulsive non-conformity. Therefore, whilst the current study did not conduct mediation analyses due to only weak associations in the correlation analysis, it is plausible that the association between neurocognitive performance and PWB is due to greater self-reflectiveness and higher impulsive non-conformity. For example, those with higher self-reflective abilities, and greater impulsive nonconformity, who have better cognitive capacity

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may have poorer PWB, and this may be a consequence of having a better understanding of the outside world and one's own schizotypy traits.

7.4.1 Limitations and Future Research

A limitation of the current study was that mediation analyses could not be conducted due to only a small number of weak positive associations between the study variables, and the use of a university sample may have contributed to the lack of findings. It remains to be seen whether neurocognitive abilities could be contributing to the established relationships between schizotypy and cognitive insight, negative affect and PWB in community samples. Therefore, future research may look to explore neurocognitive mediating role in a larger more diverse sample. This in turn could better elucidate whether differences are occurring university samples and community samples.

A further limitation of the current study was only including a standardised cognitive battery developed for individuals with psychotic disorders, and not including additional measures that assess higher-level cognitive abilities such as cognitive control. Cognitive control refers to processes involved in carrying out goal-directed behaviour during interference, and includes dimensions of updating, shifting and inhibition (Steffens et al., 2018). A recent meta-analyses has shown that poorer performance on updating and shifting was significantly associated with positive and negative schizotypy (Steffens et al., 2018). Therefore, future research may look to include tasks that assess cognitive control, alongside standardised cognitive batteries. This may help elucidate whether there are different neurocognitive deficits occurring in individuals with schizotypy traits than the ones tested here.

7.4.2 Conclusions

The unique contribution of the current study was to add to the growing literature attempting to elucidate the relationships between schizotypy and neurocognitive abilities. Second the study

was notable for exploring the associations between neurocognition and cognitive insight, negative affect and PWB in a general population sample. These findings may help inform researchers of the potential relationship between said variables at the lower end of the psychosis continuum. Whilst the current study demonstrated that neurocognition remains intact for individuals with schizotypy traits, it is still unclear whether the related but distinct construct of social cognition also follows a similar pattern, or like individuals with psychotic disorders there are social cognitive deficits which are associated with cognitive insight and poorer wellbeing. Therefore, the final study of the thesis will explore the interplay between schizotypy, social cognition domains, cognitive insight and wellbeing.

Chapter 8. Study 5: Exploring the interplay between schizotypy, cognitive insight, negative affect, psychological wellbeing and social cognition.

8.1 Overview

8.1.1 Social cognition and the psychosis continuum

Individuals with psychosis exhibit impaired social cognition, with the National Institute of Mental Health (NIMH) statement indicating there are four relevant domains: Theory of Mind, Emotion Processing, Social Perception and Attribution Bias/Style (Green et al., 2008). Research suggests these impairments are potentially trait-related vulnerability markers for psychosis (Pinkham et al., 2013). However, the literature focusing on schizotypy traits in the general population has produced inconsistent findings.

The most studied social cognitive domains in schizotypy have been theory of mind and emotion processing. Several studies have consistently found that positive and negative schizotypy is associated with poorer cognitive theory of mind (Pickup, 2006; Barragan et al., 2011; Gooding & Pflum, 2011; Deptula et al., 2015). On the contrary, whilst some studies have found positive and negative schizotypy is associated with poorer affective theory of mind (Henry et al., 2008; Meyer & Shean, 2010; Sacks et al., 2012), others have observed no relationship between affective theory of mind and schizotypy (Gooding et al., 2010; Gooding & Pflum, 2011; Bedwell et al., 2014). Therefore, it remains unclear whether affective theory of mind is impaired in individuals with schizotypy traits.

Furthermore, individuals with high schizotypy have demonstrated impaired emotion processing, in particular, poorer facial emotion perception, when compared to control groups (Williams et al., 2007; Brown & Cohen, 2010; Morrison et al., 2013). However, it remains unclear what schizotypal traits are associated with facial emotion perception. For example, studies have consistently found inverse associations between facial emotion perception and

negative schizotypy (Williams et al., 2007; Abbott & Green, 2013; Abbott & Bryne, 2013; Morrison, Brown & Cohen, 2013). Furthermore, some studies have also reported inverse associations between facial emotion perception and positive schizotypy (Germine & Hooker, 2011; Abbott & Bryne, 2013) and disorganised schizotypy (Germine & Hooker, 2011). On the contrary the associations between facial emotion perception and positive and disorganised schizotypy were not present in other studies (Abbott & Green, 2013).

One study to date has explored social perception in schizotypy. Miller and Lenzenweger (2012) found poorer social perception performance in individuals with high schizotypy compared to a low schizotypy group. Finally, with respect to attribution biases, studies exploring its associations in "healthy populations" have focused on subclinical "paranoia". Several studies have found that nonclinical paranoia is associated with greater levels of perceived hostility and greater blame towards others for ambiguous negative social situations (Combs et al., 2007; Combs et al., 2009).Therefore, it remains to be seen whether attribution biases and social perception are also associated with individual schizotypy dimensions.

It is important to note that the previous schizotypy studies have often narrowly focused on one or two social cognition domains. This study will extend the prior literature, by being the first to multidimensional schizotypy traits relationships with all four social cognition domains, identified as relevant to psychosis. Based on the aforementioned research, it is hypothesised that greater schizotypy traits will significantly predict poorer performance in all four social cognitive domains.

8.1.2 The relationship between social cognition and insight

Social developmentalists have long posited that self-representations are built from experiential learning, reflection and engaging in social interactions; therefore, having intact social cognition abilities, not only aids an individual in understanding the motives of others but is also essential

for own self-reflective abilities and mechanisms (Gallagher & Meltzoff, 1996; Bora et al., 2007). Thus, the relationship between insight and social cognition in individuals with psychotic disorders has begun to draw interest of researchers.

Psychosis research has demonstrated a well-established relationship between social cognitive abilities, specifically, impaired affective and cognitive theory of mind and emotion processing and poor clinical insight (Langdon et al., 2006; Bora et al., 2007; Pousa et al., 2008; Langdon & Ward, 2009; Pijenberg et al., 2013; Vaskin et al., 2013; Bhagyaythi et al., 2014; Konstantakopolous et al., 2014; Ng et al., 2015; Zhang et al., 2016). The associations between social cognition and cognitive insight has received much less attention and narrowly focused on theory of mind, yielding inconsistent results. One study found cogntive theory of mind impairments are associated with poorer composite cognitive insight (Popolo et al., 2016), whereas other studies have found no relationship (Ng et al., 2015; Zhang et al., 2016). I am unaware of any prior research that has explored the relationships between cognitive insight and the social cognitive domains- emotion processing, social perception and attribution bias, nor any research exploring whether social cognitive abilities may be contributing to the established relationship between schizotypy and cognitive insight. Given that social cognitive abilities and cognitive insight subcomponents are potential protective/risk factors in the transition to psychosis, such knowledge would be informative in understanding similarities and disparities across the psychosis continuum. The current study will extend the previous literature by exploring the mediating role of social cognition in the relationship between schizotypy and cognitive insight subcomponents-self-reflectiveness and self-certainty. It is hypothesised that the four social cognition domains will mediate the relationship between schizotypy and the cognitive insight subcomponents-self-reflectiveness and self-certainty.

8.1.3 The relationship between social cognition and negative affect and wellbeing.

There is a general consensus that social cognitive impairments detrimentally impact functional outcomes in psychosis, including greater depression, poorer social functioning and quality of life (Fett et al., 2011; Horan et al., 2012; Irani et al., 2012; Urbach et al., 2013; Buck et al., 2017). However, schizotypy research exploring the relationships between social cognition and functioning has remained sparse and inconsistent with limited research focusing on social functioning and limited social cognitive domains. For example, Jahshan and Sergi (2007) found non-significant associations between social functioning and both theory of mind and facial emotion perception in a high schizotypy group. Furthermore, a more recent study, found that schizotypal traits were negatively correlated with both facial emotion perception and social functioning, however, facial emotion perception did not mediate the relationship between schizotypal traits and social functioning (Statucka & Walder, 2017).

I am unaware of any research to date that has explored social cognitive abilities potential role in the relationship between schizotypy traits and negative affect or PWB. Negative affect and PWB are related to functional outcomes in individuals with psychosis (Aki et al., 2008), and it is hypothesised that impaired social cognition should be associated with distress and wellbeing (Maat et al., 2008). Therefore, the well-established relationship between schizotypy traits and negative affect and PWB may be mediated by social cognitive abilities. Because individuals with schizotypy traits exhibit greater negative affect and poorer PWB irrespective of transition to psychosis, then it is essential to elucidate what factors may be accounting for this relationship.

8.1.4 Study 5 Aims and Hypotheses

The aims of the current study are twofold. First to examine the associations between multidimensional schizotypy traits and the four social cognitive domains- Theory of mind,

emotion processing, social perception and attribution bias, as they are identified as relevant to psychosis. Second to explore whether the established relationships between schizotypy and cognitive insight, negative affect and PWB are accounted for by social cognitive abilities. The hypotheses are as follows:

1) Greater schizotypy traits will significantly predict poorer performance in all four social cognition domains.

2) The four social cognition domains will mediate the relationship between schizotypy and the cognitive insight subcomponents-self-reflectiveness and self-certainty.

3) The four social cognition domains would mediate the relationships between schizotypy and both negative affect and PWB.
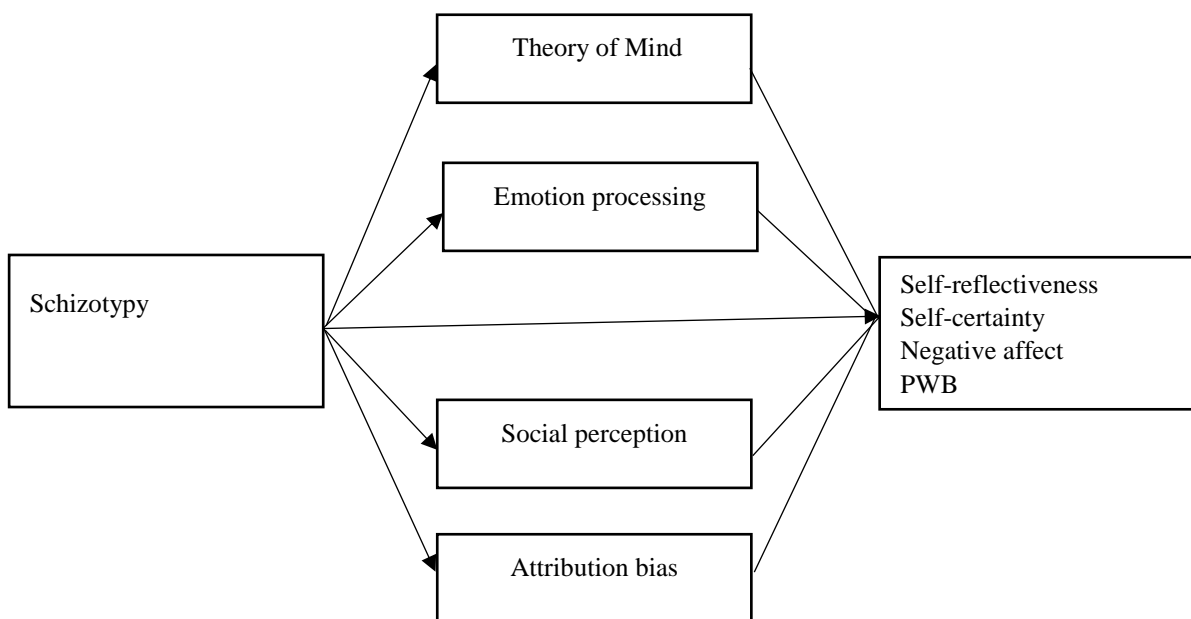
Figure 8.1. The hypothesised parallel mediation models from schizotypy to self-reflectiveness, self-certainty, negative affect and psychological wellbeing via social cognition.

8.2 Methods

8.2.1 Participants

This study used a convenience sample of 209 participants (mean= 21.18, SD=1.27 years) who were predominantly female (79.4%). Participants were 81.6% White, 5.7% Asian, 6.2% Black/African/Caribbean and 1.9% other. In terms of occupation, 85.6% were students, 12.4% employed and 1.9% unemployed.

8.2.2 Measures

The Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al., 2007) is a measure of attribution bias and includes three subscales; hostility bias, aggression bias and blame bias. Only the blame bias subscale for ambiguous situations was utilised as a measure of attribution bias as the other two subscales have weak test-retest reliability and do not provide any additional information beyond the self-report blame scores (Pinkham et al., 2016; Buck et al., 2017). The Penn Emotion Recognition Test (ER-40; Gur et al., 2002) assesses facial affect recognition ability, with the total accuracy score used to measure emotion processing. The abbreviated Relationships Across Domains (RAD; Sergi et al., 2009) assesses how individuals use their implicit knowledge to understand social relations and to be able to make inferences about the behaviour of others in future interactions. The total number of correct responses was used to measure social perception. The Reading the Mind in the Eyes task (Eyes; Baron-Cohen et al., 2001) assesses an individuals' ability to identify mental states of others based on the eye region of the face, with the total score used to measure affective Theory of Mind. The sO-LIFE (Mason et al., 2005), was used to measure unusual experiences, introvertive anhedonia, cognitive disorganisation, impulsive non-conformity and total schizotypy. The DASS-21 (Lovibond & Lovibond, 1995) utilising the total score to measure negative affect. The BCIS (Beck et al., 2004), measuring the cognitive insight subcomponents- self-reflectiveness and

self-certainty. The 54-item Ryff scales of Psychological wellbeing (SPWB; Ryff, 1989), utilising the total score to measure PWB. Refer to chapter 3 for a detailed description of the measures.

8.2.3 Procedure

Participants read an information sheet and provided consent before completing demographics and all above mentioned measures in Qualtrics software. After demographics, measures were presented to participants in a randomised order. There were 219 initial responses recorded. However, 10 responses were excluded for missing one or more of the studies measures. After exclusion criteria the final sample of 209 participants were included for further analysis.

8.2.4 Missing Data

There was 0.26% of missing values across study fives measures. There were 8 values missing for the sO-LIFE, 5 values for the BCIS, 4 values for the DASS-21, 8 values for the AIHQ, 57 values for the Eyes task, 9 values for the ER-40 and 23 values for the SPWB-54. An Expectation Maximization (EM) algorithm was utilised to maintain the structure of the data in the analysis.

8.3 Results

8.3.1 Descriptive Characteristics

Box plots revealed two extreme outliers for the ER-40, which were excluded prior to any subsequent analyses. Skewness and kurtosis fell within the acceptable range +/- 2 for all study variables, suggesting data was normally distributed (Table 8.1). The mean scores for each of the study variables were visually inspected and compared with previous published studies that have used large community and university samples (Table 8.1). In the current sample, mean scores were within 10% of the mean scores of previously published studies for the four social

cognition domains- (AIHQ, Combs et al., 2007; ER-40, Pelletier et al., 2013; Eyes, Pinkham et al., 2015; RAD, Pinkham et al., 2015). Furthermore, in the current sample, mean scores on other study variables that were within 10% of mean scores of previous published studies included the BCIS subscales; self-reflectiveness and self-certainty (Warman & Martin, 2006) the SPWB total score (Singleton et al., 2014) and the sO-LIFE subscale; unusual experiences (Fonseca-Pedrero et al., 2015b). In the current sample, the mean scores were higher when compared with previous studies for the sO-LIFE total schizotypy score (Dagnall et al., 2016), the sO-LIFE subscales; cognitive disorganisation, introvertive anhedonia and impulsive non-conformity (Fonseca-Pedrero et al., 2015b) and the mean DASS-21 total score (Carrigan & Barkus, 2017).

Table 8.1. Sample descriptive statistics.

	Mean (SD)	Skewness	Kurtosis	Sample Range	Alpha	Normative Values Mean (SD)
SO-LIFE						
Total schizotypy	17.46 (7.59)	0.02	-0.53	1-37	0.92	14.93 (7.73)
Unusual experiences	3.87 (2.64)	0.40	-0.34	0-12	0.86	3.48 (2.76)
Cognitive disorganisation	6.32 (3.23)	-0.25	-0.99	0-11	0.91	5.15 (2.94)
Introvertive anhedonia	3.20 (2.40)	0.59	-0.37	0-10	0.81	2.03 (1.86)
Impulsive non-conformity	4.07 (2.90)	0.01	-0.90	0-9	0.75	3.59 (2.11)
BCIS						
Self-reflectiveness	13.81 (4.38)	0.31	-0.46	5-25	0.73	13.74 (3.38)
Self-certainty	7.12 (2.90)	0.16	-0.18	1-15	0.61	6.70 (2.71)
DASS-21						
Negative affect	22.18 (13.27)	0.38	-0.69	0-54	0.93	15.54 (11.50)
SPWB-54						
Total PWB	212.72 (37.27)	-0.09	-0.13	104-299	0.95	224.64 (28.62)
AIHQ-Ambiguous Situations						
Blame-bias	2.85 (0.72)	0.28	0.35	1-5.27	0.88	3.0 (0.67)
RAD						
Social perception	31.84 (5.09)	-0.58	-0.33	17-40	0.70	29.87 (5.21)
Eyes						
Theory of Mind	24.84 (4.76)	-0.60	0.39	8-35	0.70	23.50 (4.71)
ER-40						
Emotion processing	32.93 (3.29)	-0.75	0.86	21-40	0.66	33.90 (2.80)

8.3.2 Correlations between study variables

Correlations between social cognitive abilities and the other study variables are presented in Table 8.2. Analyses revealed that blame-bias was significantly correlated with all variables except introvertive anhedonia. These associations ranged from weak to moderate *(r=0.15, p<0.05* to *r= -0.35, p<0.001)*. Contrary to expectations there were non-significant associations between the social cognition domains- Theory of Mind, emotion processing and social

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perception and the other variables, with the exception of a significant, weak, inverse association between social perception and self-certainty. Intercorrelations between the social cognition domains and correlations between the other study variables are presented in Appendix E, Table E.1 and Table E.2.

Table 8.2. Pearson's correlations between social cognition and schizotypy traits, self-reflectiveness, self-certainty, negative affect and PWB.

	Blame-bias	Social perception	Theory of Mind	Emotion processing
Total schizotypy	0.30***	-0.01	-0.09	-0.07
Unusual experiences	0.15*	-0.03	-0.08	-0.09
Cognitive disorganisation	0.34***	0.02	-0.07	-0.03
Introvertive anhedonia	0.09	-0.02	-0.10	-0.05
Impulsive non-conformity	0.24**	0.01	0.001	-0.05
Self-reflectiveness	0.33***	0.09	-0.04	0.05
Self-certainty	0.17*	-0.16*	-0.12	-0.08
Negative affect	0.32***	-0.02	-0.04	-0.04
PWB	-0.35***	0.01	0.12	-0.04

$*p<0.05$, $**p<0.01$ ***, $p<0.001$

8.3.3 Schizotypy and Social cognitive abilities

To explore the first hypothesis, one regression model was run to explore the unique contribution of each of the four schizotypy dimensions (simultaneous predictor variables) on blame-bias (outcome variable) (Table 8.3). Regression analyses was not conducted for the other social cognition domains as they were not significantly correlated with any schizotypy dimension. Multicollinearity assumptions were met for the regression model. Greater cognitive disorganisation significantly predicted greater blame-bias. No other schizotypy

dimensions significantly predicted blame-bias. The regression model accounted for 12%

variance in blame-bias.

Table 8.3. Simultaneous regression between schizotypy dimensions (predictors) and blame-bias (outcome variable).

Outcome	Blame-bias	
	B (SE)	β
Unusual experiences	-0.01 (0.02)	-0.05
Cognitive disorganisation	0.07*** (0.02)	0.31
Introvertive anhedonia	-0.004 (0.02)	-0.01
Impulsive non-conformity	0.04 (0.02)	0.12
F	7.14***	
R^2	0.12	

*$p<0.05$, **$p<0.01$, ***$p<0.001$

8.3.4 Mediation

To explore the second and third hypotheses, mediation analyses was conducted with the

schizotypy total score as the predictor variable, blame-bias as the mediator and self-

reflectiveness, self-certainty, negative affect and PWB outcome variables. The other social

cognitive domains were not included as mediator variables, due to a lack of association with

schizotypy dimensions. The current study uses the total schizotypy score, as the predictor

variable for the sake of clarity, as using individual schizotypy subscales as predictor variables

would have resulted in 16 mediation models. Secondary analyses were run using the four

schizotypy dimensions as the predictor variables, with significant indirect effects largely

comparable with the final study analyses, with the exception of the mediation models where

introvertive anhedonia was the predictor variable (Appendix E, Figure E.1, Figure E.2 and

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Table E.3). This was not unexpected given that introvertive anhedonia was not significantly correlated with the mediating variable blame-bias.

8.3.4.1 Schizotypy, blame-bias and cognitive insight.

Mediation model (Figure 8.2a) revealed a significant total effect with greater total schizotypy significantly predicting higher self-reflectiveness (=0.21, $p<0.001$), accounting for 13% variance. Mediation model (Figure 8.2b) revealed a non-significant total effect between total schizotypy and self-certainty (= -0.01, $p>0.05$). Furthermore, greater blame-bias significantly predicted both higher self-reflectiveness and self-certainty. In support of the second hypotheses, significant indirect effects showed that blame-bias significantly mediated the relationship between total schizotypy and both self-reflectiveness (a_1, b_1; =0.04, 95% CI= 0.02, 0.07) and self-certainty (a_1, b_1; =0.02, 95% CI= 0.01, 0.04). The direct effect of total schizotypy after controlling for the mediator was significant for self-reflectiveness (=0.21, $p<0.001$) and non-significant for self-certainty (= -0.03, $p>0.05$). The mediation models explained 19% variance in self-reflectiveness and 3% variance in self-certainty, demonstrating that the inclusion of blame-bias added little extra variance to the cognitive insight subcomponents.

(a)

(b)
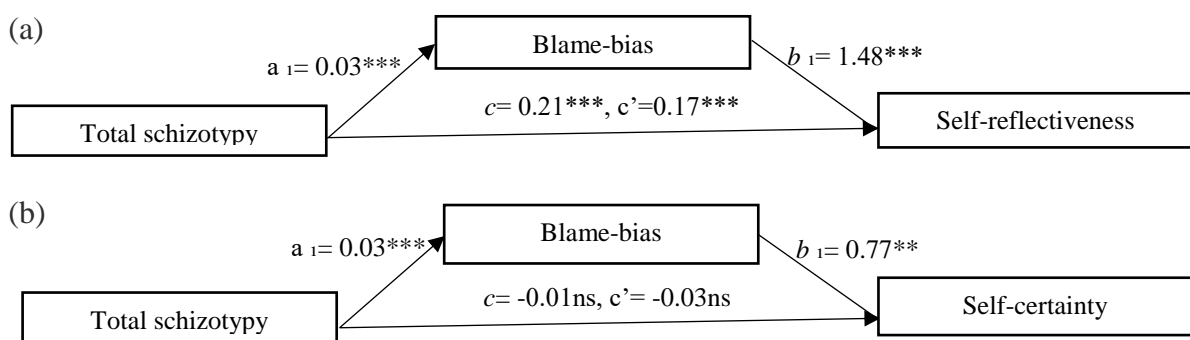
Figure 8.2. Regression path from total schizotypy to self-reflectiveness (a) and self-certainty (b) mediated by blame-bias. a=effect of total schizotypy on blame bias. b= effect of blame-bias on self-reflectiveness and self-certainty. c= total effect of total schizotypy on self-reflectiveness and self-certainty. c'= direct effect of total schizotypy on the outcome variables. Values are unstandardised coefficients. *$p<0.05$, **$p<0.01$, *** $p<0.001$, ns $p>0.05$

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8.3.4.2 Schizotypy, blame-bias, negative affect and PWB.

Mediation model (Figures 8.3a-8.3b) revealed significant total effects with greater total schizotypy significantly predicting higher negative affect (=1.17, *p*<0.001) and lower PWB (= -2.78, *p*<0.001). Total schizotypy accounted for 45% variance in negative affect and 32% variance in PWB. Furthermore, greater blame-bias significantly predicted higher negative affect and lower PWB. In support of the third hypotheses, significant indirect effects showed that blame-bias significantly mediated the relationships between total schizotypy and both negative affect (a_1, b_1; =0.07, 95% CI= 0.02, 0.13) and PWB (a_1, b_1; = -0.29, 95% C.I. -0.52, -0.11). Total schizotypy remained a significant predictor of both negative affect (=1.10, *p*<0.001) and PWB (= -2.49, *p*<0.001) after controlling for the mediator. Mediation analyses revealed that total schizotypy and blame-bias together accounted for 46% variance in negative affect and 36% variance in PWB, demonstrating that the inclusion of blame-bias added little extra variance to the outcome variables.
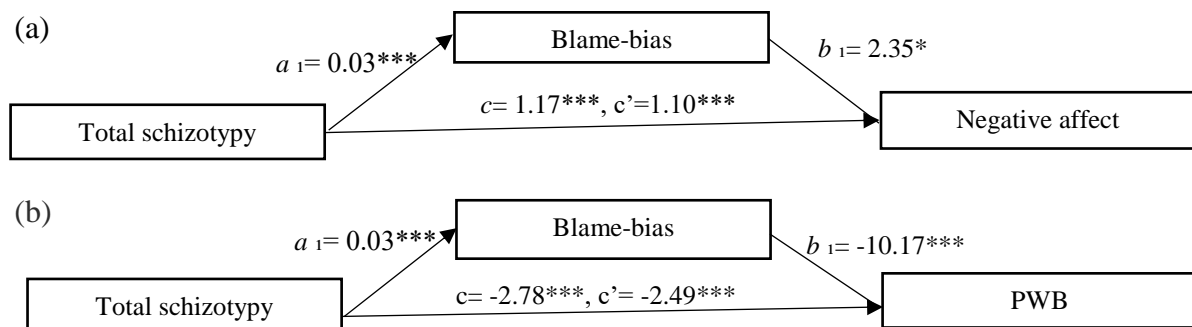
Figure 8.3. Regression path from total schizotypy to negative affect (a) and PWB (b) mediated by blame-bias. a=effect of total schizotypy on blame bias. b= effect of blame-bias on negative affect and PWB. c= total effect of total schizotypy on negative affect and PWB. c'= direct effect of total schizotypy on negative affect and PWB. Values are unstandardised coefficients. *p*<0.05, **p*<0.01, *** *p*< 0.001, ns *p*> 0.05

8.4 Discussion

The purpose of the current study was twofold. First to build on past schizotypy research by exploring the unique contribution of multidimensional schizotypy traits to the multifaceted construct of social cognition. Second to extend our understanding of the link between schizotypy and cognitive insight subcomponents, negative affect and PWB, by exploring the mediating role of social cognitive abilities. In relation to the first hypothesis; correlation analyses showed that total schizotypy and all schizotypy dimensions, with the exception of introvertive anhedonia, were positively associated with blame-bias. The regression analyses revealed that cognitive disorganisation was the only significant schizotypy dimension to predict greater blame-bias, providing evidence that attribution bias is associated with schizotypy traits. Unexpectedly, multidimensional schizotypy traits were not correlated with measures of theory of mind, social perception or emotion processing. In support of the second hypothesis; greater blame-bias predicted higher self-reflectiveness and self-certainty and mediated the relationships between total schizotypy and both cognitive insight subcomponents. In support of the third hypothesis, greater blame-bias significantly predicted higher negative affect and lower PWB and mediated the relationships between total schizotypy and both negative affect and PWB. The study provides evidence that specific social cognitive biases may play a specific role in the established relationships between schizotypy and cognitive insight, negative affect and PWB, replicating similar patterns observed in individuals with psychosis.

The finding that greater cognitive disorganisation significantly predicted greater blame-bias towards others for ambiguous negative social situations is in line with recent research identifying positive associations between cognitive symptoms and blame-bias in first episode psychosis (Buck et al., 2017), and extends the previous literature observing the link between

non-clinical paranoia and blame-bias (Combs et al., 2007; Combs et al., 2009). The current study findings demonstrate the importance of exploring broad schizotypy traits, in particular cognitive disorganisation, when examining their associations with social cognitive abilities. The findings have important implications, given the suggestion that disorganisation/cognitive dimensions are associated with transition to psychosis in at risk mental states (Demjaha et al., 2010). It is plausible that individuals with greater schizotypy traits, particularly ones of social anxiety and cognitive difficulties, have difficulties interpreting social interactions and potentially report greater blame towards others for ambiguous negative social situations. Whilst the schizotypy dimensions; unusual experiences and impulsive non-conformity were positively associated with blame-bias, they did not significantly predict blame-bias when holding other schizotypy traits constant. This suggests that schizotypy traits such as unusual experiences are only associated with attribution biases when there are elevated levels of other schizotypy traits.

