

The Social Environment and Psychosis: Search for Symptom Specificity

Thesis submitted in accordance with the requirements of the University of Liverpool
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By

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ABSTRACT

Research with clinical and nonclinical samples has linked multiple psychosocial risk factors with psychosis. There has since been an emphasis on the importance of investigating specific symptoms experienced within the psychosis spectrum to better understand the psychological processes involved. The studies included in this doctoral thesis used cross sectional methods to explore relationships between specific social adversities and specific symptoms within the psychotic domain and also depression, using a number of different samples (students, client groups and general population). This thesis also explores mediating mechanisms between adversities and specific symptoms, paying particular attention to the role of specific adversities in paranoid ideation.

I found that perceived childhood inequality, neglect and adulthood social deprivation and insecure attachment styles predicted paranoid thoughts in student, epidemiological and clinical samples. In my student study I further developed and validated a tool to measure perceived relative deprivation. I then used this tool and found that personal perceptions of injustice and low social rank mediated the relationship between perceived relative deprivation and paranoia. In my epidemiological study I found that experiences of discrimination, lack of trust and stress partially explained the relationship between current social disadvantage and paranoia. In my two clinical studies I found that negative self-esteem explained the association between insecure attachment dimensions and paranoia, and strong perceptions of injustice and an over perception of justice in the world explained the association between childhood emotional neglect and paranoia.

Considering hallucinations, I found specific associations between perceived childhood deprivation and hallucinations in my student sample and between sexual

abuse and hallucinations in my patient sample, although none of the mediating variables tested in this thesis accounted for these associations, suggesting other mechanisms may be important.

The findings of the current studies suggest that it is possible to identify specific associations between adversity and psychotic symptoms in general, and highlight the need to develop a science of public mental health, which at present barely exists as a discipline. In the future, more complex and imaginative designs examining specific environments, specific outcomes, and specific mediating mechanisms will be required if this is to be achieved.

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DECLARATION

This thesis is the result of my own work. The material contained in the thesis has not been presented, nor is currently being presented, either wholly or in part for any other degree or qualification.

Signed(candidate)

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Chapter 1

The social environment and psychosis: Search for symptom specificity

1.1 Abstract

Cumulative evidence from genetic, social and psychological research provides strong evidence of the causal role of the social environment in mental health diagnoses including severe mental illnesses such as schizophrenia and bipolar disorder. Despite this, conventional theories of psychoses continue to focus on biological and endogenous causes. The aim of this review is to synthesise evidence on a range of social and environmental risk factors for psychosis. I discuss the pitfalls and problems of using diagnostic categories as dependent variables, in terms of poor reliability, poor validity, comorbidity with other diagnoses and heterogeneity of symptoms. This review also explores the value of employing symptom-specific approaches (e.g. Bentall, 2003) as an alternative to using diagnostic outcomes in psychosis research. Specifically, I explore the social predictors and underlying mechanisms of paranoia and hallucinations.

1.2 Introduction

1.2.1 Biogenetic approaches to psychosis

The conventional view of schizophrenia suggests that the illness is largely caused by an inherited genetic predisposition resulting in a disease of the brain, so that the role of the environment is small but may be the trigger required for symptoms to develop. The most frequently cited evidence in support of this theory comes from family (Gottesman, McGuffin, & Farmer, 1987), twin (Cardno & Gottesman, 2000) and adoption studies (Kety, Rosenthal, Wender, & Schulsinger, 1968; Kety, Rosenthal, Wender, Schulsinger, & Jacobsen, 1976; Tienari et al., 1987). As a result, many researchers today accept that schizophrenia is between 64% and 85% heritable (Lichtenstein et al., 2009; Sullivan, Kendler, & Neale, 2003) and assume, under an additive model of heritability, that the remaining variance is due to external or psychosocial factors. However, Joseph (2004) discusses the methodological pitfalls of family, twin and adoption studies, suggesting that these types of investigations do not provide conclusive evidence of genetic causation as is usually supposed. In pooling together the most methodologically sound data, pairwise concordance rates (the presence of the same trait, here schizophrenia, in both members of a pair of twins) based on monozygotic and dizygotic twins were 24% and 4.5% respectively, leading Joseph to conclude that the heritability of the illness is perhaps considerably lower than has often been suggested.