Against expectations, the current study found that affective theory of mind, emotion processing and social perception were not significantly associated with multidimensional schizotypy traits. The lack of association observed between affective theory of mind and schizotypy adds to a plethora of mixed findings. Whilst a number of studies have reported associations between affective theory of mind and schizotypy (Henry et al., 2008; Meyer & Shean, 2010; Sacks et al., 2012), the current findings are consistent with studies that have observed no relationship between affective theory of mind and schizotypy (Gooding et al., 2010; Gooding & Pflum, 2011; Bedwell et al., 2014). Therefore, affective theory of mind, reliant on mental-state "decoding", potentially remains intact at the lower end of the psychosis continuum. In addition, the non-significant associations between schizotypy traits and emotion processing, is at odds with a plethora of prior studies which have identified relationships between poorer facial emotion perception and greater schizotypy traits (Williams et al., 2007; Brown & Cohen, 2010; Germine & Hooker, 2011; Abbott & Bryne, 2013; Abbott & Green, 2013; Morrison et al.,

2013). The aforementioned research used the SPQ-B to assess schizotypy traits, whilst the current study used the sO-LIFE. Therefore, it is plausible that differences in social cognitive abilities may arise as a function of how schizotypy is defined.

A factor analysis study of social cognition was conducted in individuals with schizophrenia spectrum disorders, which revealed separate two separate factors (Buck et al., 2017). One factor was labelled social cognitive skills and included theory of mind, emotion processing and social perception and the other factor was labelled hostile attribution bias style and included the subscales of the AIHQ (Buck et al., 2017). Taken this into consideration, the findings of the current study may provide evidence that social cognitive skills remain intact in individuals with schizotypy, whilst hostile attribution style may be occurring across the psychosis continuum. Furthermore, McCleery and colleagues (2012) propose that there may be a "threshold effect" whereby schizotypy traits are only associated with social cognitive abilities after one surpasses a symptomatic threshold. Thus, theory of mind, emotion processing and social perception abilities may be protective mechanisms at the lower end of the psychosis continuum.

An alternative explanation for the lack of relationships observed between schizotypy and theory of mind, emotion processing and social perception may be a consequence of utilising a predominantly university sample. As mentioned in the previous empirical chapter, educational attainment and cognitive resources may obscure relationships between schizotypy and neurocognition, in university students (Badcock et al., 2015). Therefore, it is plausible that educational attainment and cognitive resources may also be influencing the relationships between schizotypy traits and social cognitive abilities. Furthermore, future research may look to assess differential outcomes for the "gold standard" measures of theory of mind, emotion processing and social perception. For example, the current study did not put a time constraint on how quickly the social cognitive tasks needed to be completed. A previous study found that slower reaction time in facial affect recognition was associated with greater schizotypy, on the

other hand this relationship was not observed for the accuracy of facial affect recognition (Brown & Cohen, 2010). Therefore, individuals with greater schizotypy may have intact social cognitive skills, however, it may take them longer to come to the correct conclusions.

The second aim of the study was to explore whether social cognitive abilities mediated the relationship between schizotypy and cognitive insight. Notably, the current study found that blame-bias mediated the relationship between schizotypy and both self-reflectiveness and self-certainty. This extends the psychosis literature, which has only explored associations between theory of mind and cognitive insight in psychosis (Ng et al., 2015; Popolo et al., 2016; Zhang et al., 2016). Overall the results suggest that individuals with schizotypy traits who blame others for ambiguous negative situations have the self-reflective abilities to consider that these beliefs could be false but are over confident in their abilities to reappraise and modify such experiences. These findings are of importance given the suggestion that social cognitive biases and greater self-certainty are vulnerability markers and greater self-reflectiveness a potential protective against the transition to psychosis. There was not a direct relationship between schizotypy and self-certainty in the current study, which is inconsistent with the four other empirical chapters of the current thesis. Therefore, the mediation analysis and explanations regarding self-certainty should be interpreted with caution.

The current study found an inverse association between social perception and self-certainty. Whilst the relationship between social perception and cognitive insight has previously been unexplored, this fits with the suggestion that the ability to identify, decode and utilise social cues is of great importance for our own self-reflective abilities and mechanisms (Bora et al., 2007). The current study found no association between theory of mind and cognitive insight, which is inconsistent with previous psychosis studies (Popolo et al., 2016). Popolo et al., (2016) used a measure of cognitive theory of mind, whereas the current study used a measure of affective theory of mind. A recent imaging study found that affective and cognitive theory of

mind have different neural correlates (Schlaffke et al., 2015). Therefore, cognitive theory of mind may be more closely related to cognitive insight than affective theory of mind. Future research may look to explore the associations between cognitive theory of mind and cognitive insight in individuals with schizotypy traits. Overall the current study helps inform the psychosis literature regarding the potential role that social cognitive abilities may play in cognitive insight. Future research may look to explore how the four social cognitive domains are associated with cognitive insight subcomponents in individuals who are at clinical risk of psychosis and individuals with psychotic disorders.

Finally, mediation analyses revealed that the well-established relationships between schizotypy and both negative affect and PWB may be partially explained by hostile blame biases. This is consistent with the psychosis research, which has identified that a greater tendency to blame others for ambiguous negative situations is significantly related to both emotional distress and discomfort (Fett et al., 2011; Buck et al., 2017) and poorer functional outcomes (Buck et al., 2016). Furthermore, it extends the schizotypy literature, which found that schizotypal traits were negatively correlated with both facial emotion perception and social functioning (Statucka & Walder, 2017). The results suggest that individuals with greater schizotypy traits, who have a greater tendency to blame others for negative ambiguous situations, find social situations emotionally distressing, in turn impacting detrimentally on their satisfaction or contentment with certain elements of their life. Overall, the results suggest attribution biases are playing a role in important outcomes across the psychosis continuum.

Correlation analysis revealed no associations between the social cognitive domains; emotion processing, theory of mind or social perception, and negative affect or PWB. Intuitively, it has been hypothesised that impaired social cognition should negatively affect psychological well-being in individuals with schizophrenia (Maat et al., 2008). However, the lack of associations between these specific social cognitive domains and negative affect and PWB in the current

study may be a consequence of non-significant associations between these social cognitive domains and multidimensional schizotypy traits. As previously mentioned, it could be that these social cognitive domains are only impaired in individuals who have reached a symptomatic threshold, and it is only at this threshold where social cognitive abilities would detrimentally impact on one's wellbeing (McCleery et al., 2012).

8.4.1 Implications

Given the current study findings, individuals with schizotypy traits may benefit from interventions which modify hostile social cognitive biases. The understanding social situations (USS) training was designed for individuals with schizophrenia spectrum disorders and consists of modules targeting aspects of theory of mind and attributional style (Fizdon et al., 2017). Fizdon et al., (2017) found that individuals with schizophrenia spectrum disorders significantly improved on measures of AIHQ-Blame Bias after undertaking the understanding social situations training. Thus, given the current study findings, individuals with schizotypy traits may benefit from interventions such as USS. This may help improve outcomes in individuals with schizotypy traits, such as psychological distress/negative affect and wellbeing as well as reducing hostile biases in social situations.

8.4.2 Limitations and future research

The current study examined a broad array of social cognitive domains using "gold standard" measures for schizophrenia. However, the findings revealed non-significant associations between accuracy scores for emotion processing, social perception and affective theory of mind. Therefore, as previously mentioned, future research should look to explore alternative outcomes of these "gold standard" measures such as reaction time and ratings of confidence in accuracy of responses, to explore how these social cognitive domains may be related with schizotypy traits. In addition, future research should look at exploring whether subjective social

cognitive complaints are associated with schizotypy. This may provide a greater indication as to whether there is a potential disjunction between schizotypy and subjective and objective measures of social cognition. Alternatively, future research may look to employ social cognitive tasks that resemble real world social skills, such as role-play tasks or video-based measures (Miller & Lenzenweger, 2012). A further limitation of the current study was that blame-bias only accounted for a small proportion of additional variance in the cognitive insight subcomponents, negative affect and PWB, therefore findings and explanations are interpreted with caution.

8.4.3 Conclusion

The unique contribution of this study was two-fold. First, the study extends most schizotypy research which has narrowly focused on one or two social cognition domains, by exploring whether the multifaceted social cognition construct relevant to psychosis, is also related to schizotypy traits. The study identified that hostile attributional blame-biases are associated with multidimensional schizotypy traits. Relationships were not found between schizotypy and affective theory of mind, emotion processing and social perception. Second, the current study identified that the established path from schizotypy to cognitive insight, negative affect and PWB features hostile attributional blame-biases, replicating similar patterns observed in psychotic disorders.

Chapter 9. General Discussion

The fully dimensional model of schizotypy represents a range of personality traits that are continuously distributed across the general population (Claridge, 1997). The fully dimensional model proposes that schizotypy can represent sources of healthy variation, but also have the potential for predisposition to psychotic disorders (Claridge, 1997). Therefore, schizotypy represents a useful construct for exploring the psychosis continuum, allowing researchers to investigate relationships with potential risk and protective factors, enabling greater understanding of the commonalities and differences between schizotypy and psychotic disorders (Barrantes-Vidal et al., 2015).

The overarching aim of this thesis was to explore the complex interplay of schizotypy with a host of risk factors and adverse outcomes associated with psychotic disorders. Cognitive insight, negative affective states, and poor functioning have all been suggested to be potential risk factors for transition to psychotic disorders. Furthermore, there is evidence that higher levels of the cognitive insight subcomponent self-reflectiveness may be a protective factor in preventing the transition to psychosis. However, there is also evidence that higher self-reflectiveness is not always psychologically healthier, as research has found that is has been associated with greater negative affect and poorer wellbeing in individuals with psychotic disorders (i.e. the insight paradox). Despite these findings, there has been limited research exploring the associations between schizotypy and cognitive insight, as well as the contribution of the cognitive insight subcomponent-self-reflectiveness to the well-established relationship between schizotypy traits and wellbeing. Therefore, this thesis (study one) began by exploring the relationships between multidimensional schizotypy traits and the cognitive insight subcomponents (self-reflectiveness and self-certainty). Furthermore, exploring the insight paradox in terms of whether the link between higher self-reflectiveness and negative affect

could be contributing to the well-established relationship between greater schizotypy traits and poorer psychological wellbeing (PWB).

Additionally, it is important to understand factors that may be a contribution or a consequence of the relationship between schizotypy traits and cognitive insight, negative affect and PWB. It is suggested that dysfunctional metacognitive beliefs and impairments in neurocognition and social cognition are potential risk factors for transition to psychosis. Furthermore, self-stigma has been found to be a significant adverse outcome in psychotic disorders. These four key factors have also been associated with negative affect, wellbeing and cognitive insight in psychotic disorders. However, research exploring the associations between these four factors and schizotypy has remained limited or inconsistent. Additionally, there is limited research exploring how these factors may be implicated in the relationships between schizotypy and cognitive insight, negative affect and PWB. Therefore, studies two to five extended the prior literature; first by exploring the associations between schizotypy dimensions and self-stigma, metacognitive beliefs, neurocognition and social cognition. Second, exploring whether these variables were either contributing to the relationships between schizotypy traits and cognitive insight, negative affect and PWB, or whether they were an outcome of these relationships.

9.1 Overview of findings

Study one examined the associations between multidimensional schizotypy traits and cognitive insight subcomponents- self-reflectiveness and self-certainty. Additionally, the study examined whether the well-established relationship between schizotypy and PWB could be accounted for by higher self-reflectiveness and negative affect. Broadly consistent with the original hypotheses, greater unusual experiences and cognitive disorganisation significantly predicted higher self-reflectiveness; greater unusual experiences and impulsive non-conformity also significantly predicted higher self-certainty, whereas greater cognitive disorganisation

significantly predicted lower self-certainty. On the contrary, introvertive anhedonia was not a significant predictor of either cognitive insight subcomponent. Furthermore, the hypothesised serial mediation model was supported, with the pathway from greater schizotypy traits to lower psychological wellbeing mediated by self-reflectiveness and negative affect in serial. The findings suggest that there are unique and differential relationships between individual schizotypy traits and the cognitive insight subcomponents. The findings extend the previous literature focused on self-certainty or on specific schizotypy features i.e. delusional proneness (Warman & Martin, 2006; Sacks et al., 2012) and provide evidence that the "insight paradox" is occurring across the psychosis continuum.

Self-stigma is an adverse outcome in individuals with psychotic disorders, however there is limited research exploring schizotypy and self-stigma. Study two is the first to explore the associations between schizotypy and self-stigma of seeking psychological help. The associations between multidimensional schizotypy traits and self-stigma for seeking psychological help were examined. The study also examined whether cognitive insight, negative affect and PWB mediated the relationship between schizotypy and self-stigma for seeking psychological help. Results indicated that all four schizotypy traits were positively associated with self-stigma for seeking psychological help, however in contrast to expectations, only cognitive disorganisation was a significant predictor of greater self-stigma towards seeking psychological help. Furthermore, PWB mediated the relationships between all four schizotypy traits and self-stigma of seeking psychological help. Self-certainty mediated the relationships between unusual experiences and impulsive non-conformity and self-stigma of seeking psychological help. The findings suggest that individuals with greater schizotypy traits who are not particularly content or satisfied with elements of their life, and are overconfident in the accuracy of their beliefs, would view seeking help as a threat to their self-esteem and self-confidence.

Study three explored the associations between dysfunctional metacognitive beliefs and multidimensional schizotypy traits and examined whether dysfunctional metacognitive beliefs mediated the relationships between schizotypy traits and cognitive insight subcomponents, negative affect and PWB. Broadly consistent with the original hypotheses, greater unusual experiences and impulsive non-conformity significantly predicted greater negative beliefs about the need to control thoughts. Greater cognitive disorganisation and impulsive non-conformity also significantly predicted a lack of cognitive confidence, and greater negative beliefs about the uncontrollability of thoughts and corresponding danger. Furthermore, unusual experiences were the only schizotypy trait to significantly predict greater positive beliefs about worry and cognitive self-consciousness. Against expectations, introvertive anhedonia was not a significant predictor of any metacognitive belief. These findings extend the previous literature which focused on features of positive schizotypy and metacognitive beliefs, by identifying unique relationships between individual schizotypy traits and differential metacognitive beliefs. The results of the study also revealed that dysfunctional metacognitive beliefs (cognitive confidence, cognitive self-consciousness and negative beliefs about the uncontrollability of thoughts and corresponding danger) mediated the relationship between schizotypy and self-reflectiveness. Cognitive confidence, cognitive self-consciousness and negative beliefs about need to control thoughts mediated the relationship between schizotypy and self-certainty. Finally, cognitive self-consciousness and negative beliefs about need to control thoughts mediated the relationships between schizotypy and both negative affect and PWB. Study three is the first to explore dysfunctional metacognitive beliefs mediating role in the relationships between schizotypy and cognitive insight, negative affect and PWB.

Study four examined the associations between multidimensional schizotypy and a battery of neurocognitive domains. Furthermore, the study examined whether neurocognition mediated the relationship between schizotypy and cognitive insight, negative affect and PWB. Against

expectations, only weak positive associations were found between impulsive non-conformity and the cognitive domains-verbal fluency and attention and processing speed. Mediation analyses was not conducted, however weak associations were observed between working memory and self-reflectiveness, and working memory, attention and speed of processing and PWB. The study extended previous literature by measuring a variety of neurocognitive domains, in an attempt to explore their associations with schizotypy, cognitive insight and wellbeing. However, the findings add to a plethora of inconsistent previous research exploring associations between schizotypy and neurocognition.

In study five, the associations between four social cognition domains and multidimensional schizotypy traits were examined. Additionally, social cognitions contribution to the relationships between schizotypy and cognitive insight, negative affect and PWB was explored. Attribution bias (i.e. hostile blame bias) was positively associated with all four schizotypy traits, however only greater cognitive disorganisation significantly predicted greater blame bias. The findings extend the previous literature which has focused on subclinical paranoia and attribution bias. Furthermore, blame bias mediated the relationships between schizotypy and the cognitive insight subcomponents, negative affect and PWB. To my knowledge this is the first study to explore attribution biases mediating role in the relationships between schizotypy and cognitive insight, negative affect and PWB. Additionally, it extends the psychosis literature, which has predominantly focused on exploring associations between theory of mind and cognitive insight. Against hypotheses, theory of mind, emotion processing and relationship perception were not associated with schizotypy traits.

9.2 Implications

9.2.1 Theoretical implications

Holistically, this thesis has identified that there are both commonalities and differences between schizotypy and psychotic disorders, whilst providing a detailed complex integration of these factors, which may better inform the psychosis continuum literature.

In common with psychotic disorders and at-risk mental states, the current thesis found that multidimensional schizotypy traits were associated with negative affect, PWB, cognitive insight subcomponents, self-stigma, maladaptive metacognitive beliefs and hostile blame biases. The majority of the aforementioned factors have only been previously investigated in relation to specific schizotypy features i.e. delusional proneness or subclinical paranoia, however the current findings suggest these associations extend to multidimensional schizotypy traits. Therefore, the current findings have important implications, whereby these factors and their associations with schizotypy warrant further investigation.

In contrast to the psychosis literature, the current thesis found that schizotypy traits were not associated with neurocognition or the social cognition domains- theory of mind, emotion processing and social perception. The latter findings may imply that there are certain compensatory or protective factors in individuals with schizotypy traits, particularly regarding objective measures of cognition and social cognition. Interestingly, a recent proposition suggests there is a potential subjective-objective disjunction in schizotypy (Cohen et al., 2017). Cohen and colleagues (2017) suggest that this disjunction in schizotypy may be underpinned by dysfunctions in systems which underly reasoning and self-evaluation. More simply individuals with higher schizotypy present with a negative appraisal of themselves and their experiences based on just a small number of salient experiences despite there being objective evidence to the contrary. Evidence from the current thesis which would support this notion

comes from study three and study five which found that whilst schizotypy traits predicted a subjective lack of cognitive confidence, no associations were observed between objective measures of neurocognition and schizotypy. Therefore, future schizotypy research may look to explore both subjective and objective measures (e.g. subjective cognitive complaints and objective neurocognitive performance or subjective and objective quality of life). Furthermore, future research should explore factors that may be underpinning this potential discrepancy (e.g. reasoning biases). This may provide a better understanding of the subjective-objective disjunction in schizotypy research and may have important implications for understanding the neurobiological basis of schizophrenia (Cohen et al., 2017).

The majority of previous schizotypy research has most commonly observed relationships positive and negative schizotypy traits and factors such as neurocognition, social cognition and wellbeing. However, the current thesis found that cognitive disorganisation was the most frequent significant predictor of outcome variables across studies one to five, which was often over and above the other schizotypy traits. This may suggest that schizotypy research should pay greater attention to cognitive disorganisation and support for this comes from research employing network analysis. For example, a recent study found that disorganised features are a central network, which may predict elevated unusual experiences, introvertive anhedonia and impulsive non-conformity and vice versa (Polner et al., 2018). This has important implications given that a combination of elevated schizotypy is associated with the worst outcomes (Barrantes Vidal et al. 2010).

 It is also important to mention that multiple regression analyses in the current thesis revealed that introvertive anhedonia was not a significant predictor of any outcome measures. This was somewhat unexpected, given that previous research has found that negative schizotypy is associated with self-certainty, neurocognition and social cognition (e.g. Gooding & Pflum, 2011; Sacks et al., 2012; Zouraki et al., 2016). A strength of the current thesis was that it

explored each individual schizotypy traits unique contribution to outcome variables, whilst holding the other schizotypy traits constant. The mean scores for introvertive anhedonia were lower than the other schizotypy dimensions across all five of the thesis' studies, however, despite this introvertive anhedonia scores were comparable with previous published studies (Fonseca-Pedrero et al., 2015b). Therefore, the current thesis findings suggest that introvertive anhedonia is only associated with factors such as metacognitive beliefs and social cognition, when individuals also experience higher levels of other schizotypy traits.

In psychotic disorders, emerging evidence has found that metacognition, neurocognition, social cognition, and self-stigma are associated with cognitive insight (Riggs et al., 2010; Van Camp et al., 2017). To my knowledge, this thesis is the first to explore how these aforementioned factors could either contribute to the relationship between schizotypy and cognitive insight or are an outcome of this relationship. The results of the thesis revealed that dysfunctional metacognitive beliefs and hostile blame biases mediated the relationship between schizotypy and both cognitive insight subcomponents. Self-certainty also mediated the relationship between schizotypy and self-stigma for seeking help. The mediating role of neurocognition was not explored in the current thesis, however, associations were found between working memory and self-reflectiveness. The findings of the thesis overall provide evidence that the relationships between the aforementioned factors and cognitive insight may be occurring across the psychosis continuum. The current thesis explored cognitive insights associations with discrete metacognitive beliefs, self-stigma of seeking help and a variety of social cognitive and neurocognitive domains. On the contrary, research in psychotic disorders, have focused on more synthetic metacognition, self-stigma of having a mental illness and the specific social cognition domain- theory of mind. Therefore, given the suggestion that dysfunctional metacognitive beliefs, social cognitive impairments and cognitive insight are potential vulnerability markers for transition to psychotic disorders, the findings of the current thesis

may help inform the psychosis literature of the potential benefit to exploring the relationships between cognitive insight and dysfunctional metacognitive beliefs and other social cognitive biases.

The findings of the current thesis also provide evidence that the model of cognitive insight and its underpinnings is complex. Warman & Martin (2006) suggest individuals who have lower self-reflectiveness and higher self-certainty would be at particular risk for developing psychosis, and that higher self-reflectiveness has the potential to be a protective factor in preventing the transition to psychotic disorders. In the current thesis, unusual experiences significantly predicted both higher self-reflectiveness and self-certainty, which would support the suggestion that higher self-reflectiveness is a potential protective factor. However, researchers propose that higher self-reflectiveness can also be seen as a paradox as whilst it has the potential to be a protective factor, it is also associated with greater negative affect and lower wellbeing in psychotic disorders. The findings of the thesis extend this insight paradox to schizotypy, as the relationship between greater schizotypy and lower wellbeing was mediated by higher self-reflectiveness and negative affect in serial.

Furthermore, studies in psychotic disorders have shown that impairments in neurocognition, social cognition and metacognition are associated with lower cognitive insight (i.e. lower self-reflectiveness and higher self-certainty (e.g. Popolo et al., 2016; Poyraz et al., 2016; Mahour et al., 2018). Similar to these studies, the current thesis showed that the relationship between greater schizotypy traits and higher self-certainty (i.e. lower cognitive insight) was mediated by maladaptive metacognitive beliefs and hostile blame biases. However, disparate with this suggestion, maladaptive metacognitive beliefs and hostile blame biases also mediated the relationship between greater schizotypy and higher self-reflectiveness (i.e. higher cognitive insight).

Finally, it is important to note that schizotypy dimensions accounted for more variance in self-reflectiveness than they did for self-certainty, with dysfunctional metacognitive beliefs and hostile blame biases also accounting for more variance in the relationship between schizotypy and self-reflectiveness than they did for the relationship between schizotypy and self-certainty. Therefore, taking the overall findings of the thesis into consideration, I would argue that higher self-reflectiveness is perhaps not as helpful in individuals with greater schizotypy traits and less of a protective factor than previously suggested.

9.2.2 Practical implications

The previous research has identified that negative affective states and poorer functioning are potential risk factors for transitioning to psychotic disorders (Yung et al., 2004). In the current thesis, schizotypy was found to be related to negative affect and PWB directly, and indirectly via higher self-reflectiveness, greater maladaptive metacognitive beliefs, and greater hostile blame bias. Therefore, the findings of this thesis can inform the schizotypy research of the potential factors and mechanisms that contribute to distress and poorer wellbeing in individuals with schizotypy personality traits. Furthermore, it provides evidence that individuals with greater schizotypy traits may benefit from interventions which help alleviate distress and improve wellbeing. I acknowledge that the majority of people with elevated schizotypy traits would not be visible to be targeted for interventions. Therefore, interventions that could be provided to young adults in general may be a useful way for targeting individuals with elevated schizotypy traits. For example, psychoeducation workshops could be provided to university or college students, in an attempt to better educate young people about low-level psychotic symptoms. Such workshops could reduce the negative consequences that arise from both the catastrophising of psychotic experiences and the ruminative aspects of greater self-reflectiveness, in individuals with greater schizotypy traits. Interventions that also reduce one's self stigma towards mental health and seeking help should also be provided to young adults, as

individuals with greater schizotypy traits may come to a possible critical juncture in the future (i.e. seeking mental health services). Finally, other interventions may be more suitable to those who are help seeking and are distressed by their experiences i.e. at-risk mental states, rather than young adults in general. For example, Metacognitive training that focuses on increasing voluntary control of worry/rumination and unhelpful attentional strategies (Wells, 2009) and understanding social situations training (Fizdon et al., 2017) which modify hostile social cognitive biases, may be beneficial for reducing dysfunctional metacognitive beliefs and blame-bias and reduce the negative consequences that arise from these beliefs.

9.3 Limitations and Future Research

Specific limitations and directions for future research are discussed in each of the empirical chapters. This section will discuss general limitations and recommendations for future research in terms of the overall thesis.

Firstly, the cross-sectional nature of the thesis means that findings should be interpreted as associational and caution should be exercised when drawing inferences about causal links between the study variables. Furthermore, as mentioned in the methods chapter, a limitation to the correlation approach adopted in the current thesis, was that this approach does not take into consideration that individuals may be simultaneously scoring highly on more than one schizotypy dimension (Barrantes-Vidal et al., 2010). However, an overarching aim of this thesis was to better understand how differential schizotypy traits are related with a range of emotional, cognitive and psychological factors. This was of particular importance given that the exploration of the factors within the current thesis, has been limited in previous schizotypy research. Therefore, the findings of the current thesis may help better inform the schizotypy research of the differential relationships that may be observed in respect to the individual schizotypy traits. For example, the findings of the current thesis provide a greater theoretical

insight into what differences may be expected if future researchers were to explore differences in emotional, cognitive and psychological factors across schizotypy clusters.

Furthermore, the current study did not assess whether individuals had a diagnosis of psychiatric or neurological conditions. Whilst this has the potential to obscure potential relationships and introduce error variance (Mason, 2014) it is a limitation that can also be aimed at much of the current schizotypy research. In addition, the current thesis attempted to recruit a more diverse community sample of individuals aged 18-30 years old. However, across all 5 studies, the majority of participants were female and university students. This was not wholly unexpected given that a large proportion of 18-30-year olds are in higher education, however, it does limit the generalizability of the current thesis findings. It is important to note that the fully dimensional model of schizotypy implies meaningful variance associated with schizotypy across the continuum, can be measured in university samples (Kwapil & Barrantes-Vidal, 2014). Use of university samples has been considered a conservative approach to assessing schizotypy and psychosis risk in research as these individuals are expected to have a host of protective factors. Therefore, any significant findings observed, encourage research to extend to broader community samples as well integrating with high risk research studies (Kwapil & Barrantes-Vidal, 2014).

Combined, the findings of the current thesis, demonstrate how known risk factors for psychosis may be linked in individuals with schizotypy traits. Based on these findings, and the current thesis's limitations, future research may benefit from employing both cluster analysis and longitudinal research designs. This may help researchers better understand how risk factors such as neurocognition, metacognition and social cognition, negative affect and cognitive insight interact across the psychosis continuum. Specific questions that may come out of this thesis include:

- What is the longitudinal trajectory of negative affective states, cognitive insight, neurocognition, social cognition and metacognition in individuals with schizotypy traits?

- How do negative affective states, cognitive insight, neurocognition, social cognition and metacognition interact overtime in individuals with schizotypy traits?

- How do negative affective states, cognitive insight, neurocognition, social cognition and metacognition differ across schizotypy clusters?

Furthermore, there is a growing consensus that neurocognition, social cognition and metacognition are related but distinct constructs in psychotic disorders (Sergi et al., 2007; Kukla & Lysaker, 2019). More specifically, research has also found that social cognition mediated the relationship between neurocognition and functioning in individuals with schizophrenia (Bell et al., 2008). The current thesis did not explore how these factors were related with one another. However, based on the aforementioned schizophrenia research, future studies may look to examine the interplay of neurocognition, social cognition and metacognition in schizotypy.

9.4 Conclusions

In summary, this thesis examined the complex interplay of schizotypy traits and risk factors, and adverse outcomes identified for psychosis, in the form of cognitive insight, negative affect, PWB, metacognitive beliefs, neurocognition, social cognition and self-stigma for seeking psychological help. The findings of the thesis highlight the relevance of schizotypy traits as contributors to cognitive insight, negative affect, PWB, metacognitive beliefs, attributional biases and self-stigma of seeking psychological help. Furthermore, providing evidence that factors contributing to cognitive insight and wellbeing in individuals with psychotic disorders, may also be occurring in individuals with schizotypy traits. Combined, the findings of the thesis

not only provide additional evidence for the hypothesised continuity between schizotypy and schizophrenia spectrum disorders, but also provides a more coherent understanding of how these risk factors may be interacting in individuals with schizotypy traits. Finally, the lack of associations observed between schizotypy and objective measures of neurocognition and social cognition suggest there is a potential disjunction between subjective and objective measures in individuals with schizotypy. Consideration of how emotional, cognitive and psychological risk factors studied within the current thesis are associated with different schizotypy profiles, and how these risk factors may interact overtime, may provide greater insights into the developmental trajectory of psychotic disorders.

References

Abbott, G. R., & Byrne, L. K. (2012). Schizotypy and subjective well-being in university students. *Psychiatry Research*, *196*(1), 154-156.

Abbott, G. R., & Green, M. J. (2013). Facial affect recognition and schizotypal personality characteristics. *Early Intervention in Psychiatry*, *7*(1), 58-63.

Abbott, G. R., Do, M., & Byrne, L. K. (2012a). Diminished subjective wellbeing in schizotypy is more than just negative affect. *Personality and Individual Differences*, *52*(8), 914-918.

Abbott, G., & Byrne, L. K. (2013). Schizotypal traits are associated with poorer identification of emotions from dynamic stimuli. *Psychiatry Research*, *207*(1), 40-44.

Abbott, R. A., Ploubidis, G. B., Huppert, F. A., Kuh, D., Wadsworth, M. E., & Croudace, T. J. (2006). Psychometric evaluation and predictive validity of Ryff's psychological well-being items in a UK birth cohort sample of women. *Health and Quality of Life Outcomes*, *4*(1), 76.

Addington, J., Liu, L., Perkins, D. O., Carrion, R. E., Keefe, R. S., & Woods, S. W. (2016). The role of cognition and social functioning as predictors in the transition to psychosis for youth with attenuated psychotic symptoms. *Schizophrenia Bulletin*, *43*(1), 57-63.

Addington, J., Saeedi, H., & Addington, D. (2005). The course of cognitive functioning in first episode psychosis: changes over time and impact on outcome. *Schizophrenia Research*, *78*(1), 35-43.

Aghvinian, M., & Sergi, M. J. (2018). Social functioning impairments in schizotypy when social cognition and neurocognition are not impaired. *Schizophrenia Research: Cognition*, *14*, 7-13.

Aki, H., Tomotake, M., Kaneda, Y., Iga, J. I., Kinouchi, S., Shibuya-Tayoshi, S., ... & Yamauchi, K. (2008). Subjective and objective quality of life, levels of life skills, and their clinical determinants in outpatients with schizophrenia. *Psychiatry Research*, *158*(1), 19-25.

Alptekin, K., Akvardar, Y., Akdede, B. B. K., Dumlu, K., Işık, D., Pirinçci, F., ... & Kitiş, A. (2005). Is quality of life associated with cognitive impairment in

schizophrenia?. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *29*(2), 239-244.

Ambady, N., Hallahan, M., & Rosenthal, R. (1995). On judging and being judged accurately in zero-acquaintance situations. *Journal of Personality and Social Psychology*, *69*(3), 518-523.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders (3rd ed. rev.).* Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (5th ed).* Washington, DC: American Psychiatric Association.

An, S. K., Kang, J. I., Park, J. Y., Kim, K. R., Lee, S. Y., & Lee, E. (2010). Attribution bias in ultra-high risk for psychosis and first-episode schizophrenia. *Schizophrenia Research*, *118*(1-3), 54-61.

Austin, S. F., Mors, O., Nordentoft, M., Hjorthøj, C. R., Secher, R. G., Hesse, M., ... & Wells, A. (2015). Schizophrenia and metacognition: An investigation of course of illness and metacognitive beliefs within a first episode psychosis. *Cognitive Therapy and Research*, *39*(1), 61-69.

Badcock, J. C., Clark, M. L., Pedruzzi, R. A., Morgan, V. A., & Jablensky, A. (2015). Intact speed of processing in a community-based sample of adults with high schizotypy: a marker of reduced psychosis risk?. *Psychiatry Research*, *228*(3), 531-537.

Bang, M., Kim, K. R., Song, Y. Y., Baek, S., Lee, E., & An, S. K. (2015). Neurocognitive impairments in individuals at ultra-high risk for psychosis: who will really convert?. *Australian & New Zealand Journal of Psychiatry*, *49*(5), 462-470.

Barahmand, U., Tavakolian, E., & Alaei, S. (2014). Association of Metacognitive Beliefs, Obsessive Beliefs and Symptom Severity With Quality of Life in Obsessive–Compulsive Patients. *Archives of Psychiatric Nursing*, *28*(5), 345-351.

Barbato, M., Liu, L., Penn, D. L., Keefe, R. S., Perkins, D. O., Woods, S. W., & Addington, J. (2013). Social cognition as a mediator between neurocognition and functional outcome in individuals at clinical high risk for psychosis. *Schizophrenia Research*, *150*(2-3), 542-546.

Barbato, M., Penn, D. L., Perkins, D. O., Woods, S. W., Liu, L., & Addington, J. (2014). Metacognitive functioning in individuals at clinical high risk for psychosis. *Behavioural and Cognitive Psychotherapy*, *42*(5), 526-534.

Bardhoshi, G., Duncan, K., & Erford, B. T. (2016). Psychometric meta-analysis of the English version of the Beck Anxiety Inventory. *Journal of Counseling & Development*, *94*(3), 356-373.

Barkl, S. J., Lah, S., Harris, A. W., & Williams, L. M. (2014). Facial emotion identification in early-onset and first-episode psychosis: a systematic review with meta-analysis. *Schizophrenia Research*, *159*(1), 62-69.

Barkus, E., Stirling, J., French, P., Morrison, A., Bentall, R., & Lewis, S. (2010). Distress and metacognition in psychosis prone individuals: comparing high schizotypy to the at-risk mental state. *The Journal of Nervous and Mental Disease*, *198*(2), 99-104.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182.

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(2), 241-251.

Barragan, M., Laurens, K. R., Navarro, J. B., & Obiols, J. E. (2011). 'Theory of Mind', psychotic-like experiences and psychometric schizotypy in adolescents from the general population. *Psychiatry Research*, *186*(2-3), 225-231.

Barrantes-Vidal, N., Chun, C. A., Myin-Germeys, I., & Kwapil, T. R. (2013). Psychometric schizotypy predicts psychotic-like, paranoid, and negative symptoms in daily life. *Journal of Abnormal Psychology*, *122*(4), 1077-1087.

Barrantes-Vidal, N., Fañanás, L., Rosa, A., Caparrós, B., Riba, M. D., & Obiols, J. E. (2003). Neurocognitive, behavioural and neurodevelopmental correlates of schizotypy clusters in adolescents from the general population. *Schizophrenia Research*, *61*(2-3), 293-302.

Barrantes-Vidal, N., Grant, P., & Kwapil, T. R. (2015). The role of schizotypy in the study of the etiology of schizophrenia spectrum disorders. *Schizophrenia Bulletin*, *41*(2), S408-S416.

Barrantes-Vidal, N., Lewandowski, K. E., & Kwapil, T. R. (2010). Psychopathology, social adjustment and personality correlates of schizotypy clusters in a large nonclinical sample. *Schizophrenia Research*, *122*(1-3), 219-225.

Barron, D., Furnham, A., Weis, L., Morgan, K. D., Towell, T., & Swami, V. (2018). The relationship between schizotypal facets and conspiracist beliefs via cognitive processes. *Psychiatry Research*, *259*, 15-20.

Barron, D., Swami, V., Towell, T., Hutchinson, G., & Morgan, K. D. (2015). Examination of the factor structure of the Schizotypal Personality Questionnaire among British and Trinidadian adults. *BioMed Research International*, *2015*.

Beck, A. T., & Steer, R. A. (1990). *Manual for the Beck Anxiety Inventory*. San Antonio, TX: Psychological Corporation.

Beck, A. T., & Warman, D. M. (2004). Cognitive insight: theory and assessment. In X. Amador. & A.S. David (Eds.), *Insight and psychosis: Awareness of illness in schizophrenia and related disorders*, (2nd ed., pp. 79-87). New York, NY: Oxford University Press.

Beck, A. T., Baruch, E., Balter, J. M., Steer, R. A., & Warman, D. M. (2004). A new instrument for measuring insight: the Beck Cognitive Insight Scale. *Schizophrenia Research*, *68*(2-3), 319-329.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for Beck Depression Inventory II*. San Antonio, TX: Psychological Corporation.

Bedwell, J. S., Compton, M. T., Jentsch, F. G., Deptula, A. E., Goulding, S. M., & Tone, E. B. (2014). Latent factor modeling of four schizotypy dimensions with theory of mind and empathy. *PloS ONE*, *9*(11), e113853.

Bell, M., Tsang, H. W., Greig, T. C., & Bryson, G. J. (2008). Neurocognition, social cognition, perceived social discomfort, and vocational outcomes in schizophrenia. *Schizophrenia Bulletin*, *35*(4), 738-747.

Belvederi Murri, M., Amore, M., Calcagno, P., Respino, M., Marozzi, V., Masotti, M., ... & Maj, M. (2016). The "insight paradox" in schizophrenia: magnitude, moderators and mediators of the association between insight and depression. *Schizophrenia Bulletin*, *42*(5), 1225-1233.

Bentall, R. P., Claridge, G. S., & Slade, P. D. (1989). The multidimensional nature of schizotypal traits: A factor analytic study with normal subjects. *British Journal of Clinical Psychology*, *28*(4), 363-375.

Bhagyavathi, H. D., Mehta, U. M., & Thirthalli, J. (2014). The relationship between empathy, emotion processing and clinical insight in remitted schizophrenia patients. *European Archives of Psychiatry and Clinical Neuroscience*, *264*(6), 551-553.

Birchwood, M., Mason, R., MacMillan, F., & Healy, J. (1993). Depression, demoralization and control over psychotic illness: a comparison of depressed and non-depressed patients with a chronic psychosis. *Psychological Medicine*, *23*(2), 387-395.

Bismark, A. W., Thomas, M. L., Tarasenko, M., Shiluk, A. L., Rackelmann, S. Y., Young, J. W., & Light, G. A. (2018). Reverse translated and gold standard continuous performance tests predict global cognitive performance in schizophrenia. *Translational Psychiatry*, *8*(80), 1-8.

Bjorkquist, O. A., Olsen, E. K., Nelson, B. D., & Herbener, E. S. (2016). Altered amygdala-prefrontal connectivity during emotion perception in schizophrenia. *Schizophrenia Research*, *175*(1), 35-41.

Bora, E. (2015). Neurodevelopmental origin of cognitive impairment in schizophrenia. *Psychological Medicine*, *45*(1), 1-9.

Bora, E., & Pantelis, C. (2013). Theory of mind impairments in first-episode psychosis, individuals at ultra-high risk for psychosis and in first-degree relatives of schizophrenia: systematic review and meta-analysis. *Schizophrenia Research*, *144*(1-3), 31-36.

Bora, E., & Pantelis, C. (2015). Meta-analysis of cognitive impairment in first-episode bipolar disorder: comparison with first-episode schizophrenia and healthy controls. *Schizophrenia Bulletin*, *41*(5), 1095-1104.

Bora, E., Erkan, A., Kayahan, B., & Veznedaroglu, B. (2007). Cognitive insight and acute psychosis in schizophrenia. *Psychiatry and Clinical Neurosciences*, *61*(6), 634-639.

Bora, E., Lin, A., Wood, S. J., Yung, A. R., McGorry, P. D., & Pantelis, C. (2014). Cognitive deficits in youth with familial and clinical high risk to psychosis: a systematic review and meta-analysis. *Acta Psychiatrica Scandinavica*, *130*(1), 1-15.

Bora, E., Sehitoglu, G., Aslier, M., Atabay, I., & Veznedaroglu, B. (2007). Theory of mind and unawareness of illness in schizophrenia. *European Archives of Psychiatry and Clinical Neuroscience*, *257*(2), 104-111.

Bora, E., Yalincetin, B., Akdede, B. B., & Alptekin, K. (2018). Duration of untreated psychosis and neurocognition in first-episode psychosis: a meta-analysis. *Schizophrenia Research*, *193*, 3-10.

Bora, E., Yucel, M., & Pantelis, C. (2009). Theory of mind impairment in schizophrenia: meta-analysis. *Schizophrenia Research*, *109*(1-3), 1-9.

Bortolon, C., Larøi, F., Stephan, Y., Capdevielle, D., Yazbek, H., Boulenger, J. P., ... & Raffard, S. (2014). Further insight into the role of metacognitive beliefs in schizophrenia and OCD patients: testing a mediation model. *Psychiatry Research*, *220*(1-2), 698-701.

Bottesi, G., Ghisi, M., Altoè, G., Conforti, E., Melli, G., & Sica, C. (2015). The Italian version of the Depression Anxiety Stress Scales-21: Factor structure and psychometric properties on community and clinical samples. *Comprehensive Psychiatry*, *60*, 170-181.

Boyd, J. E., Otilingam, P. G., & DeForge, B. R. (2014). Brief version of the Internalized Stigma of Mental Illness (ISMI) scale: Psychometric properties and relationship to depression, self esteem, recovery orientation, empowerment, and perceived devaluation and discrimination. *Psychiatric Rehabilitation Journal*, *37*(1), 17-23.

Brébion, G., Amador, X., Smith, M., Malaspina, D., Sharif, Z., & Gorman, J. M. (2000). Depression, psychomotor retardation, negative symptoms, and memory in schizophrenia. *Neuropsychiatry, Neuropsychology, & Behavioral Neurology, 13*(3), 177-183.

Brébion, G., Smith, M. J., Amador, X., Malaspina, D., & Gorman, J. M. (1997). Clinical correlates of memory in schizophrenia: differential links between depression, positive and negative symptoms, and two types of memory impairment. *American Journal of Psychiatry*, *154*(11), 1538-1543.

Brekke, J. S., Kohrt, B., & Green, M. F. (2001). Neuropsychological functioning as a moderator of the relationship between psychosocial functioning and the subjective experience of self and life in schizophrenia. *Schizophrenia Bulletin*, *27*(4), 697-708.

Brenner, K., Schmitz, N., Pawliuk, N., Fathalli, F., Joober, R., Ciampi, A., & King, S. (2007). Validation of the English and French versions of the Community Assessment of Psychic Experiences (CAPE) with a Montreal community sample. *Schizophrenia Research*, *95*(1-3), 86-95.

Brett, C. M. C., Johns, L. C., Peters, E. P., & McGuire, P. K. (2009). The role of metacognitive beliefs in determining the impact of anomalous experiences: a comparison of help-seeking and non-help-seeking groups of people experiencing psychotic-like anomalies. *Psychological Medicine*, *39*(6), 939-950.

Bright, M., Parker, S., French, P., Fowler, D., Gumley, A., Morrison, A. P., ... & Wells, A. (2018). Metacognitive beliefs as psychological predictors of social functioning: An investigation with young people at risk of psychosis. *Psychiatry Research*, *262*, 520-526.

Brissos, S., Dias, V. V., Carita, A. I., & Martinez-Arán, A. (2008). Quality of life in bipolar type I disorder and schizophrenia in remission: clinical and neurocognitive correlates. *Psychiatry Research*, *160*(1), 55-62.

Brohan, E., Elgie, R., Sartorius, N., Thornicroft, G., & GAMIAN-Europe Study Group. (2010). Self-stigma, empowerment and perceived discrimination among people with schizophrenia in 14 European countries: the GAMIAN-Europe study. *Schizophrenia Research*, *122*(1-3), 232-238.

Brown, L. A., & Cohen, A. S. (2010). Facial emotion recognition in schizotypy: the role of accuracy and social cognitive bias. *Journal of the International Neuropsychological Society*, *16*(3), 474-483.

Browne, J., Penn, D. L., Meyer-Kalos, P. S., Mueser, K. T., Estroff, S. E., Brunette, M. F., ... & Robinson, D. G. (2017). Psychological well-being and mental health recovery in the NIMH RAISE early treatment program. *Schizophrenia Research*, *185*, 167-172.

Brüne, M. (2005). "Theory of mind" in schizophrenia: a review of the literature. *Schizophrenia Bulletin*, *31*(1), 21-42.

Bruno, N., Sachs, N., Demily, C., Franck, N., & Pacherie, E. (2012). Delusions and metacognition in patients with schizophrenia. *Cognitive Neuropsychiatry*, *17*(1), 1-18.

Bryson, G., Bell, M., & Lysaker, P. (1997). Affect recognition in schizophrenia: a function of global impairment or a specific cognitive deficit. *Psychiatry Research*, *71*(2), 105-113.

Buchy, L., Czechowska, Y., Chochol, C., Malla, A., Joober, R., Pruessner, J., & Lepage, M. (2009). Toward a model of cognitive insight in first-episode psychosis: verbal memory and hippocampal structure. *Schizophrenia Bulletin*, *36*(5), 1040-1049.

Buchy, L., Malla, A., Joober, R., & Lepage, M. (2009a). Delusions are associated with low self-reflectiveness in first-episode psychosis. *Schizophrenia Research*, *112*(1-3), 187-191.

Buck, B. E., Healey, K. M., Gagen, E. C., Roberts, D. L., & Penn, D. L. (2016). Social cognition in schizophrenia: factor structure, clinical and functional correlates. *Journal of Mental Health*, *25*(4), 330-337.

Buck, B., Iwanski, C., Healey, K. M., Green, M. F., Horan, W. P., Kern, R. S., ... & Penn, D. L. (2017). Improving measurement of attributional style in schizophrenia; A psychometric evaluation of the Ambiguous Intentions Hostility Questionnaire (AIHQ). *Journal of Psychiatric Research*, *89*, 48-54.

Burns, R. A., & Machin, M. A. (2009). Investigating the structural validity of Ryff's psychological well-being scales across two samples. *Social Indicators Research*, *93*(2), 359-375.

Callaway, D. A., Cohen, A. S., Matthews, R. A., & Dinzeo, T. (2014). Schizotypal Personality Questionnaire—Brief Revised: Psychometric replication and extension. *Personality Disorders: Theory, Research, and Treatment*, *5*(1), 32-38.

Carrigan, N., & Barkus, E. (2017). Schizotypy and cognitive failures: A mediating role for affect. *Psychopathology*, *50*(3), 195-202.

Carrión, R. E., McLaughlin, D., Auther, A. M., Olsen, R., Correll, C. U., & Cornblatt, B. A. (2015). The impact of psychosis on the course of cognition: a prospective, nested case-control study in individuals at clinical high-risk for psychosis. *Psychological Medicine*, *45*(15), 3341-3354.

Carruthers, P. (2009). Mindreading underlies metacognition. *Behavioral and Brain Sciences*, *32*(2), 164-182.

Carse, T., & Langdon, R. (2013). Delusion proneness in nonclinical individuals and cognitive insight: The contributions of rumination and reflection. *The Journal of Nervous and Mental Disease*, *201*(8), 659-664.

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: The Meta-Cognitions Questionnaire and its correlates. *Journal of Anxiety Disorders*, *11*(3), 279-296.

Cella, M., Serra, M., Lai, A., Mason, O. J., Sisti, D., Rocchi, M. B. L., ... & Petretto, D. R. (2013). Schizotypal traits in adolescents: links to family history of psychosis and psychological distress. *European Psychiatry*, *28*(4), 247-253.

Chabrol, H., & Raynal, P. (2018). The Healthy Side of Positive Schizotypy May Reflect Positive Self-Report Biases. *International Journal of Psychology and Psychological Therapy*, *18*(1), 55-64.

Chan, C. C., Spencer, C. C., West, C., Viegas, C., & Bedwell, J. S. (2015). Metacognitive processes in psychometrically defined schizotypy. *Psychiatry Research*, *230*(2), 279-286.

Chan, K. K. (2016). Associations of symptoms, neurocognition, and metacognition with insight in schizophrenia spectrum disorders. *Comprehensive Psychiatry*, *65*, 63-69.

Chan, R. C., Li, H., Cheung, E. F., & Gong, Q. Y. (2010). Impaired facial emotion perception in schizophrenia: a meta-analysis. *Psychiatry Research*, *178*(2), 381-390.

Chan, S. K. W., Kao, S. Y. S., Leung, S. L., Hui, C. L. M., Lee, E. H. M., Chang, W. C., & Chen, E. Y. H. (2017). Relationship between neurocognitive function and clinical symptoms with self-stigma in patients with schizophrenia-spectrum disorders. *Journal of Mental Health*, 1-6.

Chapman, J. P., Chapman, L. J., & Kwapil, T. R. (1994). Does the Eysenck psychoticism scale predict psychosis? A ten year longitudinal study. *Personality and Individual Differences*, *17*(3), 369-375.

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1976). Scales for physical and social anhedonia. *Journal of Abnormal Psychology*, *85*(4), 374-382.

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1978). Body-image aberration in Schizophrenia. *Journal of Abnormal Psychology*, *87*(4), 399-407.

Chino, B., Nemoto, T., Fujii, C., & Mizuno, M. (2009). Subjective assessments of the quality of life, well-being and self-efficacy in patients with schizophrenia. *Psychiatry and Clinical Neurosciences*, *63*(4), 521-528.

Cho, Y., Jahng, S., & Chai, S. (2012). The factor structure and concurrent validity of the Korean version of the Metacognitions Questionnaire 30 (K-MCQ-30). *Journal of Clinical Psychology*, *68*(3), 349-391.

Choudhary, V., Baniya, G. C., & Jain, S. (2017). A comparative study of cognitive insight in schizophrenia patients with and without depression. *International Journal of Research in Medical Sciences*, *4*(6), 2367-2372.

Chun, C. A., Minor, K. S., & Cohen, A. S. (2013). Neurocognition in psychometrically defined college schizotypy samples: we are not measuring the "right stuff". *Journal of the International Neuropsychological Society*, *19*(3), 324-337.

Cimino, M., & Haywood, M. (2008). Inhibition and facilitation in schizotypy. *Journal of Clinical and Experimental Neuropsychology*, *30*(2), 187-198.

Claridge, G., (1997). Theorical background and issues. In: G. Claridge (Ed.), *Schizotypy. Implications for Illness and Health* (pp.3-19). Oxford: Oxford University Press.

Claridge, G., & Beech, T. (1995). Fully and quasi-dimensional constructions of schizotypy. In: A. Raine. T. Lencz. & S.A. Mednick (Eds.), *Schizotypal Personality* (pp. 192–216). Cambridge: Cambridge University Press.

Claridge, G., McCreery, C., Mason, O., Bentall, R., Boyle, G., Slade, P., & Popplewell, D. (1996). The factor structure of ''schizotypal'' traits: a large replication study. *British Journal of Clinical Psycholog*y, *35,* 103–115.

Cochrane, M., Petch, I., & Pickering, A. D. (2010). Do measures of schizotypal personality provide non-clinical analogues of schizophrenic symptomatology?. *Psychiatry Research*, *176*(2-3), 150-154.

Cochrane, M., Petch, I., & Pickering, A. D. (2012). Aspects of cognitive functioning in schizotypy and schizophrenia: evidence for a continuum model. *Psychiatry Research*, *196*(2-3), 230-234.

Cohen, A. S., & Davis III, T. E. (2009). Quality of life across the schizotypy spectrum: findings from a large nonclinical adult sample. *Comprehensive Psychiatry*, *50*(5), 408-414.

Cohen, A. S., Iglesias, B., & Minor, K. S. (2009). The neurocognitive underpinnings of diminished expressivity in schizotypy: What the voice reveals. *Schizophrenia Research*, *109*(1-3), 38-45.

Cohen, A. S., Matthews, R. A., Najolia, G. M., & Brown, L. A. (2010). Toward a more psychometrically sound brief measure of schizotypal traits: introducing the SPQ-Brief Revised. *Journal of Personality Disorders*, *24*(4), 516-537.

Cohen, A. S., Mitchell, K. R., Beck, M. R., & Hicks, J. L. (2017). The subjective-objective disjunction in psychometrically-defined schizotypy: what it is and why it is important?. *Journal of Experimental Psychopathology*, *8*(4), 347-363.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.).* Hillsdale, NJ: Erlbaum.

Collip, D., Wigman, J. T., Myin-Germeys, I., Jacobs, N., Derom, C., Thiery, E., ... & van Os, J. (2013). From epidemiology to daily life: linking daily life stress reactivity to persistence of psychotic experiences in a longitudinal general population study. *PloS ONE*, *8*(4), e62688.

Combs, D. R., Penn, D. L., Michael, C. O., Basso, M. R., Wiedeman, R., Siebenmorgan, M., ... & Chapman, D. (2009). Perceptions of hostility by persons with and without persecutory delusions. *Cognitive Neuropsychiatry*, *14*(1), 30-52.

Combs, D. R., Penn, D. L., Wicher, M., & Waldheter, E. (2007). The Ambiguous Intentions Hostility Questionnaire (AIHQ): a new measure for evaluating hostile social-cognitive biases in paranoia. *Cognitive Neuropsychiatry*, *12*(2), 128-143.

Compton, M. T., Goulding, S. M., Bakeman, R., & McClure-Tone, E. B. (2009). An examination of the factorial structure of the Schizotypal Personality Questionnaire-Brief (SPQ-B) among undergraduate students. *Schizophrenia Research*, *115*(2-3), 286-289.

Consortium, I. S. (2009). Common polygenic variation contributes to risk of schizophrenia that overlaps with bipolar disorder. *Nature*, *460*(7256), 748-752.

Cooke, M. A., Peters, E. R., Fannon, D., Aasen, I., Kuipers, E., & Kumari, V. (2010). Cognitive insight in psychosis: the relationship between self-certainty and self-reflection dimensions and neuropsychological measures. *Psychiatry Research*, *178*(2), 284-289.

Corcoran, C. M., Keilp, J. G., Kayser, J., Klim, C., Butler, P. D., Bruder, G. E., ... & Javitt, D. C. (2015). Emotion recognition deficits as predictors of transition in individuals at clinical high risk for schizophrenia: a neurodevelopmental perspective. *Psychological Medicine*, *45*(14), 2959-2973.

Corcoran, R., Mercer, G., & Frith, C. D. (1995). Schizophrenia, symptomatology and social inference: investigating "theory of mind" in people with schizophrenia. *Schizophrenia Research*, *17*(1), 5-13.

Corigliano, V., De Carolis, A., Trovini, G., Dehning, J., Di Pietro, S., Curto, M., ... & Comparelli, A. (2014). Neurocognition in schizophrenia: from prodrome to multi-episode illness. *Psychiatry Research*, *220*(1-2), 129-134.

Corrigan, P.W. (2004). How stigma interferes with mental health care. *American Psychologist*, *59*(7), 614-625.

Corrigan, P. W. (2007). How clinical diagnosis might exacerbate the stigma of mental illness. *Social Work*, *52*(1), 31-39.

Corrigan, P. W., & Rao, D. (2012). On the self-stigma of mental illness: Stages, disclosure, and strategies for change. *The Canadian Journal of Psychiatry*, *57*(8), 464-469.

Corrigan, P. W., & Watson, A. C. (2002). The paradox of self-stigma and mental illness. *Clinical Psychology: Science and Practice*, *9*(1), 35-53.

Corrigan, P. W., Watson, A. C., & Barr, L. (2006). The self–stigma of mental illness: Implications for self–esteem and self–efficacy. *Journal of Social and Clinical Psychology*, *25*(8), 875-884.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, *78*(1), 98-104.

Cotter, J., Yung, A. R., Carney, R., & Drake, R. J. (2017). Metacognitive beliefs in the at-risk mental state: a systematic review and meta-analysis. *Behaviour Research and Therapy*, *90*, 25-31.

Cotton, S. M., Gleeson, J. F. M., Alvarez-Jimenez, M., & McGorry, P. D. (2010). Quality of life in patients who have remitted from their first episode of psychosis. *Schizophrenia Research*, *121*(1-3), 259-265.

Cowan, T., Le, T. P., & Cohen, A. S. (2019). Social cognition and schizotypy. In *Social Cognition in Psychosis* (pp. 71-88). Cambridge, Massachusetts: Academic Press.

Crouch, M. K., Mack, D. E., Wilson, P. M., & Kwan, M. Y. (2017). Variability of Coefficient Alpha: An Empirical Investigation of the Scales of Psychological Wellbeing. *Review of General Psychology*, *21*(3), 255-268.

Cuthbert, B. N., & Insel, T. R. (2013). Toward the future of psychiatric diagnosis: the seven pillars of RDoC. *BMC Medicine*, *11*(1), 126.

Dagnall, N., Denovan, A., Drinkwater, K., Parker, A., & Clough, P. (2016). Toward a better understanding of the relationship between belief in the paranormal and statistical bias: the potential role of schizotypy. *Frontiers in Psychology*, *7*, 1045.

Daly, M. P., Afroz, S., & Walder, D. J. (2012). Schizotypal traits and neurocognitive functioning among nonclinical young adults. *Psychiatry Research*, *200*(2-3), 635-640.

Darrell-Berry, H., Bucci, S., Palmier-Claus, J., Emsley, R., Drake, R., & Berry, K. (2017). Predictors and mediators of trait anger across the psychosis continuum: The role of attachment style, paranoia and social cognition. *Psychiatry Research*, *249*, 132-138.

David, A. S. (1990). Insight and psychosis. *The British Journal of Psychiatry*, *156*(6), 798-808.

De Herdt, A., Wampers, M., Vancampfort, D., De Hert, M., Vanhees, L., Demunter, H., ... & Probst, M. (2013). Neurocognition in clinical high risk young adults who did or did not convert to a first schizophrenic psychosis: a meta-analysis. *Schizophrenia Research*, *149*(1-3), 48-55.

de Leede-Smith, S., & Barkus, E. (2013). A comprehensive review of auditory verbal hallucinations: lifetime prevalence, correlates and mechanisms in healthy and clinical individuals. *Frontiers in Human Neuroscience*, *7*, 367.

de Raykeer, R. P., Hoertel, N., Blanco, C., Lavaud, P., Kaladjian, A., Blumenstock, Y., ... & CSA Study Group. (2019). Effects of depression and cognitive impairment on quality of life in older adults with schizophrenia spectrum disorder: Results from a multicenter study. *Journal of Affective Disorders*, *256,*164-175.

Debbané, M., Van der Linden, M., Balanzin, D., Billieux, J., & Eliez, S. (2012). Associations among metacognitive beliefs, anxiety and positive schizotypy during adolescence. *The Journal of Nervous and Mental Disease*, *200*(7), 620-626.

Demjaha, A., Valmaggia, L., Stahl, D., Byrne, M., & McGuire, P. (2010). Disorganization/cognitive and negative symptom dimensions in the at-risk mental state predict subsequent transition to psychosis. *Schizophrenia Bulletin*, *38*(2), 351-359.

Denenny, D., Thompson, E., Pitts, S. C., Dixon, L. B., & Schiffman, J. (2015). Subthreshold psychotic symptom distress, self-stigma, and peer social support among college students with mental health concerns. *Psychiatric Rehabilitation Journal*, *38*(2), 164-170.

Deptula, A. E., & Bedwell, J. S. (2015). Schizotypy, Autobiographical Memory, and Theory of Mind: Sex Differences. *The Journal of Nervous and Mental Disease*, *203*(2), 96-100.

DeRosse, P., & Karlsgodt, K. H. (2015). Examining the psychosis continuum. *Current Behavioral Neuroscience Reports*, *2*(2), 80-89.

Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, *55*(1), 34-43.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71-75.

Dinzeo, T. J., Serna, V. C., Pujji, S. D., & Sledjeski, E. M. (2018). The relationship of categorical and phonological verbal fluency to negative schizotypy and social functioning in a non-clinical sample. *Cognitive Neuropsychiatry*, *23*(1), 43-57.

Durak, M., Senol-Durak, E., & Gencoz, T. (2010). Psychometric properties of the satisfaction with life scale among Turkish university students, correctional officers, and elderly adults. *Social Indicators Research*, *99*(3), 413-429.

Eack, S. M., & Newhill, C. E. (2007). Psychiatric symptoms and quality of life in schizophrenia: a meta-analysis. *Schizophrenia Bulletin*, *33*(5), 1225-1237.

Eckblad, M. L., Chapman, L. J., Chapman, J. P., & Mishlove, M. (1982). The revised social anhedonia scale. *Unpublished test*.

Eckblad, M., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology*, *51*(2), 215-225.

Eisenberg, D., Downs, M. F., Golberstein, E., & Zivin, K. (2009). Stigma and help seeking for mental health among college students. *Medical Care Research and Review*, *66*(5), 522-541.

Ekinci, O., & Ekinci, A. (2016). The relationship between clinical characteristics, metacognitive appraisals, and cognitive insight in patients with obsessive-compulsive disorder. *Nordic Journal of Psychiatry*, *70*(8), 591-598.

Engh, J. A., Friis, S., Birkenaes, A. B., Jónsdóttir, H., Klungsøyr, O., Ringen, P. A., ... & Andreassen, O. A. (2009). Delusions are associated with poor cognitive insight in schizophrenia. *Schizophrenia Bulletin*, *36*(4), 830-835.

Engh, J. A., Sundet, K., Simonsen, C., Vaskinn, A., Lagerberg, T. V., Opjordsmoen, S., ... & Andreassen, O. A. (2011). Verbal learning contributes to cognitive insight in schizophrenia independently of affective and psychotic symptoms. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *35*(4), 1059-1063.

Esterberg, M. L., & Compton, M. T. (2009). The psychosis continuum and categorical versus dimensional diagnostic approaches. *Current Psychiatry Reports*, *11*(3), 179-184.

Ettinger, U., Meyhöfer, I., Steffens, M., Wagner, M., & Koutsouleris, N. (2014). Genetics, cognition, and neurobiology of schizotypal personality: a review of the overlap with schizophrenia. *Frontiers in Psychiatry*, *5*, 1-18.

Fatouros-Bergman, H., Cervenka, S., Flyckt, L., Edman, G., & Farde, L. (2014). Meta-analysis of cognitive performance in drug-naïve patients with schizophrenia. *Schizophrenia Research*, *158*(1-3), 156-162.

Favrod, J., Zimmermann, G., Raffard, S., Pomini, V., & Khazaal, Y. (2008). The Beck Cognitive Insight Scale in outpatients with psychotic disorders: further evidence from a French-speaking sample. *The Canadian Journal of Psychiatry*, *53*(11), 783-787.

Fett, A. K. J., Viechtbauer, W., Penn, D. L., van Os, J., & Krabbendam, L. (2011). The relationship between neurocognition and social cognition with functional outcomes in schizophrenia: a meta-analysis. *Neuroscience & Biobehavioral Reviews*, *35*(3), 573-588.

Fioravanti, M., Bianchi, V., & Cinti, M. E. (2012). Cognitive deficits in schizophrenia: an updated metanalysis of the scientific evidence. *BMC Psychiatry*, *12*(1),64.

Fiske, A. P. (1992). The four elementary forms of sociality: framework for a unified theory of social relations. *Psychological Review*, *99*(4), 689-723.

Fiszdon, J. M., Roberts, D. L., Penn, D. L., Choi, K. H., Tek, C., Choi, J., & Bell, M. D. (2017). Understanding Social Situations (USS): A proof-of-concept social–cognitive intervention targeting theory of mind and attributional bias in individuals with psychosis. *Psychiatric Rehabilitation Journal*, *40*(1), 12-20.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist*, *34*(10), 906-911.

Flückiger, R., Ruhrmann, S., Debbané, M., Michel, C., Hubl, D., Schimmelmann, B. G., ... & Schultze-Lutter, F. (2016). Psychosis-predictive value of self-reported schizotypy in a clinical high-risk sample. *Journal of Abnormal Psychology*, *125*(7), 923-932.

Fonseca-Pedrero, E., Compton, M. T., Tone, E. B., Ortuño-Sierra, J., Paino, M., Fumero, A., & Lemos-Giráldez, S. (2014). Cross-cultural invariance of the factor structure of the Schizotypal Personality Questionnaire across Spanish and American college students. *Psychiatry Research*, *220*(3), 1071-1076.

Fonseca-Pedrero, E., Fumero, A., Paino, M., de Miguel, A., Ortuño-Sierra, J., Lemos-Giráldez, S., & Muñiz, J. (2014). Schizotypal Personality Questionnaire: New sources of validity evidence in college students. *Psychiatry Research*, *219*(1), 214-220.

Fonseca-Pedrero, E., Ortuño-Sierra, J., Lucas-Molina, B., Debbané, M., Chan, R. C., Cicero, D. C., ... & Kwapil, T. (2018). Brief assessment of schizotypal traits: A multinational study. *Schizophrenia Research*, *197*, 182-191.

Fonseca-Pedrero, E., Ortuño-Sierra, J., Mason, O. J., & Muñiz, J. (2015a). The oxford–liverpool inventory of feelings and experiences short version: further validation. *Personality and Individual Differences*, *86*, 338-343.

Fonseca-Pedrero, E., Ortuño-Sierra, J., Sierro, G., Daniel, C., Cella, M., Preti, A., ... & Mason, O. J. (2015b). The measurement invariance of schizotypy in Europe. *European Psychiatry*, *30*(7), 837-844.

Fonseca-Pedrero, E., Paino, M., Lemos-Giráldez, S., Muñiz, J., 2012. Validation of the Community Assessment Psychic Experiences-42 (CAPE-42) in Spanish college students and patients with psychosis. *Actas Españolas Psiquiatr*. *40*, 169–176

Fonseca-Pedrero, E., Paíno-Piñeiro, M., Lemos-Giráldez, S., Villazón-García, Ú., & Muñiz, J. (2009). Validation of the Schizotypal Personality Questionnaire—Brief Form in adolescents. *Schizophrenia Research*, *111*(1-3), 53-60.

Forbes, N. F., Carrick, L. A., McIntosh, A. M., & Lawrie, S. M. (2009). Working memory in schizophrenia: a meta-analysis. *Psychological Medicine*, *39*(6), 889-905.

Fossati, A., Raine, A., Carretta, I., Leonardi, B., & Maffei, C. (2003). The three-factor model of schizotypal personality: Invariance across age and gender. *Personality and Individual Differences*, *35*(5), 1007-1019.

Fraser, J., Morrison, A., & Wells, A. (2006). Cognitive processes, reasoning biases and persecutory delusions: A comparative study. *Behavioural and Cognitive Psychotherapy*, *34*(4), 421-435.

Frisch, M. B., Cornell, J., Villanueva, M., & Retzlaff, P. J. (1992). Clinical validation of the Quality of Life Inventory. A measure of life satisfaction for use in treatment planning and outcome assessment. *Psychological Assessment*, *4*(1), 92-101.

Fulford, D., Niendam, T. A., Floyd, E. G., Carter, C. S., Mathalon, D. H., Vinogradov, S., ... & Loewy, R. L. (2013). Symptom dimensions and functional impairment in early psychosis: more to the story than just negative symptoms. *Schizophrenia Research*, *147*(1), 125-131.

Fumero, A., Marrero, R. J., & Fonseca-Pedrero, E. (2018). Well-being in schizotypy: The effect of subclinical psychotic experiences. *Psicothema*, *30*(2), 177-182.

Fung, K. M., Tsang, H. W., & Corrigan, P. W. (2008). Self-stigma of people with schizophrenia as predictor of their adherence to psychosocial treatment. *Psychiatric Rehabilitation Journal*, *32*(2), 95-104.

Fusar-Poli, P., Carpenter, W. T., Woods, S. W., & McGlashan, T. H. (2014). Attenuated psychosis syndrome: ready for DSM-5.1?. *Annual Review of Clinical Psychology*, *10*, 155-192.

Fusar-Poli, P., Deste, G., Smieskova, R., Barlati, S., Yung, A. R., Howes, O., ... & Borgwardt, S. (2012). Cognitive functioning in prodromal psychosis: a meta-analysis. *Archives of General Psychiatry*, *69*(6), 562-571.

Fusar-Poli, P., Nelson, B., Valmaggia, L., Yung, A. R., & McGuire, P. K. (2012). Comorbid depressive and anxiety disorders in 509 individuals with an at-risk mental state: impact on psychopathology and transition to psychosis. *Schizophrenia Bulletin*, *40*(1), 120-131.

Gagnon, G., Kumar, S., Maltais, J. R., Voineskos, A. N., Mulsant, B. H., & Rajji, T. K. (2018). Superior memory performance in healthy individuals with subclinical psychotic symptoms but without genetic load for schizophrenia. *Schizophrenia Research: Cognition*, *13*, 7-11.

Gallagher, S., & Meltzoff, A. N. (1996). The earliest sense of self and others: Merleau-Ponty and recent developmental studies. *Philosophical Psychology*, *9*(2), 211-233.

Galuppi, A., Turola, M. C., Nanni, M. G., Mazzoni, P., & Grassi, L. (2010). Schizophrenia and quality of life: how important are symptoms and functioning?. *International Journal of Mental Health Systems*, *4*(1), 31.

García-Batista, Z. E., Guerra-Peña, K., Cano-Vindel, A., Herrera-Martínez, S. X., & Medrano, L. A. (2018). Validity and reliability of the Beck Depression Inventory (BDI-II) in general and hospital population of Dominican Republic. *PloS ONE*, *13*(6), e0199750.

García-Montes, J. M., Cangas, A., Pérez-Álvarez, M., Fidalgo, A. M., & Gutiérrez, O. (2006). The role of meta-cognitions and thought control techniques in predisposition to auditory and visual hallucinations. *British Journal of Clinical Psychology*, *45*(3), 309-317.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference 11.0 update (4th ed.).* Boston: Allyn & Bacon.

Gerlinger, G., Hauser, M., Hert, M., Lacluyse, K., Wampers, M., & Correll, C. U. (2013). Personal stigma in schizophrenia spectrum disorders: a systematic review of prevalence rates, correlates, impact and interventions. *World Psychiatry*, *12*(2), 155-164.

Germine, L. T., & Hooker, C. I. (2011). Face emotion recognition is related to individual differences in psychosis-proneness. *Psychological Medicine*, *41*(5), 937-947.

Gianotti, L. R., Mohr, C., Pizzagalli, D., Lehmann, D., & Brugger, P. (2001). Associative processing and paranormal belief. *Psychiatry and Clinical Neurosciences*, *55*(6), 595-603.

Gilleen, J., Greenwood, K., & David, A. S. (2010). Domains of awareness in schizophrenia. *Schizophrenia Bulletin*, *37*(1), 61-72.

Giusti, L., Mazza, M., Pollice, R., Casacchia, M., & Roncone, R. (2013). Relationship between self-reflectivity, Theory of Mind, neurocognition, and global functioning: an investigation of schizophrenic disorder. *Clinical Psychologist*, *17*(2), 67-76.

Gloster, A. T., Rhoades, H. M., Novy, D., Klotsche, J., Senior, A., Kunik, M., ... & Stanley, M. A. (2008). Psychometric properties of the Depression Anxiety and Stress Scale-21 in older primary care patients. *Journal of Affective Disorders*, *110*(3), 248-259.

Goldstone, E., Farhall, J., Thomas, N., & Ong, B. (2013). The role of metacognitive beliefs in the proneness to hallucinations and delusions: An analysis across clinical and non-clinical populations. *British Journal of Clinical Psychology*, *52*(3), 330-346.

González-Ortega, I., de los Mozos, V., Echeburúa, E., Mezo, M., Besga, A., de Azúa, S. R., ... & González-Pinto, A. (2013). Working memory as a predictor of negative symptoms and functional outcome in first episode psychosis. *Psychiatry Research*, *206*(1), 8-16.

Gooding, D. C., & Pflum, M. J. (2011). Theory of mind and psychometric schizotypy. *Psychiatry Research*, *188*(2), 217-223.

Gooding, D. C., Johnson, M., & Peterman, J. S. (2010). Schizotypy and altered digit ratios: a second look. *Psychiatry Research*, *178*(1), 73-78.

Gooding, D. C., Tallent, K. A., & Matts, C. W. (2005). Clinical status of at-risk individuals 5 years later: further validation of the psychometric high-risk strategy. *Journal of Abnormal Psychology*, *114*(1), 170-175.

Goulding, A. (2004). Schizotypy models in relation to subjective health and paranormal beliefs and experiences. *Personality and Individual Differences*, *37*(1), 157-167.

Granholm, E., McQuaid, J. R., McClure, F. S., Auslander, L. A., Perivoliotis, D., Pedrelli, P., ... & Jeste, D. V. (2005). A randomized, controlled trial of cognitive behavioral social skills training for middle-aged and older outpatients with chronic schizophrenia. *American Journal of Psychiatry*, *162*(3), 520-529.

Grant, P., Green, M. J., & Mason, O. J. (2018). Models of schizotypy: the importance of conceptual clarity. *Schizophrenia Bulletin*, *44*(2), S556-S563.

Green, M. F., Bearden, C. E., Cannon, T. D., Fiske, A. P., Hellemann, G. S., Horan, W. P., ... & Subotnik, K. L. (2011). Social cognition in schizophrenia, part 1: performance across phase of illness. *Schizophrenia Bulletin*, *38*(4), 854-864.

Green, M. F., Horan, W. P., & Lee, J. (2015). Social cognition in schizophrenia. *Nature Reviews Neuroscience*, *16*, 620-631.

Green, M. F., Penn, D. L., Bentall, R., Carpenter, W. T., Gaebel, W., Gur, R. C., ... & Heinssen, R. (2008). Social cognition in schizophrenia: an NIMH workshop on definitions, assessment, and research opportunities. *Schizophrenia Bulletin*, *34*(6), 1211-1220.

Green, S. B. (1991). How many subjects does it take to do a regression analysis. *Multivariate Behavioral Research*, *26*(3), 499-510.

Gross, G. M., Kwapil, T. R., Burgin, C. J., Raulin, M. L., Silvia, P. J., Kemp, K. C., & Barrantes-Vidal, N. (2018). Validation of the Multidimensional Schizotypy Scale-Brief in two large samples. *Journal of Psychopathology and Behavioral Assessment*, *40*(4), 669-677.

Gross, G. M., Silvia, P. J., Barrantes-Vidal, N., & Kwapil, T. R. (2012). Psychometric properties and validity of short forms of the Wisconsin Schizotypy Scales in two large samples. *Schizophrenia Research*, *134*(2-3), 267-272.

Grover, S., Sahoo, S., Chakrabarti, S., & Avasthi, A. (2018). Association of internalized stigma and insight in patients with schizophrenia. *International Journal of Culture and Mental Health*, *11*(3), 338-350.

Groves, R. M., & Peytcheva, E. (2008). The impact of nonresponse rates on nonresponse bias: a meta-analysis. *Public Opinion Quarterly*, *72*(2), 167-189.

Guerrero, A. G., & Lysaker, P. H. (2013). Socially naïve self-appraisal moderates the relationship between cognitive insight and positive symptoms in schizophrenia. *Schizophrenia Research*, *143*(1), 97-101.

Gur, R. C., Richard, J., Hughett, P., Calkins, M. E., Macy, L., Bilker, W. B., ... & Gur, R. E. (2010). A cognitive neuroscience-based computerized battery for efficient measurement of individual differences: standardization and initial construct validation. *Journal of Neuroscience Methods*, *187*(2), 254-262.

Gur, R. C., Sara, R., Hagendoorn, M., Marom, O., Hughett, P., Macy, L., ... & Gur, R. E. (2002). A method for obtaining 3-dimensional facial expressions and its standardization for use in neurocognitive studies. *Journal of Neuroscience Methods*, *115*(2), 137-143.

Gur, R. E., Nimgaonkar, V. L., Almasy, L., Calkins, M. E., Ragland, J. D., Pogue-Geile, M. F., ... & Gur, R. C. (2007). Neurocognitive endophenotypes in a multiplex multigenerational family study of schizophrenia. *American Journal of Psychiatry*, *164*(5), 813-819.

Haaga, D. A., & Beck, A. T. (1995). Perspectives on depressive realism: implications for cognitive theory of depression. *Behaviour Research and Therapy*, *33*(1), 41-48.

Hanel, P. H., & Wolfradt, U. (2016). The 'dark side'of personal values: Relations to clinical constructs and their implications. *Personality and Individual Differences*, *97*, 140-145.

Hasson-Ohayon, I. (2018). Overlap and distinction between measures of insight and self-stigma. *Psychiatry Research*, *266*, 47-64.

Hasson-Ohayon, I., Mashiach-Eizenberg, M., Arnon-Ribenfeld, N., Kravetz, S., & Roe, D. (2017). Neuro-cognition and social cognition elements of social functioning and social quality of life. *Psychiatry research*, *258*, 538-543.

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, *76*(4), 408-420.

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modelling [White Paper]. Retrieved from http://www.afhayes. com/public/process2012.pdf.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based perspective* (*2nd ed*.). New York, NY: The Guilford Press.

Healey, K. M., Penn, D. L., Perkins, D., Woods, S. W., & Addington, J. (2013). Theory of mind and social judgments in people at clinical high risk of psychosis. *Schizophrenia Research*, *150*(2), 498-504.

Heath, P. J., Seidman, A. J., Vogel, D. L., Cornish, M. A., & Wade, N. G. (2017). Help-seeking stigma among men in the military: The interaction of restrictive emotionality and distress. *Psychology of Men & Masculinity*, *18*(3), 193-197.

Heckers, S., Barch, D. M., Bustillo, J., Gaebel, W., Gur, R., Malaspina, D., ... & Van Os, J. (2013). Structure of the psychotic disorders classification in DSM-5. *Schizophrenia Research*, *150*(1), 11-14.

Helzer, J. E., Kraemer, H. C., & Krueger, R. F. (2006). The feasibility and need for dimensional psychiatric diagnoses. *Psychological Medicine*, *36*(12), 1671-1680.

Hengartner, M. P., & Lehmann, S. N. (2017). Why psychiatric research must abandon traditional diagnostic classification and adopt a fully dimensional scope: two solutions to a persistent problem. *Frontiers in Psychiatry*, *8*, 101.

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *44*(2), 227-239.

Henry, J. D., Bailey, P. E., & Rendell, P. G. (2008). Empathy, social functioning and schizotypy. *Psychiatry Research*, *160*(1), 15-22.

Herniman, S. E., Cotton, S. M., Killackey, E., Hester, R., & Allott, K. A. (2018). Co-morbid depressive disorder is associated with better neurocognitive performance in first episode schizophrenia spectrum. *Journal of Affective Disorders*, *229*, 498-505.

Heugten-Van Der Kloet, V., & van Heugten, T. (2015). The classification of psychiatric disorders according to DSM-5 deserves an internationally standardized psychological test battery on symptom level. *Frontiers in Psychology*, *6*, 1108.

Heydebrand, G., Weiser, M., Rabinowitz, J., Hoff, A. L., DeLisi, L. E., & Csernansky, J. G. (2004). Correlates of cognitive deficits in first episode schizophrenia. *Schizophrenia Research*, *68*(1), 1-9.

Hill, K., & Startup, M. (2013). The relationship between internalized stigma, negative symptoms and social functioning in schizophrenia: the mediating role of self-efficacy. *Psychiatry Research*, *206*(2), 151-157.

Hill, K., Varese, F., Jackson, M., & Linden, D. E. (2012). The relationship between metacognitive beliefs, auditory hallucinations, and hallucination-related distress in clinical and non-clinical voice-hearers. *British Journal of Clinical Psychology*, *51*(4), 434-447.

Hing, N., & Russell, A. M. (2017). How anticipated and experienced stigma can contribute to self-stigma: The case of problem gambling. *Frontiers in Psychology*, *8*, 235.

Hoch, P. H., & Cattell, J. P. (1959). The diagnosis of pseudoneurotic schizophrenia. *Psychiatric Quarterly*, *33*(1), 17-43.

Hodgekins, J. (2015). Schizotypy and psychopathology. In: O. Mason & G. Claridge (Eds), *Schizotypy: New Dimensions* (pp.180-196). London: Routledge.

Hoerger, M. (2010). Participant dropout as a function of survey length in Internet-mediated university studies: Implications for study design and voluntary participation in psychological research. *Cyberpsychology, Behavior, and Social Networking*, *13*(6), 697-700.

Hofer, A., Post, F., Pardeller, S., Frajo-Apor, B., Hoertnagl, C. M., Kemmler, G., & Fleischhacker, W. W. (2019). Self-stigma versus stigma resistance in schizophrenia: Associations with resilience, premorbid adjustment, and clinical symptoms. *Psychiatry Research*, *271*, 396-401.

Holubova, M., Prasko, J., Latalova, K., Ociskova, M., Grambal, A., Kamaradova, D., ... & Hruby, R. (2016). Are self-stigma, quality of life, and clinical data interrelated in schizophrenia spectrum patients? A cross-sectional outpatient study. *Patient Preference and Adherence*, *10*, 265-274.

Horan, W. P., Blanchard, J. J., Gangestad, S. W., & Kwapil, T. R. (2004). The psychometric detection of schizotypy: do putative schizotypy indicators identify the same latent class?. *Journal of Abnormal Psychology*, *113*(3), 339-357.

Horan, W. P., Green, M. F., DeGroot, M., Fiske, A., Hellemann, G., Kee, K., ... & Sugar, C. A. (2011). Social cognition in schizophrenia, Part 2: 12-month stability and prediction of functional outcome in first-episode patients. *Schizophrenia Bulletin*, *38*(4), 865-872.

Hori, H., Teraishi, T., Sasayama, D., Matsuo, J., Kinoshita, Y., Ota, M., ... & Kunugi, H. (2014). A latent profile analysis of schizotypy, temperament and character in a nonclinical population: association with neurocognition. *Journal of Psychiatric Research*, *48*(1), 56-64.

Horsselenberg, E. M., van Busschbach, J. T., Aleman, A., & Pijnenborg, G. H. (2016). Self-Stigma and Its Relationship with Victimization, Psychotic Symptoms and Self-Esteem among People with Schizophrenia Spectrum Disorders. *PloS ONE*, *11*(10), e0149763.

Hou, C. L., Xiang, Y. T., Wang, Z. L., Everall, I., Tang, Y., Yang, C., ... & Jia, F. J. (2016). Cognitive functioning in individuals at ultra-high risk for psychosis, first-degree relatives of patients with psychosis and patients with first-episode schizophrenia. *Schizophrenia Research*, *174*(1), 71-76.

Hutton, P., Morrison, A. P., Wardle, M., & Wells, A. (2014). Metacognitive therapy in treatment-resistant psychosis: a multiple-baseline study. *Behavioural and Cognitive Psychotherapy*, *42*(2), 166-185.

Index, P. W. International Wellbeing Group (2006). *The Personal Wellbeing Index.* Australian Centre on Quality of Life, Deakin University, Melbourne.

Irani, F., Seligman, S., Kamath, V., Kohler, C., & Gur, R. C. (2012). A meta-analysis of emotion perception and functional outcomes in schizophrenia. *Schizophrenia Research*, *137*(1), 203-211.

Jackson-Koku, G. (2016). Beck depression inventory. *Occupational Medicine*, *66*(2), 174-175.

Jahshan, C. S., & Sergi, M. J. (2007). Theory of mind, neurocognition, and functional status in schizotypy. *Schizophrenia Research*, *89*(1-3), 278-286.

Jennings, K. S., Cheung, J. H., Britt, T. W., Goguen, K. N., Jeffirs, S. M., Peasley, A. L., & Lee, A. C. (2015). How are perceived stigma, self-stigma, and self-reliance related to

treatment-seeking? A three-path model. *Psychiatric Rehabilitation Journal*, *38*(2), 109-116.

Jepsen, J. R. M., Fagerlund, B., Pagsberg, A. K., Christensen, A. M. R., Nordentoft, M., & Mortensen, E. L. (2013). Profile of cognitive deficits and associations with depressive symptoms and intelligence in chronic early-onset schizophrenia patients. *Scandinavian Journal of Psychology*, *54*(5), 363-370.

Johns, L. C., & Van Os, J. (2001). The continuity of psychotic experiences in the general population. *Clinical Psychology Review*, *21*(8), 1125-1141.

Jørgensen, R., Licht, R. W., Lysaker, P. H., Munk-Jørgensen, P., Buck, K. D., Jensen, S. O. W., ... & Zoffmann, V. (2015). Effects on cognitive and clinical insight with the use of guided self-determination in outpatients with schizophrenia: a randomized open trial. *European Psychiatry*, *30*(5), 655-663.

Joshanloo, M. (2019). Investigating the relationships between subjective well-being and psychological well-being over two decades. *Emotion*, *19*(1), 183-187.

Julian, L. J. (2011). Measures of anxiety: state-trait anxiety inventory (STAI), Beck anxiety inventory (BAI), and Hospital anxiety and Depression scale-anxiety (HADS-A). *Arthritis Care & Research*, *63*(S11), S467-S472.

Kalkstein, S., Hurford, I., & Gur, R. C. (2010). Neurocognition in schizophrenia. In *Behavioral neurobiology of schizophrenia and its treatment* (pp. 373-390). Berlin, Heidelberg: Springer.

Kane, L., & Ashbaugh, A. R. (2017). Simple and parallel mediation: A tutorial exploring anxiety sensitivity, sensation seeking, and gender. *The Quantitative Methods for Psychology*, *13*(3), 148-165.

Kane, M. J., Meier, M. E., Smeekens, B. A., Gross, G. M., Chun, C. A., Silvia, P. J., & Kwapil, T. R. (2016). Individual differences in the executive control of attention, memory, and thought, and their associations with schizotypy. *Journal of Experimental Psychology: General*, *145*(8), 1017-1048.

Kaneda, A., Katagai, T., & Yasui-Furukori, N. (2013). Comparing the influences of age and disease on the Brief Assessment of Cognition in Schizophrenia in Japanese patients with schizophrenia. *Neuropsychiatric Disease and Treatment*, *9*, 1203-1208.

Kao, Y. C., Liu, Y. P., Lien, Y. J., Lin, S. J., Lu, C. W., Wang, T. S., & Loh, C. H. (2013). The influence of sex on cognitive insight and neurocognitive functioning in schizophrenia. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, *44*, 193-200.

Kao, Y. C., Wang, T. S., Lu, C. W., & Liu, Y. P. (2011). Assessing cognitive insight in nonpsychiatric individuals and outpatients with schizophrenia in Taiwan: an investigation using the Beck Cognitive Insight Scale. *BMC Psychiatry*, *11*(1), 170-184.

Karagiannopoulou, L., Karamaouna, P., Zouraraki, C., Roussos, P., Bitsios, P., & Giakoumaki, S. G. (2016). Cognitive profiles of schizotypal dimensions in a community cohort: Common properties of differential manifestations. *Journal of Clinical and Experimental Neuropsychology*, *38*(9), 1050-1063.

Keefe, R. S., Goldberg, T. E., Harvey, P. D., Gold, J. M., Poe, M. P., & Coughenour, L. (2004). The Brief Assessment of Cognition in Schizophrenia: reliability, sensitivity, and comparison with a standard neurocognitive battery. *Schizophrenia Research*, *68*(2-3), 283-297.

Keefe, R. S., Harvey, P. D., Goldberg, T. E., Gold, J. M., Walker, T. M., Kennel, C., & Hawkins, K. (2008). Norms and standardization of the Brief Assessment of Cognition in Schizophrenia (BACS). *Schizophrenia Research*, *102*(1-3), 108-115.

Keefe, R. S., Poe, M., Walker, T. M., & Harvey, P. D. (2006). The relationship of the Brief Assessment of Cognition in Schizophrenia (BACS) to functional capacity and real-world functional outcome. *Journal of Clinical and Experimental Neuropsychology*, *28*(2), 260-269.

Kelleher, I., Murtagh, A., Clarke, M. C., Murphy, J., Rawdon, C., & Cannon, M. (2013). Neurocognitive performance of a community-based sample of young people at putative ultra high risk for psychosis: support for the processing speed hypothesis. *Cognitive Neuropsychiatry*, *18*(1-2), 9-25.

Kelley, K., & Maxwell, S. E. (2003). Sample size for multiple regression: obtaining regression coefficients that are accurate, not simply significant. *Psychological Methods*, *8*(3), 305-321.

Kemp, K. C., Gross, G. M., Barrantes-Vidal, N., & Kwapil, T. R. (2018). Association of positive, negative, and disorganized schizotypy dimensions with affective symptoms and experiences. *Psychiatry Research*, *270*, 1143-1149.

Kern, R. S., Gold, J. M., Dickinson, D., Green, M. F., Nuechterlein, K. H., Baade, L. E., ... & Sugar, C. A. (2011). The MCCB impairment profile for schizophrenia outpatients: results from the MATRICS psychometric and standardization study. *Schizophrenia Research*, *126*(1), 124-131.

Kim, H. J., Jhin, H. K., Chung, E. K., Chang, D., & Lee, J. (2007). Cross-cultural validation of the beck cognitive insight scale in Korean. *Psychiatry Investigation*, *4*(2), 109-115.

Kim, J. E., & Zane, N. (2016). Help-seeking intentions among Asian American and White American students in psychological distress: Application of the health belief model. *Cultural Diversity and Ethnic Minority Psychology*, *22*(3), 311-321.

Kim, J. H., Lee, S., Han, A. Y., Kim, K., & Lee, J. (2015). Relationship between cognitive insight and subjective quality of life in outpatients with schizophrenia. *Neuropsychiatric Disease and Treatment*, *11*, 2041-2048.

Kim, M. S., Oh, S. H., Hong, M. H., & Choi, D. B. (2011). Neuropsychologic profile of college students with schizotypal traits. *Comprehensive Psychiatry*, *52*(5), 511-516.

Kim, N. W., Song, Y. Y., Park, J. Y., Baek, S. Y., Kang, J. I., Lee, E., & An, S. K. (2014). Emotional Dysregulation, Attributional Bias, Neurocognitive Impairment in Individuals at Ultra-High Risk for Psychosis and with Schizophrenia: Its Association with Paranoia. *Korean Journal of Schizophrenia Research*, *17*(2), 63-71.

Kimhy, D., Jobson-Ahmed, L., Ben-David, S., Ramadhar, L., Malaspina, D., & Corcoran, C. M. (2014). Cognitive insight in individuals at clinical high risk for psychosis. *Early Intervention in Psychiatry*, *8*(2), 130-137.

Klein, H. S., Kelsven, S., & Pinkham, A. E. (2018). Increased social cognitive bias in subclinical paranoia. *Schizophrenia Research: Cognition*, *12*, 74-76.

Kline, p. (2000). *The handbook of psychological testing* (2nd ed, pp.13). London: Routledge

Knowles, E. E., David, A. S., & Reichenberg, A. (2010). Processing speed deficits in schizophrenia: reexamining the evidence. *American Journal of Psychiatry*, *167*(7), 828-835.

Kohler, C. G., Richard, J. A., Brensinger, C. M., Borgmann-Winter, K. E., Conroy, C. G., Moberg, P. J., ... & Calkins, M. E. (2014). Facial emotion perception differs in young persons at genetic and clinical high-risk for psychosis. *Psychiatry Research*, *216*(2), 206-212.

Kohler, C., Gur, R. C., Swanson, C. L., Petty, R., & Gur, R. E. (1998). Depression in schizophrenia: I. Association with neuropsychological deficits. *Biological Psychiatry*, *43*(3), 165-172.

Konstantakopoulos, G., Ploumpidis, D., Oulis, P., Patrikelis, P., Nikitopoulou, S., Papadimitriou, G. N., & David, A. S. (2014). The relationship between insight and theory of mind in schizophrenia. *Schizophrenia Research*, *152*(1), 217-222.

Korponay, C., Nitzburg, G. C., Malhotra, A. K., & DeRosse, P. (2014). Positive and negative subclinical symptoms and MCCB performance in non-psychiatric controls. *Schizophrenia Research: Cognition*, *1*(4), 175-179.

Kotlicka-Antczak, M., Karbownik, M. S., Pawełczyk, A., Żurner, N., Pawełczyk, T., Strzelecki, D., & Urban-Kowalczyk, M. (2019). A developmentally-stable pattern of premorbid schizoid-schizotypal features predicts psychotic transition from the clinical high-risk for psychosis state. *Comprehensive Psychiatry*, *90*, 95-101.

Kukla, M., & Lysaker, P. H. (2019). Metacognition over time is related to neurocognition, social cognition, and intrapsychic foundations in psychosis. *Schizophrenia Research: Cognition*, 100149.

Kurtz, M. M., & Tolman, A. (2011). Neurocognition, insight into illness and subjective quality-of-life in schizophrenia: what is their relationship?. *Schizophrenia Research*, *127*(1), 157-162.

Kurtz, M. M., Bronfeld, M., & Rose, J. (2012). Cognitive and social cognitive predictors of change in objective versus subjective quality-of-life in rehabilitation for schizophrenia. *Psychiatry Research*, *200*(2-3), 102-107.

Kurtz, M. M., Trask, C. L., Rosengard, R., Hyman, S., Kremen, L., Mehta, S., ... & Choi, J. (2017). Verbal Learning and Memory Enhancement Strategies in Schizophrenia: A Randomized, Controlled Investigation. *Journal of the International Neuropsychological Society*, *23*(4), 352-357.

Kwak, S. K., & Kim, J. H. (2017). Statistical data preparation: management of missing values and outliers. *Korean Journal of Anesthesiology*, *70*(4), 407-411.

Kwapil T.R., & Chun, C.A. (2015). The psychometric assessment of schizotypy. In: O. Mason. & G. Claridge (Eds), *Schizotypy: New Dimensions* (pp.7-32). London: Routledge.

Kwapil, T. R. (1998). Social anhedonia as a predictor of the development of schizophrenia-spectrum disorders. *Journal of Abnormal Psychology*, *107*(4), 558-565.

Kwapil, T. R., & Barrantes-Vidal, N. (2014). Schizotypy: looking back and moving forward. *Schizophrenia Bulletin*, *41*(2), S366-S373.

Kwapil, T. R., Barrantes-Vidal, N., & Silvia, P. J. (2007). The dimensional structure of the Wisconsin schizotypy scales: Factor identification and construct validity. *Schizophrenia Bulletin*, *34*(3), 444-457.

Kwapil, T. R., Gross, G. M., Burgin, C. J., Raulin, M. L., Silvia, P. J., & Barrantes-Vidal, N. (2018). Validity of the Multidimensional Schizotypy Scale: Associations with schizotypal traits and normal personality. *Personality Disorders: Theory, Research, and Treatment*, *9*(5), 458-466.

Kwapil, T. R., Gross, G. M., Silvia, P. J., & Barrantes-Vidal, N. (2013). Prediction of psychopathology and functional impairment by positive and negative schizotypy in the Chapmans' ten-year longitudinal study. *Journal of Abnormal Psychology*, *122*(3), 807-815.

Kwapil, T. R., Miller, M. B., Zinser, M. C., Chapman, J., & Chapman, L. J. (1997). Magical ideation and social anhedonia as predictors of psychosis proneness: a partial replication. *Journal of Abnormal Psychology*, *106*(3), 491-495.

Kyriazos, T. A., Stalikas, A., Prassa, K., & Yotsidi, V. (2018). Can the Depression Anxiety Stress Scales Short Be Shorter? Factor Structure and Measurement Invariance of DASS-21 and DASS-9 in a Greek, Non-Clinical Sample. *Psychology*, *9*, 1095-1127.

Lagger, N., Amering, M., Sibitz, I., Gmeiner, A., & Schrank, B. (2018). Stability and mutual prospective relationships of stereotyped beliefs about mental illness, hope and depressive symptoms among people with schizophrenia spectrum disorders. *Psychiatry Research*, *268*, 484-489.

Lakeman, R., McGowan, P., MacGabhann, L., Parkinson, M., Redmond, M., Sibitz, I., ... & Walsh, J. (2012). A qualitative study exploring experiences of discrimination associated with mental-health problems in Ireland. *Epidemiology and Psychiatric Sciences*, *21*(3), 271-279.

Langdon, R., & Ward, P. (2008). Taking the perspective of the other contributes to awareness of illness in schizophrenia. *Schizophrenia Bulletin*, *35*(5), 1003-1011.

Langdon, R., Corner, T., McLaren, J., Ward, P. B., & Coltheart, M. (2006). Externalizing and personalizing biases in persecutory delusions: the relationship with poor insight and theory-of-mind. *Behaviour Research and Therapy*, *44*(5), 699-713.

Lannin, D. G., Vogel, D. L., Brenner, R. E., Abraham, W. T., & Heath, P. J. (2016). Does self-stigma reduce the probability of seeking mental health information?. *Journal of Counseling Psychology*, *63*(3), 351-358.

Larøi, F., & Van der Linden, M. (2005). Metacognitions in proneness towards hallucinations and delusions. *Behaviour Research and Therapy*, *43*(11), 1425-1441.

Laws, K. R., Patel, D. D., & Tyson, P. J. (2008). Awareness of everyday executive difficulties precede overt executive dysfunction in schizotypal subjects. *Psychiatry Research*, *160*(1), 8-14.

Le, M. T. H., Tran, T. D., Holton, S., Nguyen, H. T., Wolfe, R., & Fisher, J. (2017). Reliability, convergent validity and factor structure of the DASS-21 in a sample of Vietnamese adolescents. *PloS ONE*, *12*(7), e0180557.

Lee, H. K., Lee, E. H., Hwang, S. T., Hong, S. H., & Kim, J. H. (2016). Psychometric properties of the Beck Anxiety Inventory in the community-dwelling sample of Korean adults. *Korean Journal of Clinical Psychology*, *35*(4), 822-830.

Lee, R. S., Hermens, D. F., Porter, M. A., & Redoblado-Hodge, M. A. (2012). A meta-analysis of cognitive deficits in first-episode major depressive disorder. *Journal of Affective Disorders*, *140*(2), 113-124.

Lee, S. Y., Bang, M., Kim, K. R., Lee, M. K., Park, J. Y., Song, Y. Y., ... & An, S. K. (2015). Impaired facial emotion recognition in individuals at ultra-high risk for psychosis and with first-episode schizophrenia, and their associations with neurocognitive deficits and self-reported schizotypy. *Schizophrenia Research*, *165*(1), 60-65.

Lees, J., Applegate, E., Emsley, R., Lewis, S., Michalopoulou, P., Collier, T., ... & Drake, R. J. (2015). Calibration and cross-validation of MCCB and CogState in schizophrenia. *Psychopharmacology*, *232*(21-22), 3873-3882.

Leeson, V. C., Barnes, T. R., Harrison, M., Matheson, E., Harrison, I., Mutsatsa, S. H., ... & Joyce, E. M. (2008). The relationship between IQ, memory, executive function, and processing speed in recent-onset psychosis: 1-year stability and clinical outcome. *Schizophrenia Bulletin*, *36*(2), 400-409.

Lenzenweger, M. F., & Gold, J. M. (2000). Auditory working memory and verbal recall memory in schizotypy. *Schizophrenia Research*, *42*(2), 101-110.

Lenzenweger, M. F., & Korfine, L. (1992). Confirming the latent structure and base rate of schizotypy: A taxometric analysis. *Journal of Abnormal Psychology*, *101*(3), 567-571.

Lepage, M., Buchy, L., Bodnar, M., Bertrand, M. C., Joober, R., & Malla, A. (2008). Cognitive insight and verbal memory in first episode of psychosis. *European Psychiatry*, *23*(5), 368-374.

Lewandowski, K. E., Barrantes-Vidal, N., Nelson-Gray, R. O., Clancy, C., Kepley, H. O., & Kwapil, T. R. (2006). Anxiety and depression symptoms in psychometrically identified schizotypy. *Schizophrenia Research*, *83*(2), 225-235.

Lewis, A. (1934). The psychopathology of insight. *British Journal of Medical Psychology*, *14*(4), 332-348.

Lien, Y. J., Chang, H. A., Kao, Y. C., Tzeng, N. S., Lu, C. W., & Loh, C. H. (2018a). Insight, self-stigma and psychosocial outcomes in Schizophrenia: a structural equation modelling approach. *Epidemiology and Psychiatric Sciences*, *27*(2), 176-185.

Lien, Y. J., Chang, H. A., Kao, Y. C., Tzeng, N. S., Lu, C. W., & Loh, C. H. (2018b). The impact of cognitive insight, self-stigma, and medication compliance on the quality of life in patients with schizophrenia. *European Archives of Psychiatry and Clinical Neuroscience*, *268*(1), 27-38.

Lin, A., Wigman, J. T., Nelson, B., Wood, S. J., Vollebergh, W. A., van Os, J., & Yung, A. R. (2013). Follow-up factor structure of schizotypy and its clinical associations in a help-seeking sample meeting ultra-high risk for psychosis criteria at baseline. *Comprehensive Psychiatry*, *54*(2), 173-180.

Lin, A., Wood, S. J., Nelson, B., Brewer, W. J., Spiliotacopoulos, D., Bruxner, A., ... & Yung, A. R. (2011). Neurocognitive predictors of functional outcome two to 13years after identification as ultra-high risk for psychosis. *Schizophrenia Research*, *132*(1), 1-7.

Lin, C. H., Huang, C. L., Chang, Y. C., Chen, P. W., Lin, C. Y., Tsai, G. E., & Lane, H. Y. (2013). Clinical symptoms, mainly negative symptoms, mediate the influence of neurocognition and social cognition on functional outcome of schizophrenia. *Schizophrenia Research*, *146*(1), 231-237.

Lincoln, T. M., Arens, E., Berger, C., & Rief, W. (2007). Can antistigma campaigns be improved? A test of the impact of biogenetic vs psychosocial causal explanations on implicit and explicit attitudes to schizophrenia. *Schizophrenia Bulletin*, *34*(5), 984-994.

Lincoln, T. M., Möbius, C., Huber, M. T., Nagel, M., & Moritz, S. (2014). Frequency and correlates of maladaptive responses to paranoid thoughts in patients with psychosis compared to a population sample. *Cognitive Neuropsychiatry*, *19*(6), 509-526.

Lindgren, M., Torniainen-Holm, M., Heiskanen, I., Voutilainen, G., Pulkkinen, U., Mehtälä, T., ... & Therman, S. (2018). Theory of mind in a first-episode psychosis population using the Hinting Task. *Psychiatry Research*, *263*, 185-192.

Lindsberg, J., Poutiainen, E., & Kalska, H. (2009). Clarifying the diversity of first-episode psychosis: neuropsychological correlates of clinical symptoms. *Nordic Journal of Psychiatry*, *63*(6), 493-500.

Linscott, R. J., & Van Os, J. (2013). An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: on the pathway from proneness to persistence to dimensional expression across mental disorders. *Psychological Medicine*, *43*(6), 1133-1149.

Livingston, J. D., & Boyd, J. E. (2010). Correlates and consequences of internalized stigma for people living with mental illness: A systematic review and meta-analysis. *Social Science & Medicine*, *71*(12), 2150-2161.

Loughland, C. M., Lewin, T. J., Carr, V. J., Sheedy, J., & Harris, A. W. (2007). RBANS neuropsychological profiles within schizophrenia samples recruited from non-clinical settings. *Schizophrenia Research*, *89*(1-3), 232-242.

Louise, S., Gurvich, C., Neill, E., Tan, E. J., Van Rheenen, T. E., & Rossell, S. (2015). Schizotypal traits are associated with poorer executive functioning in healthy adults. *Frontiers in Psychiatry*, *6*.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, *33*(3), 335-343.

Ludwig, K. A., Pinkham, A. E., Harvey, P. D., Kelsven, S., & Penn, D. L. (2017). Social cognition psychometric evaluation (SCOPE) in people with early psychosis: A preliminary study. *Schizophrenia Research*, *190*, 136-143.

Luther, L., Firmin, R. L., Vohs, J. L., Buck, K. D., Rand, K. L., & Lysaker, P. H. (2016). Intrinsic motivation as a mediator between metacognition deficits and impaired functioning in psychosis. *British Journal of Clinical Psychology*, *55*(3), 332-347.

Lysaker, P. H., Carcione, A., Dimaggio, G., Johannesen, J. K., Nicolò, G., Procacci, M., & Semerari, A. (2005). Metacognition amidst narratives of self and illness in schizophrenia: associations with neurocognition, symptoms, insight and quality of life. *Acta psychiatrica scandinavica*, *112*(1), 64-71.

Lysaker, P. H., Clements, C. A., Plascak-Hallberg, C. D., Knipscheer, S. J., & Wright, D. E. (2002). Insight and personal narratives of illness in schizophrenia. *Psychiatry: Interpersonal and Biological Processes*, *65*(3), 197-206.

Lysaker, P. H., Davis, L. W., Warman, D. M., Strasburger, A., & Beattie, N. (2007). Stigma, social function and symptoms in schizophrenia and schizoaffective disorder: associations across 6 months. *Psychiatry Research*, *149*(1), 89-95.

Lysaker, P. H., Dimaggio, G., Buck, K. D., Callaway, S. S., Salvatore, G., Carcione, A., ... & Stanghellini, G. (2011b). Poor insight in schizophrenia: links between different forms of metacognition with awareness of symptoms, treatment need, and consequences of illness. *Comprehensive Psychiatry*, *52*(3), 253-260.

Lysaker, P. H., Irarrázaval, L., Gagen, E. C., Armijo, I., Ballerini, M., Mancini, M., & Stanghellini, G. (2018). Metacognition in schizophrenia disorders: Comparisons with community controls and bipolar disorder: Replication with a Spanish language Chilean sample. *Psychiatry Research*, *267*, 528-534.

Lysaker, P. H., Leonhardt, B. L., Pijnenborg, M., van Donkersgoed, R., de Jong, S., & Dimaggio, G. (2014). Metacognition in schizophrenia spectrum disorders: methods of assessment and associations with neurocognition, symptoms, cognitive style and function. *Israel Journal of Psychiatry and Related Sciences*, *51*(1), 54-61.

Lysaker, P. H., Olesek, K. L., Warman, D. M., Martin, J. M., Salzman, A. K., Nicolò, G., ... & Dimaggio, G. (2011a). Metacognition in schizophrenia: Correlates and stability of deficits in theory of mind and self-reflectivity. *Psychiatry Research*, *190*(1), 18-22.

Lysaker, P. H., Vohs, J. L., & Tsai, J. (2009). Negative symptoms and concordant impairments in attention in schizophrenia: associations with social functioning, hope, self-esteem and internalized stigma. *Schizophrenia Research*, *110*(1), 165-172.

Lysaker, P. H., Vohs, J. L., Ballard, R., Fogley, R., Salvatore, G., Popolo, R., & Dimaggio, G. (2013). Metacognition, self-reflection and recovery in schizophrenia. *Future Neurology*, *8*(1), 103-115.

Lysaker, P. H., Vohs, J., Hasson-Ohayon, I., Kukla, M., Wierwille, J., & Dimaggio, G. (2013). Depression and insight in schizophrenia: comparisons of levels of deficits in social cognition and metacognition and internalized stigma across three profiles. *Schizophrenia Research*, *148*(1), 18-23.

Lysaker, P., & Bell, M. (1994). Insight and Cognitive Impairment in Schizophrenia Performance on Repeated Administrations of the Wisconsin Card Sorting Test. *The Journal of Nervous and Mental Disease*, *182*(11), 656-660.

Maat, A., Fett, A. K., Derks, E., & Group Investigators. (2012). Social cognition and quality of life in schizophrenia. *Schizophrenia Research*, *137*(1), 212-218.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*, *39*(1), 99-128.

Mak, W. W., & Wu, C. F. (2006). Cognitive insight and causal attribution in the development of self-stigma among individuals with schizophrenia. *Psychiatric Services*, *57*(12), 1800-1802.

Mamun, A. S. M. A., Zubairi, Y. Z., Hussin, A. G., & Rana, S. (2016). A comparison of missing data handling methods in linear structural relationship model: evidence from BDHS2007 data. *Electronic Journal of Applied Statistical Analysis*, *9*(1), 122-133.

Mancuso, F., Horan, W. P., Kern, R. S., & Green, M. F. (2011). Social cognition in psychosis: multidimensional structure, clinical correlates, and relationship with functional outcome. *Schizophrenia Research*, *125*(2-3), 143-151.

Mark, W., & Toulopoulou, T. (2015). Psychometric properties of "community assessment of psychic experiences": review and meta-analyses. *Schizophrenia Bulletin*, *42*(1), 34-44.

Martin, J. M., Warman, D. M., & Lysaker, P. H. (2010). Cognitive insight in non-psychiatric individuals and individuals with psychosis: an examination using the Beck Cognitive Insight Scale. *Schizophrenia Research*, *121*(1), 39-45.

Martín-Santiago, O., Suazo, V., Rodríguez-Lorenzana, A., de Azúa, S. R., Valcárcel, C., Díez, Á., ... & Molina, V. (2016). Relationship between subclinical psychotic symptoms and cognitive performance in the general population. *Revista de Psiquiatría y Salud Mental (English Edition)*, *9*(2), 78-86.

Marwick, K., & Hall, J. (2008). Social cognition in schizophrenia: a review of face processing. *British Medical Bulletin*, *88*(1), 43-58.

Mason, O. J. (2014). The duality of schizotypy: is it both dimensional and categorical?. *Frontiers in Psychiatry*, *5*, 134.

Mason, O. J. (2015). The assessment of schizotypy and its clinical relevance. *Schizophrenia Bulletin*, *41*(2), S374-S385.

Mason, O., & Claridge, G. (2006). The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE): further description and extended norms. *Schizophrenia Research*, *82*(2-3), 203-211.

Mason, O., Claridge, G., & Jackson, M. (1995). New scales for the assessment of schizotypy. *Personality and Individual Differences*, *18*(1), 7-13.

Mason, O., Linney, Y., & Claridge, G. (2005). Short scales for measuring schizotypy. *Schizophrenia Research*, *78*(2-3), 293-296.

Mason, O., Startup, M., Halpin, S., Schall, U., Conrad, A., & Carr, V. (2004). Risk factors for transition to first episode psychosis among individuals with 'at-risk mental states'. *Schizophrenia Research*, *71*(2-3), 227-237.

McAlinden, N. M., & Oei, T. P. (2006). Validation of the Quality of Life Inventory for patients with anxiety and depression. *Comprehensive Psychiatry*, *47*(4), 307-314.

McCleery, A., Horan, W. P., & Green, M. F. (2014). Social Cognition During the Early Phase of Schizophrenia. *Social cognition and metacognition in schizophrenia: Psychopathology and treatment approaches*, (pp, 49-67). Academic Press,

McCleery, A., Ventura, J., Kern, R. S., Subotnik, K. L., Gretchen-Doorly, D., Green, M. F., ... & Nuechterlein, K. H. (2014). Cognitive functioning in first-episode schizophrenia: MATRICS Consensus Cognitive Battery (MCCB) Profile of Impairment. *Schizophrenia Research*, *157*(1), 33-39.

McDermott, L. M., & Ebmeier, K. P. (2009). A meta-analysis of depression severity and cognitive function. *Journal of Affective Disorders*, *119*(1-3), 1-8.

McDonald, S., Flanagan, S., Rollins, J., & Kinch, J. (2003). TASIT: A new clinical tool for assessing social perception after traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, *18*(3), 219-238.

McLeod, H. J., Gumley, A. I., MacBeth, A., Schwannauer, M., & Lysaker, P. H. (2014). Metacognitive functioning predicts positive and negative symptoms over 12 months in first episode psychosis. *Journal of Psychiatric Research*, *54*, 109-115.

Meehl, P. E. (1962). Schizophrenia, schizotypy and schizotaxia. *American Psychologist*, *17*, 827-838.

Meehl, P. E. (1964). *Manual for use with checklist of schizotypic signs*.(No. PR-73-5). Minneapolis, MN: University of Minnesota Research Laboratories of the Department of Psychiatry.

Meehl, P. E. (1990). Toward an integrated theory of schizotaxia, schizotypy, and schizophrenia. *Journal of Personality Disorders*, *4*(1), 1-99.

Mesholam-Gately, R. I., Giuliano, A. J., Goff, K. P., Faraone, S. V., & Seidman, L. J. (2009). Neurocognition in first-episode schizophrenia: a meta-analytic review. *Neuropsychology*, *23*(3), 315.

Meyer, E. C., Carrión, R. E., Cornblatt, B. A., Addington, J., Cadenhead, K. S., Cannon, T. D., ... & Woods, S. W. (2014). The relationship of neurocognition and negative symptoms to social and role functioning over time in individuals at clinical high risk in the first phase of the North American Prodrome Longitudinal Study. *Schizophrenia Bulletin*, *40*(6), 1452-1461.

Meyer, J., & Shean, G. (2006). Social-cognitive functioning and schizotypal characteristics. *The Journal of Psychology*, *140*(3), 199-207.

Miller, A. B., & Lenzenweger, M. F. (2012). Schizotypy, social cognition, and interpersonal sensitivity. *Personality Disorders: Theory, Research, and Treatment*, *3*(4), 379.

Montgomery, D. C., Peck, E. A., Vining, G. G. (2001). *Introduction to linear regression analysis,* (3rd ed). New York, NY: Wiley.

Moritz, S., Peters, M. J., Larøi, F., & Lincoln, T. M. (2010). Metacognitive beliefs in obsessive-compulsive patients: a comparison with healthy and schizophrenia participants. *Cognitive Neuropsychiatry*, *15*(6), 531-548.

Moritz, S., Woodward, T. S., Whitman, J. C., & Cuttler, C. (2005). Confidence in errors as a possible basis for delusions in schizophrenia. *The Journal of Nervous and Mental Disease*, *193*(1), 9-16.

Morrison, A. P. (2001). The interpretation of intrusions in psychosis: an integrative cognitive approach to hallucinations and delusions. *Behavioural and Cognitive Psychotherapy*, *29*(3), 257-276.

Morrison, A. P., French, P., & Wells, A. (2007). Metacognitive beliefs across the continuum of psychosis: comparisons between patients with psychotic disorders, patients at ultra-high risk and non-patients. *Behaviour Research and Therapy*, *45*(9), 2241-2246.

Morrison, A. P., Haddock, G., & Tarrier, N. (1995). Intrusive thoughts and auditory hallucinations: A cognitive approach. *Behavioural and Cognitive Psychotherapy*, *23*(3), 265-280.

Morrison, A. P., Pyle, M., Chapman, N., French, P., Parker, S. K., & Wells, A. (2014). Metacognitive therapy in people with a schizophrenia spectrum diagnosis and medication resistant symptoms: a feasibility study. *Journal of Behavior Therapy and Experimental Psychiatry*, *45*(2), 280-284.

Morrison, S. C., Brown, L. A., & Cohen, A. S. (2013). A multidimensional assessment of social cognition in psychometrically defined schizotypy. *Psychiatry Research*, *210*(3), 1014-1019.

Mosanya, T. J., Adelufosi, A. O., Adebowale, O. T., Ogunwale, A., & Adebayo, O. K. (2014). Self-stigma, quality of life and schizophrenia: An outpatient clinic survey in Nigeria. *International Journal of Social Psychiatry*, *60*(4), 377-386.

Nair, A., Palmer, E. C., Aleman, A., & David, A. S. (2014). Relationship between cognition, clinical and cognitive insight in psychotic disorders: a review and meta-analysis. *Schizophrenia Research*, *152*(1), 191-200.

Neill, E. (2014). Methodological considerations in the recruitment and analysis of schizotypy samples. *Frontiers in Psychiatry*, *5*, 156.

Ng, R., Fish, S., & Granholm, E. (2015). Insight and theory of mind in schizophrenia. *Psychiatry Research*, *225*(1), 169-174.

Nicolo, G., Dimaggio, G., Popolo, R., Carcione, A., Procacci, M., Hamm, J., ... & Lysaker, P. H. (2012). Associations of metacognition with symptoms, insight, and neurocognition in clinically stable outpatients with schizophrenia. *The Journal of Nervous and Mental Disease*, *200*(7), 644-647.

Normann, N., van Emmerik, A. A., & Morina, N. (2014). The efficacy of metacognitive therapy for anxiety and depression: A meta-analytic review. *Depression and Anxiety*, *31*(5), 402-411.

Norton, P. J. (2007). Depression Anxiety and Stress Scales (DASS-21): Psychometric analysis across four racial groups. *Anxiety, Stress, and Coping*, *20*(3), 253-265.

Nuechterlein, K. H., & Green, M. F. (2006). *MATRICS consensus cognitive battery manual.* Los Angeles, CA: MATRICS Assessment Inc.

O'Brien, M. P., Zinberg, J. L., Bearden, C. E., Daley, M., Niendam, T. A., Kopelowicz, A., & Cannon, T. D. (2007). Psychoeducational multi-family group treatment with adolescents at high risk for developing psychosis. *Early Intervention in Psychiatry*, *1*(4), 325-332.

Ödéhn, N., & Goulding, A. (2018). Schizotypy and mental health in women and men from the general population. *Nordic Psychology*, *70*(3), 198-208.

Ohmuro, N., Katsura, M., Obara, C., Kikuchi, T., Hamaie, Y., Sakuma, A., ... & Matsumoto, K. (2018). The relationship between cognitive insight and cognitive performance among individuals with at-risk mental state for developing psychosis. *Schizophrenia Research*, *192*, 281-286.

Ohmuro, N., Katsura, M., Obara, C., Kikuchi, T., Sakuma, A., Iizuka, K., ... & Matsumoto, K. (2016). Deficits of cognitive theory of mind and its relationship with functioning in individuals with an at-risk mental state and first-episode psychosis. *Psychiatry Research*, *243*, 318-325.

Ohmuro, N., Matsumoto, K., Katsura, M., Obara, C., Kikuchi, T., Hamaie, Y., ... & Matsuoka, H. (2015). The association between cognitive deficits and depressive symptoms in at-risk mental state: A comparison with first-episode psychosis. *Schizophrenia Research*, *162*(1-3), 67-73.

Orfei, M. D., Caltagirone, C., Cacciari, C., Assogna, F., & Spalletta, G. (2011). The neuropsychological correlates of cognitive insight in healthy participants. *Applied Cognitive Psychology*, *25*(6), 927-932.

Orfei, M. D., Piras, F., Macci, E., Caltagirone, C., & Spalletta, G. (2012b). The neuroanatomical correlates of cognitive insight in schizophrenia. *Social Cognitive and Affective Neuroscience*, *8*(4), 418-423.

Orfei, M. D., Spoletini, I., Banfi, G., Caltagirone, C., & Spalletta, G. (2010). Neuropsychological correlates of cognitive insight in schizophrenia. *Psychiatry Research*, *178*(1), 51-56.

Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research & Evaluation*, *8*(2), 1-9.

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The depression anxiety stress Scales—21 (DASS-21): further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology*, *68*(12), 1322-1338.

Østefjells, T., Melle, I., Aminoff, S. R., Hellvin, T., Hagen, R., Lagerberg, T. V., ... & Røssberg, J. I. (2017). An exploration of metacognitive beliefs and thought control strategies in bipolar disorder. *Comprehensive Psychiatry*, *73*, 84-92.

Østefjells, T., Melle, I., Hagen, R., Romm, K. L., Sönmez, N., Andreassen, O. A., & Røssberg, J. I. (2015). Unhelpful metacognitive beliefs in early psychosis are associated with affective symptoms and childhood social adjustment. *Schizophrenia Research*, *169*(1-3), 280-285.

Page, A. C., Hooke, G. R., & Morrison, D. L. (2007). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in depressed clinical samples. *British Journal of Clinical Psychology*, *46*(3), 283-297.

Palmer, E. C., Gilleen, J., & David, A. S. (2015). The relationship between cognitive insight and depression in psychosis and schizophrenia: a review and meta-analysis. *Schizophrenia Research*, *166*(1), 261-268.

Palmier-Claus, J. E., Dunn, G., & Lewis, S. W. (2012). Emotional and symptomatic reactivity to stress in individuals at ultra-high risk of developing psychosis. *Psychological Medicine*, *42*(5), 1003-1012.

Park, H. Y., Bang, M., Kim, K. R., Lee, E., & An, S. K. (2018). Fragile self and malevolent others: biased attribution styles in individuals at ultra-high risk for Psychosis. *Psychiatry Investigation*, *15*(8), 796-804.

Park, S. G., Bennett, M. E., Couture, S. M., & Blanchard, J. J. (2013). Internalized stigma in schizophrenia: relations with dysfunctional attitudes, symptoms, and quality of life. *Psychiatry Research*, *205*(1-2), 43-47.

Pedrelli, P., McQuaid, J. R., Granholm, E., Patterson, T. L., McClure, F., Beck, A. T., & Jeste, D. V. (2004). Measuring cognitive insight in middle-aged and older patients with psychotic disorders. *Schizophrenia Research*, *71*(2), 297-305.

Pedrero, E. F., & Debbané, M. (2017). Schizotypal traits and psychotic-like experiences during adolescence: An update. *Psicothema*, *29*(1), 5-17.

Pelletier, A. L., Dean, D. J., Lunsford-Avery, J. R., Smith, A. K., Orr, J. M., Gupta, T., ... & Mittal, V. A. (2013). Emotion recognition and social/role dysfunction in non-clinical psychosis. *Schizophrenia Research*, *143*(1), 70-73.

Penttilä, M., Jääskeläinen, E., Hirvonen, N., Isohanni, M., & Miettunen, J. (2014). Duration of untreated psychosis as predictor of long-term outcome in schizophrenia: systematic review and meta-analysis. *The British Journal of Psychiatry*, *205*(2), 88-94.

Perälä, J., Suvisaari, J., Saarni, S. I., Kuoppasalmi, K., Isometsä, E., Pirkola, S., ... & Härkänen, T. (2007). Lifetime prevalence of psychotic and bipolar I disorders in a general population. *Archives of General Psychiatry*, *64*(1), 19-28.

Perivoliotis, D., Grant, P. M., Peters, E. R., Ison, R., Kuipers, E., & Beck, A. T. (2010). Cognitive insight predicts favorable outcome in cognitive behavioral therapy for psychosis. *Psychosis*, *2*(1), 23-33.

Peters, E., Joseph, S., Day, S., & Garety, P. (2004). Measuring delusional ideation: the 21-item Peters et al. Delusions Inventory (PDI). *Schizophrenia Bulletin*, *30*(4), 1005-1022.

Pflum, M. J., Gooding, D. C., & White, H. J. (2013). Hint, hint: theory of mind performance in schizotypal individuals. *The Journal of Nervous and Mental Disease*, *201*(5), 394-399.

Phalen, P. L., Viswanadhan, K., Lysaker, P. H., & Warman, D. M. (2015). The relationship between cognitive insight and quality of life in schizophrenia spectrum disorders: Symptom severity as potential moderator. *Psychiatry Research*, *230*(3), 839-845.

Pickup, G. (2006). Theory of mind and its relation to schizotypy. *Cognitive Neuropsychiatry*, *11*(2), 117-192.

Pietrzak, R. H., Olver, J., Norman, T., Piskulic, D., Maruff, P., & Snyder, P. J. (2009). A comparison of the CogState Schizophrenia Battery and the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) Battery in assessing cognitive impairment in chronic schizophrenia. *Journal of Clinical and Experimental Neuropsychology*, *31*(7), 848-859.

Pijnenborg, G. H. M., Spikman, J. M., Jeronimus, B. F., & Aleman, A. (2013). Insight in schizophrenia: associations with empathy. *European Archives of Psychiatry and Clinical Neuroscience*, *263*(4), 299-307.

Pinkham, A. E., Harvey, P. D., & Penn, D. L. (2016). Paranoid individuals with schizophrenia show greater social cognitive bias and worse social functioning than non-paranoid individuals with schizophrenia. *Schizophrenia Research: Cognition*, *3*, 33-38.

Pinkham, A. E., Harvey, P. D., & Penn, D. L. (2017). Social cognition psychometric evaluation: results of the final validation study. *Schizophrenia Bulletin*, *44*(4), 737-748.

Pinkham, A. E., Penn, D. L., Green, M. F., & Harvey, P. D. (2015). Social cognition psychometric evaluation: Results of the initial psychometric study. *Schizophrenia Bulletin*, *42*(2), 494-504.

Pinkham, A. E., Penn, D. L., Green, M. F., Buck, B., Healey, K., & Harvey, P. D. (2013). The social cognition psychometric evaluation study: results of the expert survey and RAND panel. *Schizophrenia Bulletin*, *40*(4), 813-823.

Piskulic, D., Liu, L., Cadenhead, K. S., Cannon, T. D., Cornblatt, B. A., McGlashan, T. H., ... & Woods, S. W. (2016). Social cognition over time in individuals at clinical high risk for psychosis: findings from the NAPLS-2 cohort. *Schizophrenia Research*, *171*(1), 176-181.

Polner, B., Faiola, E., Urquijo, M. F., Meyhöfer, I., Steffens, M., Rónai, L., … Ettinger, U. (2018). The Network Structure of Schizotypy in the General Population. Retrieved from https://doi.org/10.31234/osf.io/p389m.

Popolo, R., Dimaggio, G., Luther, L., Vinci, G., Salvatore, G., & Lysaker, P. H. (2016). Theory of mind in schizophrenia: associations with clinical and cognitive insight controlling for levels of psychopathology. *The Journal of Nervous and Mental Disease*, *204*(3), 240-243.

Pousa, E., Duno, R., Blas Navarro, J., Ruiz, A. I., Obiols, J. E., & David, A. S. (2008). Exploratory study of the association between insight and Theory of Mind (ToM) in stable schizophrenia patients. *Cognitive Neuropsychiatry*, *13*(3), 210-232.

Poyraz, B. Ç., Arikan, M. K., Poyraz, C. A., Turan, Ş., Kani, A. S., Aydin, E., & İnce, E. (2016). Clinical and cognitive insight in patients with acute-phase psychosis: Association with treatment and neuropsychological functioning. *Nordic Journal of Psychiatry*, *70*(7), 528-535.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*(3), 879-891.

Priebe, S., McCabe, R., Junghan, U., Kallert, T., Ruggeri, M., Slade, M., & Reininghaus, U. (2011). Association between symptoms and quality of life in patients with

schizophrenia: a pooled analysis of changes over time. *Schizophrenia Research*, *133*(1-3), 17-21.

Pruß, L., Wiedl, K. H., & Waldorf, M. (2012). Stigma as a predictor of insight in schizophrenia. *Psychiatry Research*, *198*(2), 187-193.

Pu, S., Nakagome, K., Itakura, M., Ohtachi, H., Iwata, M., Nagata, I., & Kaneko, K. (2018). right Frontotemporal cortex Mediates the relationship between cognitive insight and subjective Quality of life in Patients with schizophrenia. *Frontiers in Psychiatry*, *9*, 16.

Pyle, M., & Morrison, A. P. (2017). Internalised stereotypes across ultra-high risk of psychosis and psychosis populations. *Psychosis*, *9*(2), 110-118.

Pyle, M., Stewart, S. L., French, P., Byrne, R., Patterson, P., Gumley, A., ... & Morrison, A. P. (2015). Internalized stigma, emotional dysfunction and unusual experiences in young people at risk of psychosis. *Early Intervention in Psychiatry*, *9*(2), 133-140.

Quattropani, M. C., Lenzo, V., Mucciardi, M., & Toffle, M. E. (2014). Psychometric properties of the Italian version of the Short Form of the Metacognitions Questionnaire (MCQ-30). *BPA-Applied Psychology Bulletin (Bollettino di Psicologia Applicata)*, *62*(269).

Quee, P. J., van der Meer, L., Bruggeman, R., de Haan, L., Krabbendam, L., Cahn, W., ... & Aleman, A. (2010). Insight in psychosis: relationship with neurocognition, social cognition and clinical symptoms depends on phase of illness. *Schizophrenia Bulletin*, *37*(1), 29-37.

R Core Team. (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Retrieved from https://www.R-project.org.

Rabin, S. J., Avidan, M., Rozencwaig, S., & Shalev, H. (2014). Metacognition in schizophrenia and schizotypy: relation to symptoms of schizophrenia, traits of schizotypy and social quality of life. *The Israel Journal of Psychiatry and Related Sciences*, *51*(1), 44-53.

Raine, A. (1991). The SPQ: a scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, *17*(4), 555-564.

Raine, A., & Benishay, D. (1995). The SPQ-B: A brief screening instrument for schizotypal personality disorder. *Journal of Personality Disorders*, *9*(4), 346-355.

Raine, A., Reynolds, C., Lencz, T., Scerbo, A., Triphon, N., & Kim, D. (1994). Cognitive-perceptual, interpersonal, and disorganized features of schizotypal personality. *Schizophrenia Bulletin*, *20*(1), 191-201.

Rajji, T. K., Voineskos, A. N., Butters, M. A., Miranda, D., Arenovich, T., Menon, M., ... & Mulsant, B. H. (2013). Cognitive performance of individuals with schizophrenia across seven decades: a study using the MATRICS consensus cognitive battery. *The American Journal of Geriatric Psychiatry*, *21*(2), 108-118.

Randolph, C., Tierney, M. C., Mohr, E., & Chase, T. N. (1998). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS): preliminary clinical validity. *Journal of Clinical and Experimental Neuropsychology*, *20*(3), 310-319.

Rayan, A., & Jaradat, A. (2016). Stigma of mental illness and attitudes toward psychological help-seeking in Jordanian university students. *Research in Psychology and Behavioral Sciences*, *4*(1), 7-14.

Raynal, P., Goutaudier, N., Nidetch, V., & Chabrol, H. (2016). Typology of schizotypy in non-clinical young adults: Psychopathological and personality disorder traits correlates. *Psychiatry Research*, *246*, 182-187.

Reeder, C., Rexhepi-Johansson, T., & Wykes, T. (2010). Different components of metacognition and their relationship to psychotic-like experiences. *Behavioural and Cognitive Psychotherapy*, *38*(1), 49-57.

Reininghaus, U., Priebe, S., & Bentall, R. P. (2012). Testing the psychopathology of psychosis: evidence for a general psychosis dimension. *Schizophrenia Bulletin*, *39*(4), 884-895.

Reynolds, C. A., Raine, A., Mellingen, K., Venables, P. H., & Mednick, S. A. (2000). Three-factor model of schizotypal personality: invariance across culture, gender, religious affiliation, family adversity, and psychopathology. *Schizophrenia Bulletin*, *26*(3), 603-618.

Riggs, S. E., Grant, P. M., Perivoliotis, D., & Beck, A. T. (2010). Assessment of cognitive insight: a qualitative review. *Schizophrenia Bulletin*, *38*(2), 338-350.

Ripke, S., Neale, B. M., Corvin, A., Walters, J. T., Farh, K. H., Holmans, P. A., ... & Pers, T. H. (2014). Biological insights from 108 schizophrenia-associated genetic loci. *Nature*, *511*, 421-427.

Ritsher, J. B., Otilingam, P. G., & Grajales, M. (2003). Internalized stigma of mental illness: psychometric properties of a new measure. *Psychiatry Research*, *121*(1), 31-49.

Robb, K. A., Gatting, L., & Wardle, J. (2017). What impact do questionnaire length and monetary incentives have on mailed health psychology survey response?. *British Journal of Health Psychology*, *22*(4), 671-685.

Robinson, P., Turk, D., Jilka, S., & Cella, M. (2019). Measuring attitudes towards mental health using social media: investigating stigma and trivialisation. *Social Psychiatry and Psychiatric Epidemiology*, *54*(1), 51-58.

Rodriguez-Jimenez, R., Bagney, A., Garcia-Navarro, C., Aparicio, A. I., Lopez-Anton, R., Moreno-Ortega, M., ... & Green, M. F. (2012). The MATRICS consensus cognitive battery (MCCB): co-norming and standardization in Spain. *Schizophrenia Research*, *134*(2-3), 279-284.

Rominger, C., Bleier, A., Fitz, W., Marksteiner, J., Fink, A., Papousek, I., & Weiss, E. M. (2016). Auditory top-down control and affective theory of mind in schizophrenia with and without hallucinations. *Schizophrenia Research*, *174*(1), 192-196.

Rose, D., Willis, R., Brohan, E., Sartorius, N., Villares, C., Wahlbeck, K., ... & INDIGO Study Group. (2011). Reported Stigma and Discrimination by People with a Diagnosis of Schizophrenia–CORRIGENDUM. *Epidemiology and Psychiatric Sciences*, *20*(4), 379-379.

Rund, B. R., Melle, I., Friis, S., Larsen, T. K., Midbøe, L. J., Opjordsmoen, S., ... & McGlashan, T. (2004). Neurocognitive dysfunction in first-episode psychosis: correlates with symptoms, premorbid adjustment, and duration of untreated psychosis. *American Journal of Psychiatry*, *161*(3), 466-472.

Rüsch, N., Corrigan, P. W., Heekeren, K., Theodoridou, A., Dvorsky, D., Metzler, S., ... & Rössler, W. (2014). Well-being among persons at risk of psychosis: the role of self-labeling, shame, and stigma stress. *Psychiatric Services*, *65*(4), 483-489.

Rüsch, N., Hölzer, A., Hermann, C., Schramm, E., Jacob, G. A., Bohus, M., ... & Corrigan, P. W. (2006). Self-stigma in women with borderline personality disorder and women with social phobia. *The Journal of Nervous and Mental Disease*, *194*(10), 766-773.

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*(1), 141-166.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069.

Ryff, C. D. (2014). Psychological well-being revisited: Advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics*, *83*(1), 10-28.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719-727.

Ryff, C. D., & Singer, B. (1996). Psychological well-being: Meaning, measurement, and implications for psychotherapy research. *Psychotherapy and psychosomatics*, *65*(1), 14-23.

Sacks, S. A., de Mamani, A. G. W., & Garcia, C. P. (2012). Associations between cognitive biases and domains of schizotypy in a non-clinical sample. *Psychiatry Research*, *196*(1), 115-122.

Savla, G. N., Vella, L., Armstrong, C. C., Penn, D. L., & Twamley, E. W. (2012). Deficits in domains of social cognition in schizophrenia: a meta-analysis of the empirical evidence. *Schizophrenia Bulletin*, *39*(5), 979-992.

Schlaffke, L., Lissek, S., Lenz, M., Juckel, G., Schultz, T., Tegenthoff, M., ... & Brüne, M. (2015). Shared and nonshared neural networks of cognitive and affective theory-of-mind: A neuroimaging study using cartoon picture stories. *Human Brain Mapping*, *36*(1), 29-39.

Schmidt-Hansen, M., & Honey, R. C. (2009). Working memory and multidimensional schizotypy: dissociable influences of the different dimensions. *Cognitive Neuropsychology*, *26*(7), 655-670.

Schofield, K., & Claridge, G. (2007). Paranormal experiences and mental health: Schizotypy as an underlying factor. *Personality and Individual Differences*, *43*(7), 1908-1916.

Seidman, L. J., Shapiro, D. I., Stone, W. S., Woodberry, K. A., Ronzio, A., Cornblatt, B. A., ... & Mathalon, D. H. (2016). Association of neurocognition with transition to psychosis: baseline functioning in the second phase of the North American prodrome longitudinal study. *JAMA Psychiatry*, *73*(12), 1239-1248.

Sellers, R., Emsley, R., Wells, A., & Morrison, A. P. (2018). The role of cognitive and metacognitive factors in non-clinical paranoia and negative affect. *Psychology and Psychotherapy: Theory, Research and Practice*, *91*(2), 169-185.

Sellers, R., Gawęda, Ł., Wells, A., & Morrison, A. P. (2016). The role of unhelpful metacognitive beliefs in psychosis: Relationships with positive symptoms and negative affect. *Psychiatry Research*, *246*, 401-406.

Sellers, R., Varese, F., Wells, A., & Morrison, A. P. (2017). A meta-analysis of metacognitive beliefs as implicated in the self-regulatory executive function model in clinical psychosis. *Schizophrenia Research*, *179*, 75-84.

Semerari, A., Carcione, A., Dimaggio, G., Falcone, M., Nicolò, G., Procacci, M., & Alleva, G. (2003). How to evaluate metacognitive functioning in psychotherapy? The metacognition assessment scale and its applications. *Clinical Psychology & Psychotherapy*, *10*(4), 238-261

Sergi, M. J., Fiske, A. P., Horan, W. P., Kern, R. S., Kee, K. S., Subotnik, K. L., ... & Green, M. F. (2009). Development of a measure of relationship perception in schizophrenia. *Psychiatry Research*, *166*(1), 54-62.

Sergi, M. J., Rassovsky, Y., Widmark, C., Reist, C., Erhart, S., Braff, D. L., ... & Green, M. F. (2007). Social cognition in schizophrenia: relationships with neurocognition and negative symptoms. *Schizophrenia Research*, *90*(1-3), 316-324.

Sharaf, A. Y., Ossman, L. H., & Lachine, O. A. (2012). A cross-sectional study of the relationships between illness insight, internalized stigma, and suicide risk in individuals with schizophrenia. *International Journal of Nursing Studies*, *49*(12), 1512-1520.

Sharma, P., Mahour, P., Kumar, R., & Agrawal, V. (2017). Study of relationship between cognitive insight and meta cognition in schizophrenia. *Indian Journal of Health and Wellbeing*, *8*(1), 82-85.

Shi, C., Kang, L., Yao, S., Ma, Y., Li, T., Liang, Y., ... & Zhang, C. (2015). The MATRICS consensus cognitive battery (MCCB): Co-norming and standardization in China. *Schizophrenia Research*, *169*(1-3), 109-115.

Siddi, S., Petretto, D. R., & Preti, A. (2017). Neuropsychological correlates of schizotypy: a systematic review and meta-analysis of cross-sectional studies. *Cognitive Neuropsychiatry*, *22*(3), 186-212.

Sierro, G., Rossier, J., Mason, O. J., & Mohr, C. (2016). French validation of the O-LIFE short questionnaire. *European Journal of Psychological Assessment*, *32*, 195-203.

Singer, E., & Couper, M. P. (2008). Do incentives exert undue influence on survey participation? Experimental evidence. *Journal of Empirical Research on Human Research Ethics*, *3*(3), 49-56.

Singleton, O., Hölzel, B. K., Vangel, M., Brach, N., Carmody, J., and Lazar, S. W. (2014). Change in brainstem gray matter concentration following a mindfulness-based intervention is correlated with improvement in psychological well-being. *Frontiers in Human Neuroscience*. 8:33.

Spada, M. M., Mohiyeddini, C., & Wells, A. (2008). Measuring metacognitions associated with emotional distress: Factor structure and predictive validity of the metacognitions questionnaire 30. *Personality and Individual Differences*, *45*(3), 238-242.

Spielberger, C. D., & Gorsuch, R. L. (1983). *State-trait anxiety inventory for adults: Manual and sample: Manual, instrument and scoring guide.* Consulting Psychologists Press.

Sprong, M., Schothorst, P., Vos, E., Hox, J., & Van Engeland, H. (2007). Theory of mind in schizophrenia. *The British Journal of Psychiatry*, *191*(1), 5-13.

Srivastava, K., & Kumar, R. (2016). Cognitive Insight and Executive Function in Schizophrenia. *SIS Journal of Projective Psychology & Mental Health*, *23*, 106-114.

Stanford, A. D., Messinger, J., Malaspina, D., & Corcoran, C. M. (2011). Theory of Mind in patients at clinical high risk for psychosis. *Schizophrenia Research*, *131*(1), 11-17.

Stanley, I. H., Hom, M. A., & Joiner, T. E. (2018). Modifying mental health help-seeking stigma among undergraduates with untreated psychiatric disorders: A pilot randomized trial of a novel cognitive bias modification intervention. *Behaviour Research and Therapy*, *103*, 33-42.

Statucka, M., & Walder, D. J. (2017). Facial affect recognition and social functioning among individuals with varying degrees of schizotypy. *Psychiatry Research*, *256*, 180-187.

Stefanis, N. C., Hanssen, M., Smirnis, N. K., Avramopoulos, D. A., Evdokimidis, I. K., Stefanis, C. N., ... & Van Os, J. (2002). Evidence that three dimensions of psychosis have a distribution in the general population. *Psychological Medicine*, *32*(2), 347-358.

Stefanis, N. C., Smyrnis, N., Avramopoulos, D., Evdokimidis, I., Ntzoufras, I., & Stefanis, C. N. (2004). Factorial composition of self-rated schizotypal traits among young males undergoing military training. *Schizophrenia Bulletin*, *30*(2), 335-350.

Steffens, M., Meyhöfer, I., Fassbender, K., Ettinger, U., & Kambeitz, J. (2018). Association of schizotypy with dimensions of cognitive control: a meta-analysis. *Schizophrenia Bulletin*, *44*(2), S512-S524.

Stirling, J., Barkus, E., & Lewis, S. (2007). Hallucination proneness, schizotypy and meta-cognition. *Behaviour Research and Therapy*, *45*(6), 1401-1408.

Stowkowy, J., Perkins, D. O., Woods, S. W., Nyman, K., & Addington, J. (2015). Personal beliefs about experiences in those at clinical high risk for psychosis. *Behavioural and Cognitive Psychotherapy*, *43*(6), 669-675.

Strauss, G. P., Sandt, A. R., Catalano, L. T., & Allen, D. N. (2012). Negative symptoms and depression predict lower psychological well-being in individuals with schizophrenia. *Comprehensive Psychiatry*, *53*(8), 1137-1144.

Suhr, J. A., & Spitznagel, M. B. (2001). Factor versus cluster models of schizotypal traits. I: A comparison of unselected and highly schizotypal samples. *Schizophrenia Research*, *52*(3), 231-239.

Sumiyoshi, T., Nishida, K., Niimura, H., Toyomaki, A., Morimoto, T., Tani, M., ... & Katsuki, A. (2016). Cognitive insight and functional outcome in schizophrenia; a multi-center collaborative study with the specific level of functioning scale–Japanese version. *Schizophrenia Research: Cognition*, *6*, 9-14.

Sun, X., Zhu, C., & So, S. H. W. (2017). Dysfunctional metacognition across psychopathologies: a meta-analytic review. *European Psychiatry*, *45*, 139-153.

Surapaneni, S., Larson, L. M., Heath, P. J., & Vogel, D. L. (2018). The interaction of stigma and distress: predicting the help-seeking attitudes of United States students. *British Journal of Guidance & Counselling*, 1-6.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Boston, MA: Pearson.

Tabak, N. T., & de Mamani, A. G. W. (2013). Latent profile analysis of healthy schizotypy within the extended psychosis phenotype. *Psychiatry Research*, *210*(3), 1008-1013.

Talebi, M., Matheson, K., & Anisman, H. (2016). The stigma of seeking help for mental health issues: Mediating roles of support and coping and the moderating role of symptom profile. *Journal of Applied Social Psychology*, *46*(8), 470-482.

Tas, C., Brown, E., Cubukcuoglu, Z., Aydemir, O., Danaci, A. E., & Brüne, M. (2013). Towards an integrative approach to understanding quality of life in schizophrenia: the role of neurocognition, social cognition, and psychopathology. *Comprehensive Psychiatry*, *54*(3), 262-268.

Taylor, P. J., Pyle, M., Schwannauer, M., Hutton, P., & Morrison, A. (2015). Confirming the structure of negative beliefs about psychosis and bipolar disorder: A confirmatory factor analysis study of the Personal Beliefs about Experience Questionnaire and Personal Beliefs about Illness Questionnaire. *British Journal of Clinical Psychology*, *54*(4), 361-377.

Taylor, S. F., Kang, J., Brege, I. S., Tso, I. F., Hosanagar, A., & Johnson, T. D. (2012). Meta-analysis of functional neuroimaging studies of emotion perception and experience in schizophrenia. *Biological Psychiatry*, *71*(2), 136-145.

Thomas, N., Ribaux, D., & Phillips, L. J. (2014). Rumination, depressive symptoms and awareness of illness in schizophrenia. *Behavioural and Cognitive Psychotherapy*, *42*(2), 143-155.

Thompson, A., Papas, A., Bartholomeusz, C., Nelson, B., & Yung, A. (2013). Externalized attributional bias in the Ultra High Risk (UHR) for psychosis population. *Psychiatry Research*, *206*(2), 200-205.

Tolman, A. W., & Kurtz, M. M. (2010). Neurocognitive predictors of objective and subjective quality of life in individuals with schizophrenia: a meta-analytic investigation. *Schizophrenia Bulletin*, *38*(2), 304-315.

Torbet, G., Schulze, D., Fiedler, A., & Reuter, B. (2015). Assessment of self-disorders in a non-clinical population: Reliability and association with schizotypy. *Psychiatry Research*, *228*(3), 857-865.

Tosun, A., & Irak, M. (2008). Adaptation, Validity, and Reliability of the Metacognition Questionnaire-30 for the Turkish Population, and its Relationship to Anxiety and Obsessive-Compulsive Symptoms. *Turkish Journal of Psychiatry*, *19*(1), 1-12.

Tranulis, C., Lepage, M., & Malla, A. (2008). Insight in first episode psychosis: who is measuring what?. *Early Intervention in Psychiatry*, *2*(1), 34-41.

Tsang, H. W. H., Fung, K. M. T., & Chung, R. C. K. (2010). Self-stigma and stages of change as predictors of treatment adherence of individuals with schizophrenia. *Psychiatry Research*, *180*(1), 10-15.

Tucker, J. R., Hammer, J. H., Vogel, D. L., Bitman, R. L., Wade, N. G., & Maier, E. J. (2013). Disentangling self-stigma: Are mental illness and help-seeking self-stigmas different?. *Journal of Counseling Psychology*, *60*(4), 520-531.

Uchida, T., Matsumoto, K., Ito, F., Ohmuro, N., Miyakoshi, T., Ueno, T., & Matsuoka, H. (2014). Relationship between cognitive insight and attenuated delusional symptoms in individuals with at-risk mental state. *Psychiatry Research*, *217*(1), 20-24.

Uchida, T., Matsumoto, K., Kikuchi, A., Miyakoshi, T., Ito, F., Ueno, T., & Matsuoka, H. (2009). Psychometric properties of the Japanese version of the Beck Cognitive Insight Scale: relation of cognitive insight to clinical insight. *Psychiatry and Clinical Neurosciences*, *63*(3), 291-297.

Upthegrove, R., Marwaha, S., & Birchwood, M. (2017). Depression and schizophrenia: cause, consequence, or trans-diagnostic issue?. *Schizophrenia Bulletin*, *43*(2), 240-244.

Urbach, M., Brunet-Gouet, E., Bazin, N., Hardy-Baylé, M. C., & Passerieux, C. (2013). Correlations of theory of mind deficits with clinical patterns and quality of life in schizophrenia. *Frontiers in Psychiatry*, *4*, 1-8.

Uzenoff, S. R., Brewer, K. C., Perkins, D. O., Johnson, D. P., Mueser, K. T., & Penn, D. L. (2010). Psychological well-being among individuals with first-episode psychosis. *Early Intervention in Psychiatry*, *4*(2), 174-181.

Valiente, C., Prados, J. M., Gómez, D., & Fuentenebro, F. (2012). Metacognitive beliefs and psychological well-being in paranoia and depression. *Cognitive Neuropsychiatry*, *17*(6), 527-543.

Van Camp, L. S. C., Oldenburg, J. F. E., & Sabbe, B. G. C. (2016). How self-reflection and self-certainty are related to neurocognitive functioning: an examination of cognitive insight in bipolar disorder. *Cognitive Neuropsychiatry*, *21*(2), 130-145.

Van Camp, L. S. C., Sabbe, B. G. C., & Oldenburg, J. F. E. (2017). Cognitive insight: A systematic review. *Clinical Psychology Review*, *55*, 12-24.

van der Gaag, M., Smit, F., Bechdolf, A., French, P., Linszen, D. H., Yung, A. R., ... & Cuijpers, P. (2013). Preventing a first episode of psychosis: meta-analysis of randomized controlled prevention trials of 12 month and longer-term follow-ups. *Schizophrenia Research*, *149*(1-3), 56-62.

van Oosterhout, B., Krabbendam, L., Smeets, G., & van der Gaag, M. (2013). Metacognitive beliefs, beliefs about voices and affective symptoms in patients with severe auditory verbal hallucinations. *British Journal of Clinical Psychology*, *52*(3), 235-248.

Van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. *Psychological Medicine*, *39*(2), 179-195.

VanVoorhis, C. W., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in Quantitative Methods for Psychology*, *3*(2), 43-50.

Varese, F., & Bentall, R. P. (2011). The metacognitive beliefs account of hallucinatory experiences: a literature review and meta-analysis. *Clinical Psychology Review*, *31*(5), 850-864.

Vaskinn, A., Sundet, K., Ueland, T., Agartz, I., Melle, I., & Andreassen, O. A. (2013). Social cognition and clinical insight in schizophrenia and bipolar disorder. *The Journal of Nervous and Mental Disease*, *201*(6), 445-451.

Velthorst, E., Nieman, D. H., Becker, H. E., van de Fliert, R., Dingemans, P. M., Klaassen, R., ... & Linszen, D. H. (2009). Baseline differences in clinical symptomatology between

ultra high risk subjects with and without a transition to psychosis. *Schizophrenia Research*, *109*(1-3), 60-65.

Ventura, J., Ered, A., Gretchen-Doorly, D., Subotnik, K. L., Horan, W. P., Hellemann, G. S., & Nuechterlein, K. H. (2015). Theory of mind in the early course of schizophrenia: stability, symptom and neurocognitive correlates, and relationship with functioning. *Psychological Medicine*, *45*(10), 2031-2043.

Ventura, J., Wood, R. C., & Hellemann, G. S. (2011). Symptom domains and neurocognitive functioning can help differentiate social cognitive processes in schizophrenia: a meta-analysis. *Schizophrenia Bulletin*, *39*(1), 102-111.

Vidarsdottir, O. G., Twamley, E. W., Roberts, D. L., Gudmundsdottir, B., Sigurdsson, E., & Magnusdottir, B. B. (2019). Social and non-social measures of cognition for predicting self-reported and informant-reported functional outcomes in early psychosis. *Scandinavian Journal of Psychology*, *60 (*4), 295-303.

Vleeschouwer, M., Schubart, C. D., Henquet, C., Myin-Germeys, I., van Gastel, W. A., Hillegers, M. H., ... & Derks, E. M. (2014). Does assessment type matter? A measurement invariance analysis of online and paper and pencil assessment of the Community Assessment of Psychic Experiences (CAPE). *PloS ONE*, *9*(1), e84011.

Vogel, D. L., & Wade, N. G. (2009). Stigma and help-seeking. *The Psychologist, 22*, 20 –23.

Vogel, D. L., Wade, N. G., & Haake, S. (2006). Measuring the self-stigma associated with seeking psychological help. *Journal of Counseling Psychology*, *53*(3), 325-337.

Vogel, D. L., Wade, N. G., & Hackler, A. H. (2007). Perceived public stigma and the willingness to seek counseling: The mediating roles of self-stigma and attitudes toward counseling. *Journal of Counseling Psychology*, *54*(1), 40-50.

Vohs, J. L., Lysaker, P. H., Liffick, E., Francis, M. M., Leonhardt, B. L., James, A., ... & Breier, A. (2015). Metacognitive capacity as a predictor of insight in first-episode psychosis. *The Journal of Nervous and Mental Disease*, *203*(5), 372-378.

Vrbova, K., Prasko, J., Holubova, M., Slepecky, M., & Ociskova, M. (2018). Positive and negative symptoms in schizophrenia and their relation to depression, anxiety, hope, self-stigma and personality traits–a cross-sectional study. *Neuroendocrinology Letters*, *39*(1), 9-18.

Vrbova, K., Prasko, J., Ociskova, M., Kamaradova, D., Marackova, M., Holubova, M., ... & Latalova, K. (2017). Quality of life, self-stigma, and hope in schizophrenia spectrum disorders: a cross-sectional study. *Neuropsychiatric Disease and Treatment*, *13*, 567-576.

Wang, L. J., Huang, Y. C., Hung, C. F., Chen, C. K., Chen, Y. C., Lee, P. Y., ... & Hsu, S. T. (2016). The Chinese version of the brief assessment of cognition in schizophrenia: data of a large-scale mandarin-speaking population. *Archives of Clinical Neuropsychology*, *32*(3), 289-296.

Wang, Y. P., & Gorenstein, C. (2013). Psychometric properties of the Beck Depression Inventory-II: a comprehensive review. *Brazilian Journal of Psychiatry*, *35*(4), 416-431.

Warman, D. M., & Martin, J. M. (2006). Cognitive insight and delusion proneness: an investigation using the Beck Cognitive Insight Scale. *Schizophrenia Research*, *84*(2), 297-304.

Warman, D. M., Lysaker, P. H., & Martin, J. M. (2007). Cognitive insight and psychotic disorder: the impact of active delusions. *Schizophrenia Research*, *90*(1), 325-333.

Watson, A. C., Corrigan, P., Larson, J. E., & Sells, M. (2007). Self-stigma in people with mental illness. *Schizophrenia Bulletin*, *33*(6), 1312-1318.

Weintraub, M. J., & de Mamani, A. W. (2015). Effects of sub-clinical psychosis and cognitive insight on psychological well-being: a structural equation model. *Psychiatry Research*, *226*(1), 149-155.

Wells, A. (2007). Cognition about cognition: Metacognitive therapy and change in generalized anxiety disorder and social phobia. *Cognitive and Behavioral Practice*, *14*(1), 18-25.

Wells, A. (2009). *Metacognitive therapy for anxiety and depression.* New York, NY: Guilford.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research and Therapy*, *42*(4), 385-396.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy*, *34*(11), 881-888.

Welsh, P., Cartwright-Hatton, S., Wells, A., Snow, L., & Tiffin, P. A. (2014). Metacognitive beliefs in adolescents with an at-risk mental state for psychosis. *Early Intervention in Psychiatry*, *8*(1), 82-86.

Wiffen, B., & David, A. (2009). Metacognition, mindreading, and insight in schizophrenia. *Behavioral and Brain Sciences*, *32*(2), 161-162.

Williams, B. T., Henry, J. D., & Green, M. J. (2007). Facial affect recognition and schizotypy. *Early Intervention in Psychiatry*, *1*(2), 177-182.

Williams, J., & MacKinnon, D. P. (2008). Resampling and distribution of the product methods for testing indirect effects in complex models. *Structural Equation Modeling: a Multidisciplinary Journal*, *15*(1), 23-51.

Winterstein, B. P., Silvia, P. J., Kwapil, T. R., Kaufman, J. C., Reiter-Palmon, R., & Wigert, B. (2011). Brief assessment of schizotypy: Developing short forms of the Wisconsin Schizotypy Scales. *Personality and Individual Differences*, *51*(8), 920-924.

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines.* Geneva: World Health Organization.

Wright, K. B. (2017). Web-Based Survey Methodology. *Handbook of Research Methods in Health Social Sciences*, 1-14.

Wuthrich, V. M., & Bates, T. C. (2006). Confirmatory factor analysis of the three-factor structure of the schizotypal personality questionnaire and Chapman schizotypy scales. *Journal of Personality Assessment*, *87*(3), 292-304.

Xavier, S., Best, M. W., Schorr, E., & Bowie, C. R. (2015). Neurocognition, functional competence and self-reported functional impairment in psychometrically defined schizotypy. *Cognitive Neuropsychiatry*, *20*(1), 53-63.

Yanos, P. T., Lysaker, P. H., & Roe, D. (2010). Internalized stigma as a barrier to improvement in vocational functioning among people with schizophrenia-spectrum disorders. *Psychiatry Research*, *178*(1), 211-213.

Yılmaz, A. E., Gençöz, T., & Wells, A. (2008). Psychometric characteristics of the Penn State Worry Questionnaire and Metacognitions Questionnaire-30 and metacognitive predictors of worry and obsessive–compulsive symptoms in a Turkish sample. *Clinical*

Psychology & Psychotherapy: An International Journal of Theory & Practice, *15*(6), 424-439.

Yung, A. R., Nelson, B., McGorry, P. D., Wood, S. J., & Lin, A. (2019). Persistent negative symptoms in individuals at Ultra High Risk for psychosis. *Schizophrenia Research*, *206*, 355-361.

Yung, A. R., Nelson, B., Stanford, C., Simmons, M. B., Cosgrave, E. M., Killackey, E., ... & McGorry, P. D. (2008). Validation of "prodromal" criteria to detect individuals at ultra high risk of psychosis: 2 year follow-up. *Schizophrenia Research*, *105*(1-3), 10-17.

Yung, A. R., Phillips, L. J., Yuen, H. P., & McGorry, P. D. (2004). Risk factors for psychosis in an ultra high-risk group: psychopathology and clinical features. *Schizophrenia Research*, *67*(2-3), 131-142.

Zaytseva, Y., Burova, V., Garakh, Z., & Gurovich, I. Y. (2013). Attributional style in first episode of schizophrenia and schizophrenia spectrum disorders with and without paranoid ideation. *Psychiatria Danubina*, *25*(2), 329-331.

Zhang, L. C., & Brenner, C. A. (2017). The factor structure of the Schizotypal Personality Questionnaire in undergraduate and community samples. *Journal of Personality Disorders*, *31*(1), 1-15.

Zhang, Q., Li, X., Parker, G. J., Hong, X. H., Wang, Y., Lui, S. S., ... & Chan, R. C. (2016c). Theory of mind correlates with clinical insight but not cognitive insight in patients with schizophrenia. *Psychiatry Research*, *237*, 188-195.

Zhang, T., Tang, Y., Cui, H., Lu, X., Xu, L., Liu, X., ... & Jiang, K. (2016a). Theory of mind impairments in youth at clinical high risk of psychosis. *Psychiatry*, *79*(1), 40-55.

Zhang, T., Yi, Z., Li, H., Cui, H., Tang, Y., Lu, X., ... & Chow, A. (2016b). Faux pas recognition performance in a help-seeking population at clinical high risk of psychosis. *European archives of psychiatry and clinical neuroscience*, *266*(1), 71-78.

Zhao, X., Lynch Jr, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*(2), 197-206.

Zheng, W., Zhang, Q. E., Cai, D. B., Ng, C. H., Ungvari, G. S., Ning, Y. P., & Xiang, Y. T. (2018). Neurocognitive dysfunction in subjects at clinical high risk for psychosis: A meta-analysis. *Journal of Psychiatric Research*, *103*, 38-45.

Zouraraki, C., Tsaousis, I., Karamaouna, P., Karagiannopoulou, L., Roussos, P., Bitsios, P., & Giakoumaki, S. G. (2016). Associations of differential schizotypal dimensions with executive working memory: A moderated-mediation analysis. *Comprehensive Psychiatry*, *71*, 39-48.

Zumbo, B. D., Gadermann, A. M., & Zeisser, C. (2007). Ordinal versions of coefficients alpha and theta for Likert rating scales. *Journal of Modern Applied Statistical Methods*, *6*(1), 21-29.

Appendix A - Supplementary data analysis for Chapter 4. Study 1.

Table A.1. Results from ANOVA analyses comparing study variables across the three data collection processes

	Online survey one $n= 311$	Online Survey two n=192	Face to Face Survey One $n=164$	F-test	Group Comparisons
	Mean (SD)	Mean (SD)	Mean (SD)		
SO-LIFE					
Total schizotypy	16.71 (7.66)	17.69 (7.60)	15.14 (6.19)	$F (2, 664) =5.47$, $p=0.004$	Face to Face Survey one < Online Survey two
Unusual experiences	3.45 (2.80)	3.97 (2.65)	3.29 (2.49)	$F (2, 664) =3.38$, $p=0.035$	Face to Face Survey one < Online Survey two
Cognitive disorganisation	6.27 (3.06)	6.33 (3.26)	6.26 (2.79)	$F (2, 664) =0.026$, $p=0.974$	None
Introvertive anhedonia	3.19 (2.32)	3.21 (2.40)	2.27 (1.88)	$F (2, 664) = 10.62, p<0.001$	Face to Face Survey one < Online Survey one, Online survey two
Impulsive non-conformity	3.80 (2.19)	4.18 (2.25)	3.32 (2.16)	$F (2, 664) =6.93$, $p<0.001$	Face to Face Survey one < Online Survey two
BCIS					
Self-reflectiveness	13.12 (4.15)	13.99 (4.44)	13.71 (3.94)	$F (2, 664) =2.79$, $p=0.062$	None
Self-certainty	7.07 (3.13)	7.15 (2.94)	6.55 (2.74)	$F (2, 664) =2.08$, $p=0.126$	None
DASS-21					
Negative affect	19.99 (13.23)	22.60 (13.63)	16.28 (11.60)	$F (2, 664) =10.58$, $p<0.001$	Face to Face Survey one < Online Survey one, Online survey two
SPWB-54 Total PWB	212.76 (39.54)	211.51 (37.51)	227.09 (35.19)	$F (2, 664) =9.49$, $p<0.001$	Face to Face Survey one < Online Survey one, Online survey two

Appendix B- Supplementary data analysis for Chapter 5. Study 2.

Table B.1. Pearson correlations between schizotypy, cognitive insight, negative affect and PWB.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.Total schizotypy	1.00								
2.Unusual experiences	0.76**	1.00							
3.Cognitive disorganisation	0.82**	0.46**	1.00						
4.Introvertive anhedonia	0.60**	0.20**	0.37**	1.00					
5.Impulsive non-conformity	0.72**	0.48**	0.45**	0.24**	1.00				
6.Self-reflectiveness	0.37**	0.32**	0.34**	0.14*	0.28**	1.00			
7.Self-certainty	0.14*	0.19**	-0.01	0.05	0.19**	0.01	1.00		
8.Negative affect	0.63**	0.41**	0.52**	0.40**	0.50**	0.42**	0.08	1.00	
9.PWB	-0.64**	-0.26**	-0.62**	-0.60**	-0.41**	-0.28**	0.06	-0.62**	1.00

$* \ p < 0.05$, $** \ p < 0.001$

Appendix C- Supplementary data analysis for Chapter 6. Study 3.

Table C.1. Pearson correlations between schizotypy, cognitive insight, negative affect and PWB.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.Total schizotypy	1.00								
2.Unusual experiences	0.76**	1.00							
3.Cognitive disorganisation	0.82**	0.47**	1.00						
4.Introvertive anhedonia	0.61**	0.21**	0.38**	1.00					
5.Impulsive non-conformity	0.73**	0.49**	0.47**	0.26**	1.00				
6.Self-reflectiveness	0.37**	0.32**	0.34**	0.12*	0.27**	1.00			
7.Self-certainty	0.16*	0.20**	0.01	0.07	0.21**	0.02	1.00		
8.Negative affect	0.64**	0.42**	0.53**	0.42**	0.52**	0.42**	0.11	1.00	
9.PWB	-0.65**	-0.26**	-0.62**	-0.61**	-0.42**	-0.27**	0.03	-0.63**	1.00

$* p < 0.05, ** p < 0.001$

Table C.2. Pearson correlations between metacognitive beliefs subscales.

	1.	2.	3.	4.	5.
1.CC	1.00				
2.POS	0.26**	1.00			
3.CSC	0.21**	0.32**	1.00		
4.NEG	0.34**	0.37**	0.51**	1.00	
5.NC	0.34**	0.36**	0.51**	0.55**	1.00

$*p<0.05, **p<0.001$. CC= cognitive confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts
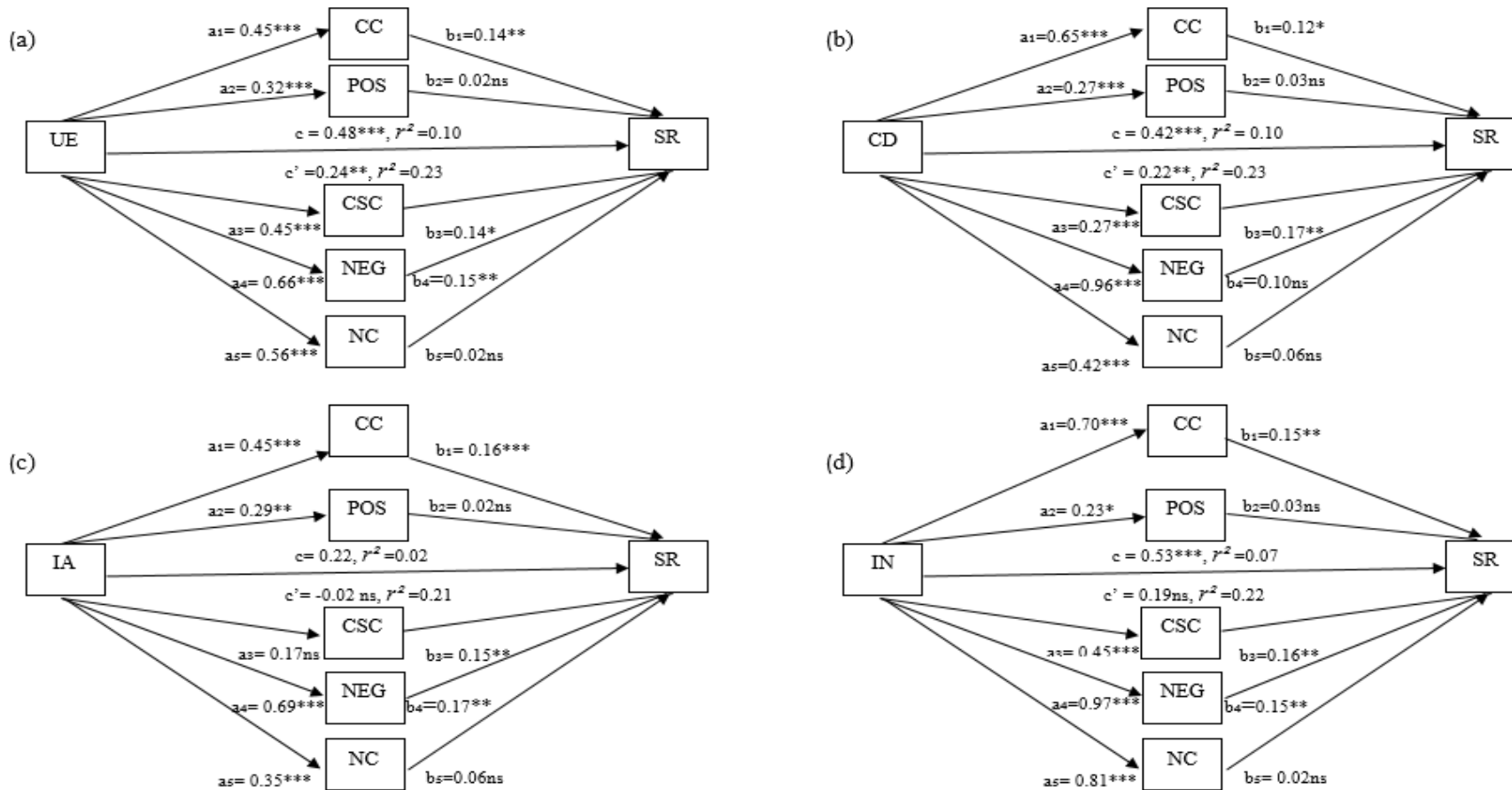
Figure C.1. Regression path from (a) UE (b) CD, (c) IA, (d) IN to SR, mediated by metacognitive beliefs dimensions. a=effect of schizotypy dimensions on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on SR; c=total effect of schizotypy dimensions on SR; c' direct effect of schizotypy dimensions on SR. Values are unstandardized coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; SR= Self-reflectiveness.

Table C.3 Summary of indirect effects of schizotypy on self-reflectiveness via metacognitive beliefs

Predictor Variable	Outcome Variable	Mediating Variables	Indirect Effect (a, b)	95% CI's
UE	SR	CC	0.06	**0.02, 0.12**
		POS	0.01	-0.03, 0.04
		CSC	0.06	**0.02, 0.13**
		NEG	0.10	**0.03, 0.17**
		NC	0.01	-0.07, 0.08
CD	SR	CC	0.08	**0.01, 0.15**
		POS	0.01	-0.02, 0.04
		CSC	0.05	**0.01, 0.10**
		NEG	0.10	**0.003, 0.20**
		NC	0.02	-0.03, 0.08
IA	SR	CC	0.07	**0.02, 0.14**
		POS	0.01	-0.03, 0.04
		CSC	0.03	-0.003, 0.07
		NEG	0.11	**0.05, 0.20**
		NC	0.02	-0.03, 0.07
IN	SR	CC	0.10	**0.03, 0.18**
		POS	0.01	-0.02, 0.04
		CSC	0.07	**0.02, 0.14**
		NEG	0.14	**0.05, 0.25**
		NC	0.02	-0.09, 0.13

Indirect effects are unstandardised estimate. CI's that do not include zero are considered significant and are bolded.

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; SR= Self-reflectiveness.

Figure C.2. Regression path from (a) UE (b) CD, (c) IA, (d) IN to SC, mediated by metacognitive beliefs dimensions. a=effect of schizotypy dimensions on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on SC; c=total effect of schizotypy dimensions on SC; c' direct effect of schizotypy dimensions on SC. Values are unstandardized coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; SC= Self-certainty.

Table C.4 Summary of indirect effects of schizotypy on self-certainty via metacognitive beliefs.

Predictor Variable	Outcome Variable	Mediating Variables	Indirect Effect (a, b)	95% CI's
UE	SC	CC	-0.04	**-0.08, -0.01**
		POS	0.01	-0.01, 0.04
		CSC	0.04	-0.01, 0.09
		NEG	-0.03	-0.09, 0.02
		NC	0.07	**0.01, 0.14**
CD	SC	CC	-0.05	-0.11, 0.01
		POS	0.01	-0.01, 0.04
		CSC	0.03	-0.001, 0.06
		NEG	-0.03	-0.11, 0.05
		NC	0.06	**0.02, 0.12**
IA	SC	CC	-0.04	**-0.08, -0.001**
		POS	0.01	-0.01, 0.04
		CSC		-0.004, 0.05
		NEG	-0.03	-0.08, 0.03
		NC	0.05	**0.01, 0.10**
IN	SC	CC	-0.07	**-0.14, -0.01**
		POS	0.01	-0.003, 0.04
		CSC	0.05	**0.004, 0.10**
		NEG	-0.06	-0.13, 0.02
		NC	0.08	-0.01, 0.18

Indirect effects are unstandardised estimate. CI's that do not include zero are considered significant and are bolded.

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; SC= Self-certainty.
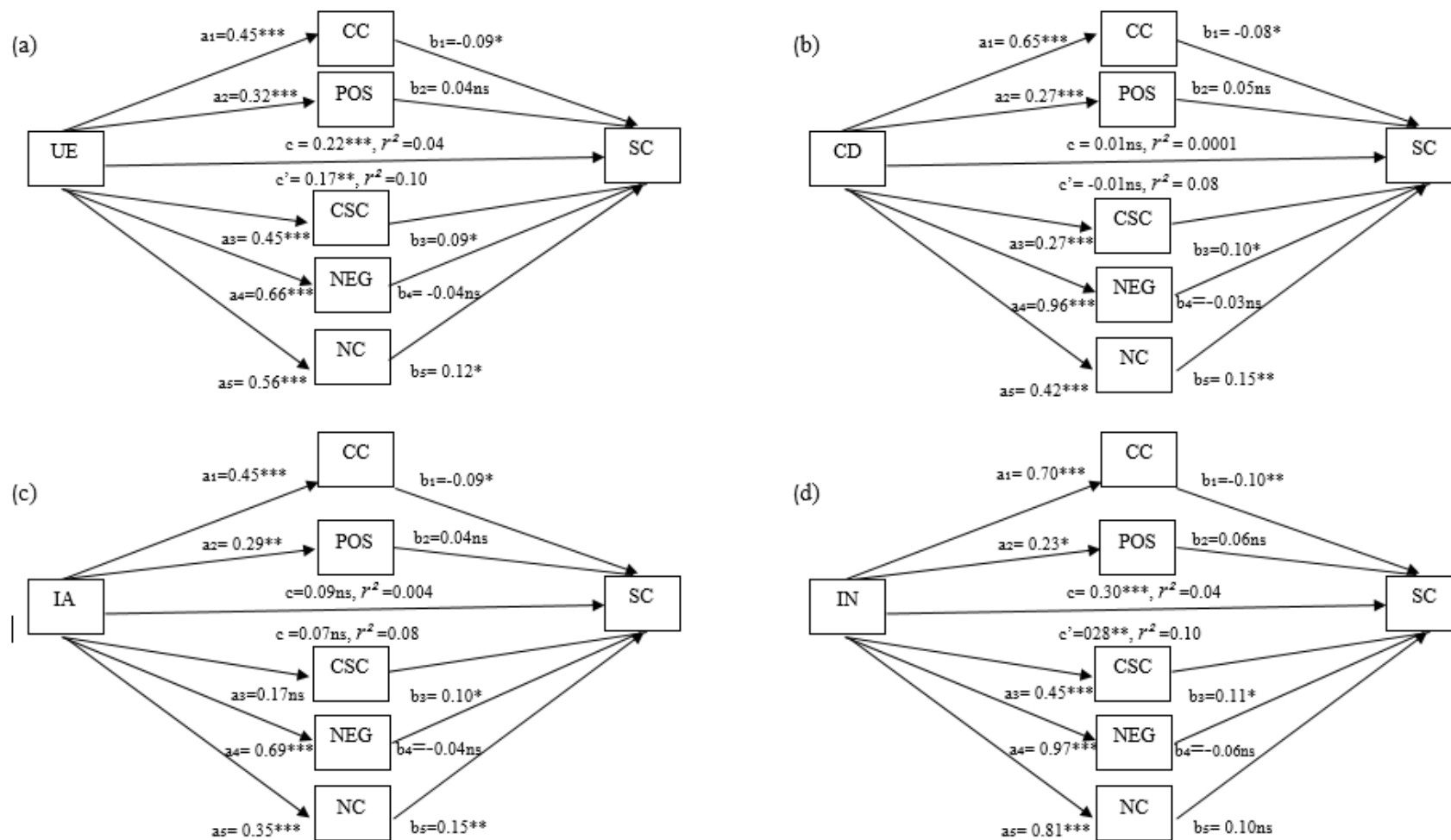
Figure C.3. Regression path from (a) UE (b) CD, (c) IA, (d) IN to NA, mediated by metacognitive beliefs dimensions. a=effect of schizotypy dimensions on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on NA; c=total effect of schizotypy dimensions on NA; c' direct effect of schizotypy dimensions on NA. Values are unstandardized coefficients. *$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; NA= Negative affect.

Table C.5 Summary of indirect effects of schizotypy on negative affect via metacognitive beliefs.

Predictor Variable	Outcome Variable	Mediating Variables	Indirect Effect (a, b)	95% C I's
UE	NA	CC	0.12	**0.002, 0.25**
		POS	-0.02	-0.11, 0.07
		CSC	0.13	-0.002, 0.29
		NEG	0.82	**0.55, 1.11**
		NC	0.11	-0.10, 0.35
CD	NA	CC	0.10	-0.08, 0.27
		POS	-0.01	-0.09, 0.07
		CSC	0.12	**0.03, 0.24**
		NEG	0.97	**0.68, 1.28**
		NC	0.13	-0.02, 0.31
IA	NA	CC	0.11	**0.001, 0.25**
		POS	-0.02	-0.11, 0.06
		CSC	0.07	-0.01, 0.19
		NEG	0.78	**0.50, 1.10**
		NC	0.10	-0.02, 0.26
IN	NA	CC	0.13	-0.04, 0.31
		POS	0.01	-0.05, 0.09
		CSC	0.17	**0.04, 0.35**
		NEG	1.11	**0.78, 1.47**
		NC	0.01	-0.28, 0.30

Indirect effects are unstandardised estimate. CI's that do not include zero are considered significant and are bolded.

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; NA= Negative affect.
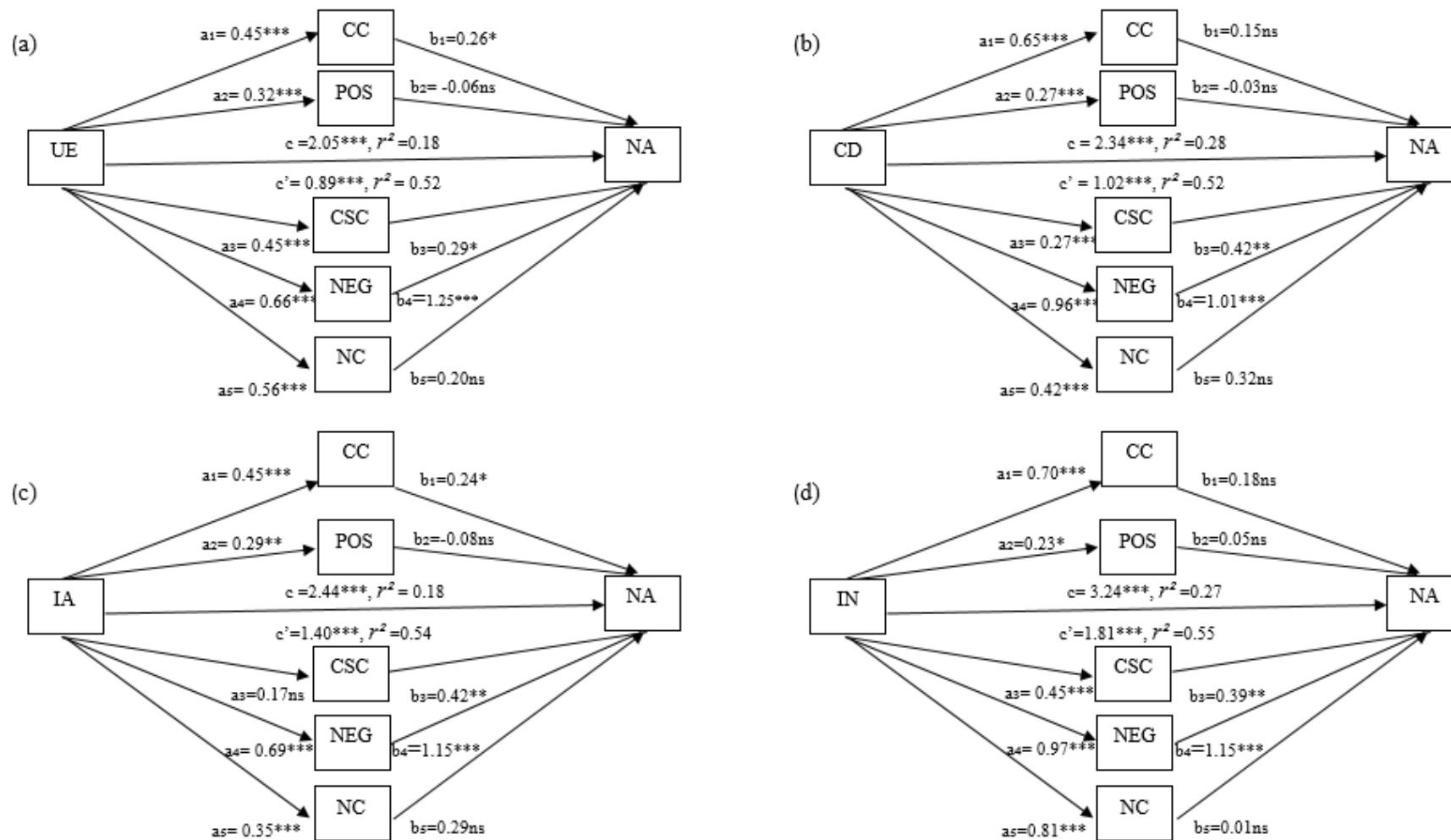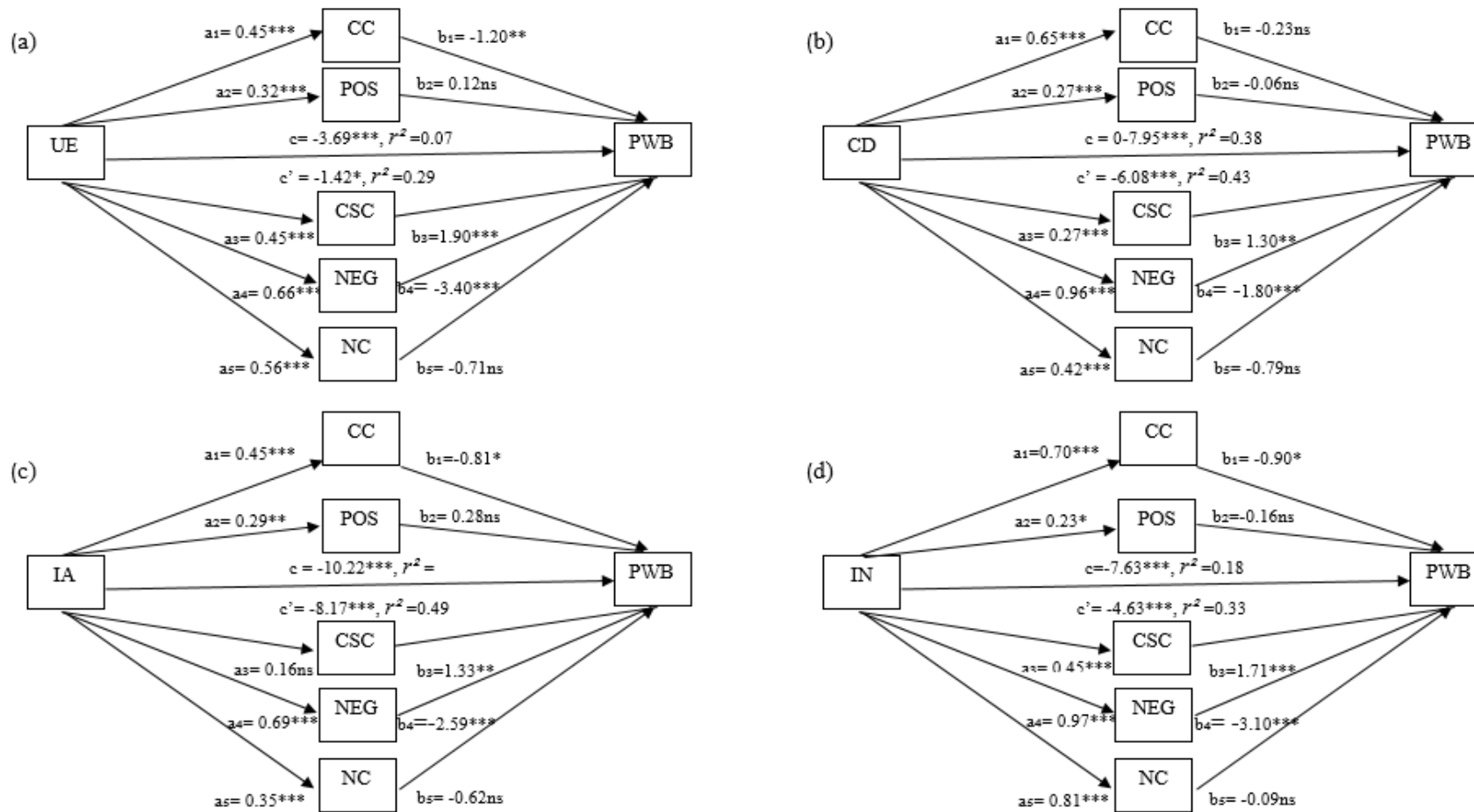
Figure C.4. Regression path from (a) UE (b) CD, (c) IA, (d) IN to PWB, mediated by metacognitive beliefs dimensions. a=effect of schizotypy dimensions on metacognitive beliefs dimensions; b=effect of metacognitive belief dimensions on PWB; c=total effect of schizotypy dimensions on PWB; c' direct effect of schizotypy dimensions on PWB. Values are unstandardized coefficients.*$p<0.05$, **$p<0.01$, ***$p<0.001$, ns $p>0.05$

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; PWB=Psychological wellbeing.

Table C.6 Summary of indirect effects of schizotypy on PWB via metacognitive beliefs.

Predictor Variable	Outcome Variable	Mediating Variables	Indirect Effect (a, b)	95% CI's
UE	PWB	CC	-0.54	**-1.03, -0.13**
		POS	0.04	-0.29, 0.34
		CSC	0.85	**0.33, 1.50**
		NEG	-2.23	**-3.14, -1.38**
		NC	-0.39	-1.17, 0.39
CD	PWB	CC	-0.15	-0.72, 0.40
		POS	-0.02	-0.26, 0.23
		CSC	0.36	**0.08, 0.73**
		NEG	-1.72	**-2.65, -0.90**
		NC	-0.34	-0.89, 0.17
IA	PWB	CC	-0.36	**-0.80, -0.02**
		POS	0.08	-0.14, 0.37
		CSC	0.22	-0.04, 0.59
		NEG	-1.77	**-2.66, -1.03**
		NC	-0.22	-0.70, 0.18
IN	PWB	CC	-0.65	**-1.37, -0.06**
		POS	-0.04	-0.29, 0.19
		CSC	0.76	**0.23, 1.41**
		NEG	-3.00	**-4.24, -1.96**
		NC	-0.07	-1.16, 1.05

Indirect effects are unstandardized estimate. CI's that do not include zero are considered significant and are bolded.

UE= unusual experiences; CD= cognitive disorganisation; IA= introvertive anhedonia; IN= impulsive non-conformity; CC= Cognitive Confidence; POS= positive beliefs about worry; CSC= Cognitive self-consciousness; NEG= negative beliefs about the uncontrollability of thoughts and corresponding danger; NC= negative beliefs about need to control thoughts; PWB= Psychological wellbeing

Appendix D- Supplementary data analysis for Chapter 7. Study 4

Table D.1 Pearson correlations between neurocognitive domains

	Verbal Memory	Working Memory	Motor Speed	Verbal Fluency	Attention and Processing Speed	Reasoning and Problem Solving
Verbal memory	1.00					
Working memory	0.23**	1.00				
Motor speed	0.12	0.13	1.00			
Verbal Fluency	0.40***	0.34***	0.08	1.00		
Attention and processing speed	0.28***	0.34***	0.16*	0.29***	1.00	
Reasoning and Problem solving	0.17*	0.20**	0.14	0.20**	0.35***	1.00

*$p<0.05$, **$p<0.01$, ***$p<0.001$

Table D.2. Pearson correlations between schizotypy, cognitive insight, negative affect and PWB.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.Total schizotypy	1.00								
2.Unusual experiences	0.72***	1.00							
3.Cognitive disorganisation	0.79***	0.39***	1.00						
4.Introvertive anhedonia	0.49***	0.15*	0.23**	1.00					
5.Impulsive non-conformity	0.64***	0.31***	0.37***	0.05	1.00				
6.Self-reflectiveness	0.37***	0.36***	0.35***	-0.003	0.23**	1.00			
7.Self-certainty	0.22**	0.22**	0.16*	0.07	0.12	-0.06	1.00		
8.Negative affect	0.67***	0.40***	0.54***	0.36***	0.48***	0.46***	0.06	1.00	
9.PWB	-0.61***	-0.27***	-0.54***	-0.43***	-0.37***	-0.23**	-0.05	-0.69***	1.00

* $p <0.05$, ** $p <0.01$, ***$p<0.001$

Appendix E- Supplementary data analysis for Chapter 8. Study 5

Table E.1 Pearson correlations between social cognition domains

	Blame-bias	Social perception	Theory of Mind	Emotion Processing
Blame-bias	1.00			
Social Perception	0.02	1.00		
Theory of Mind	-0.10	0.50***	1.00	
Emotion processing	-0.03	0.16*	0.29***	1.00

*p<0.05, **p<0.01, ***p<0.001

Table E.2. Pearson correlations between schizotypy, cognitive insight, negative affect and PWB.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.Total schizotypy	1.00								
2.Unusual experiences	0.73***	1.00							
3.Cognitive disorganisation	0.83***	0.50***	1.00						
4.Introvertive anhedonia	0.55***	0.15*	0.28***	1.00					
5.Impulsive non-conformity	0.72***	0.42***	0.47***	0.22**	1.00				
6.Self-reflectiveness	0.37***	0.22***	0.40***	0.10	0.30***	1.00			
7.Self-certainty	-0.03	0.05	-0.08	-0.12	0.10	-0.06	1.00		
8.Negative affect	0.67***	0.46***	0.59***	0.33***	0.52***	0.43***	-0.003	1.00	
9.PWB	-0.57***	-0.14*	-0.55***	-0.58***	-0.33***	-0.30***	0.11	-0.57***	1.00

* p <0.05, ** p <0.01, ***p<0.001

(a)

| a $_1$= 0.04* | Blame-bias | b $_1$= 1.85*** |

Unusual experiences — c= 0.36**, r^2= 0.05 — Self-reflectiveness

c'= 0.28**, r^2= 0.14

(b)

a $_1$= 0.08*** | Blame-bias | b $_1$= 1.34**

Cognitive disorganisation — c= 0.55***, r^2= 0.16 — Self-reflectiveness

c'= 0.45***, r^2=0.20

(c)

a $_1$= 0.03ns | Blame-bias | b $_1$= 1.97***

Introvertive anhedonia — c= 0.18ns, r^2= 0.01 — Self-reflectiveness

c'=0.12ns, r^2=0.12

(d)

a $_1$= 0.08*** | Blame-bias | b $_1$= 1.67***

Impulsive non-conformity — c=0.57***, r^2= 0.09 — Self-reflectiveness

c'=0.45***, r^2=0.16

(e)

a $_1$= 0.04* | Blame-bias | b $_1$= 0.66*

Unusual experiences — c= 0.06ns, r^2= 0.003 — Self-certainty

c'=0.03ns, r^2= 0.03

(f)

a $_1$= 0.08*** | Blame-bias | b $_1$= 0.88**

Cognitive disorganisation — c= -0.07ns, r^2=0.01 — Self-certainty

c'= -0.14*, r^2=0.05

(g)

a $_1$= 0.03ns | Blame-bias | b $_1$= 0.72**

Introvertive anhedonia — c= -0.14ns, r^2= 0.01 — Self-certainty

c'= -0.16*, r^2=0.05

(h)

a $_1$= 0.08*** | Blame-bias | b $_1$= 0.62*

Impulsive non-conformity — c= 0.12ns, r^2= 0.01 — Self-certainty

c'=0.07ns, r^2=0.03

Figure E.1 Regression path from unusual experiences (a, e), cognitive disorganisation (b, f), introvertive anhedonia (c, g) and impulsive non-conformity (d, h) to self-reflectiveness and self-certainty mediated by blame-bias. a=effect of schizotypy dimensions on blame bias. b= effect of blame-bias on self-reflectiveness and self-certainty, c= is the total effect of schizotypy dimensions on self-reflectiveness and self-certainty. c'= is the direct effect of schizotypy dimensions on self-reflectiveness and self-certainty. Values are unstandardised coefficients. *p<0.05, **p<0.01, *** p< 0.001, ns p> 0.05

(a)

Blame-bias

$a_1 = 0.04*$ $b_1 = 4.62***$

Unusual experiences $c = 2.30***, r^2 = 0.21$ Negative affect

$c' = 2.11***, r^2 = 0.27$

(b)

Blame-bias

$a_1 = 0.08***$ $b_1 = 2.44*$

Cognitive disorganisation $c = 2.41***, r^2 = 0.34$ Negative affect

$c' = 2.23***, r^2 = 0.36$

(c)

Blame-bias

$a_1 = 0.03$ns $b_1 = 5.26***$

Introvertive anhedonia $c = 1.81***, r^2 = 0.11$ Negative affect

$c' = 1.67***, r^2 = 0.19$

(d)

Blame-bias

$a_1 = 0.08***$ $b_1 = 3.73***$

Impulsive non-conformity $c = 2.99***, r^2 = 0.27$ Negative affect

$c' = 2.71***, r^2 = 0.31$

(e)

Blame-bias

$a_1 = 0.04*$ $b_1 = -17.19***$

Unusual experiences $c = -2.02*, r^2 = 0.02$ PWB

$c' = -1.31$ns, $r^2 = 0.13$

(f)

Blame-bias

$a_1 = 0.08***$ $b_1 = -9.53**$

Cognitive disorganisation $c = -6.31***, r^2 = 0.30$ PWB

$c' = -5.59***, r^2 = 0.33$

(g)

Blame-bias

$a_1 = 0.03$ns $b_1 = -15.29***$

Introvertive anhedonia $c = -8.95***, r^2 = 0.33$ PWB

$c' = -8.53***, r^2 = 0.42$

(h)

Blame-bias

$a_1 = 0.08***$ $b_1 = -14.63***$

Impulsive non-conformity $c = -5.44***, r^2 = 0.11$ PWB
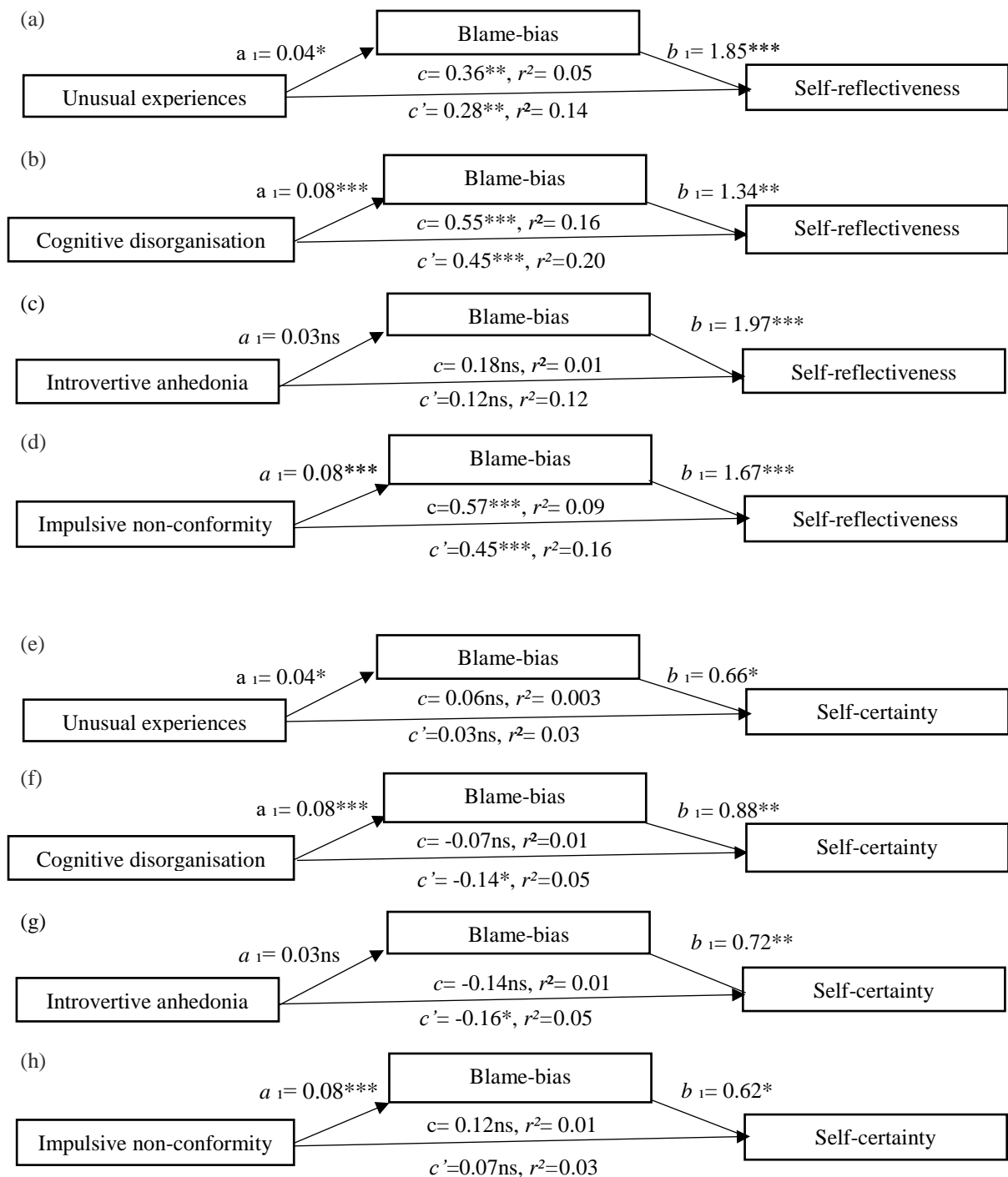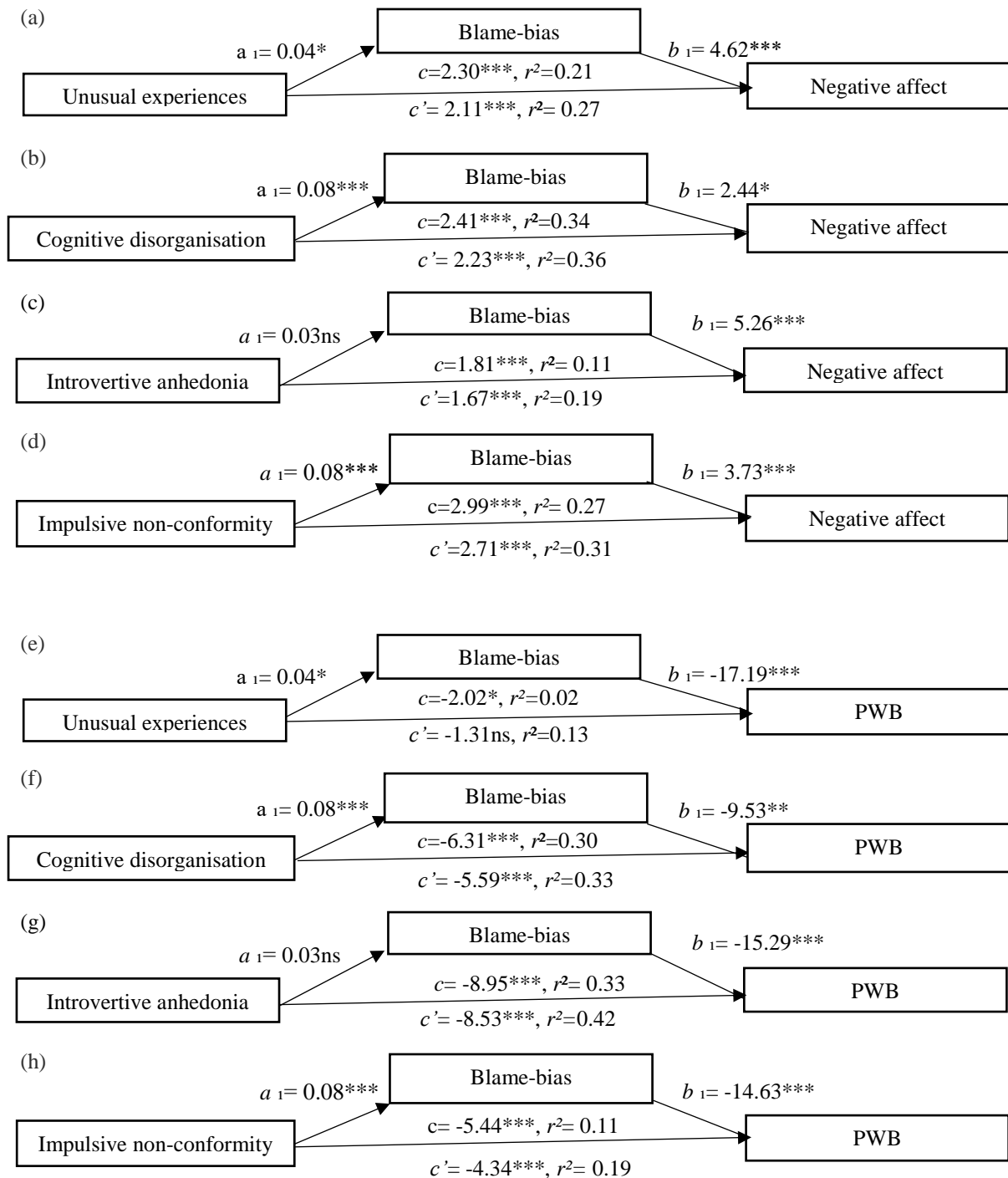
$c' = -4.34***, r^2 = 0.19$

Figure E.2 Regression path from unusual experiences (a, e), cognitive disorganisation (b, f), introvertive anhedonia (c, g) and impulsive non-conformity (d, h) to negative affect and PWB mediated by blame-bias. a=effect of schizotypy dimensions on blame bias. b= effect of blame-bias on negative affect and PWB, c= is the total effect of schizotypy dimensions on negative affect and PWB. c'= is the direct effect of schizotypy dimensions on self-reflectiveness and self-certainty. Values are unstandardised coefficients. $*p<0.05$, $**p<0.01$, $***p<0.001$, ns $p>0.05$

Table E.3. Summary of indirect effects of schizotypy dimensions on self-reflectiveness, self-certainty, negative affect and PWB via blame-bias.

Predictor Variable	Outcome Variable	Mediating Variable	Indirect Effect (a,b)	95% CI's
Unsual experiences	Self-reflectiveness	Blame-bias	0.08	**0.01, 0.16**
Cognitive disorganisation			0.10	**0.04, 0.18**
Introvertive anhedonia			0.06	-0.03, 0.14
Impulsive non-conformity			0.13	**0.05, 0.23**
Unsual experiences	Self-certainty	Blame-bias	0.03	**0.001, 0.07**
Cognitive disorganisation			0.07	**0.02, 0.12**
Introvertive anhedonia			0.02	-0.01, 0.06
Impulsive non-conformity			0.05	**0.01, 0.10**
Unsual experiences	Negative affect	Blame-bias	0.19	**0.01, 0.42**
Cognitive disorganisation			0.18	**0.02, 0.38**
Introvertive anhedonia			0.15	-0.06, 0.37
Impulsive non-conformity			0.28	**0.09, 0.53**
Unsual experiences	PWB	Blame-bias	-0.71	**-1.49, -0.07**
Cognitive disorganisation			-0.72	**-1.28, -0.24**
Introvertive anhedonia			-0.43	-1.08, 0.19
Impulsive non-conformity			-1.10	**-1.91, -0.43**

Indirect effects are unstandardised estimate. CI's that do not include zero are considered significant and are bolded.