Regardless of high or low heritability estimates, researchers interested in the genetics of schizophrenia have often suffered from a misunderstanding of what the heritability statistic means. Fundamentally this is a correlation coefficient and

therefore causation cannot be inferred conclusively (Bentall, 2009). Although the estimate found by Joseph (2004) may be more realistic, we cannot infer that as concordance rates are low for schizophrenia, environmental risk factors must be high. It is now understood, for example through epigenetic research, that the environment and genes interact (Read, Bentall, & Fosse, 2009; Rutten & Mill, 2009) so untangling the determinants of poor mental health needs to take this into account.

For the past four decades, researchers have searched for specific genes that cause schizophrenia. However there have been no breakthrough discoveries (Joseph & Ratner, 2013; Joseph, 2010). Genetic research has found specific genes that may be linked with risk of psychosis (e.g. the Catechol-*O*-methyltransferase gene (COMT; Caspi et al., 2005), neuregulin 1 gene (Stefansson et al., 2002) and the dysbindin gene (Papaleo & Weinberger, 2011), but these findings have not always been replicated (Harrison & Owen, 2003; Okochi et al., 2009)). The literature now tentatively suggests that many genes are implicated in risk for psychosis, all with very small effect (Owen, 2012). Moreover, most of these genes have no diagnostic specificity, with recent evidence suggesting certain genes that are implicated in psychosis are also implicated in other mental health diagnoses (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013).

Alongside molecular genetics research there have been developments in biological psychiatry (i.e. a model that suggests mental illness stems from a biogenetic aetiology). The finding that there are functional and structural differences in individuals with a diagnosis of schizophrenia (Chua & McKenna, 1995; Harrison, 1999; Karlsgodt, Sun, & Cannon, 2010) has led some to believe that the diagnosis is indeed a disorder of the brain. For example through post-

mortem and neuroimaging studies it has been identified that individuals with schizophrenia have abnormalities in hippocampus volume (Heckers, 2001; Thoma et al., 2009), and in prefrontal and frontal cortex volume (Casanova, 1997; Perlstein, Carter, Noll, & Cohen, 2001). However, interpreting these findings is problematic. For example, use of antipsychotic medication may confound these structural findings, as there is cumulative evidence that antipsychotics impact on brain volume. Vita and De Peri (2007) examined the literature on the effects of antipsychotic drug treatment on cerebral structure and function in individuals with a diagnosis of schizophrenia and reported that an increase in basal ganglia was the most replicated finding from positron emission tomography studies of patients chronically treated with any kind of antipsychotic. In addition, they found an association between first generation antipsychotics (e.g. haloperidol) and reduced grey matter volume in the frontal cortex. A more recent study conducted several structural magnetic resonance imaging (MRI) follow ups for over eight years with 211 individuals meeting diagnosis of schizophrenia (Ho, Andreasen, Ziebell, Pierson, & Magnotta, 2011). The study found that antipsychotic treatment was associated with smaller grey matter volumes. Higher dosage predicted progressive decrement in white matter volume, leading the researchers to conclude that antipsychotics have a significant influence on brain tissue loss over time (Ho et al., 2011).

1.2.2 Psychosocial approaches to psychosis

Critics of exclusively biological approaches to psychosis have argued that anomalies found in individuals with schizophrenia can also be explained through the “traumagenic neurodevelopment model of psychosis” (see Read, Fosse, Moskowitz, & Perry, 2014; Read, Perry, Moskowitz, & Connolly, 2001). Evidence

shows that experiences of trauma (e.g. sexual abuse) impose some of the same structural and functional changes in the brain as those described above (Hoy et al., 2012). Therefore it may be equally plausible that psychosis is caused by psychological trauma and that brain changes are a consequence of these experiences. As mentioned previously, anomalies in brain structure and function are also likely to be at least partially a consequence of pharmacological intervention. It seems plausible that, through identifying environmental factors that contribute to the development of severe mental illness, we will be able to better understand the content of symptoms and course of the illness and therefore help individuals experiencing distress.

Research investigating psychosocial factors has identified multiple risk factors that seem to play a role in the likelihood of developing psychosis – including familial and economic factors, as well as exposure to traumatic life experiences (Read, 2013). Family environment risk factors include: health of the mother and stress during pregnancy (e.g. van Os & Selton, 1998), being the product of an unwanted pregnancy (e.g. Myhrman, Rantakallio, Isohanni, Jones, & Partanen, 1996), separation from parents, particularly early experiences of separation and parental death (e.g. Morgan et al., 2007), insecure attachment relationships (see Korver-Nieberg, Berry, Meijer, & de Haan, 2013; Read & Gumley, 2008) as well as witnessing domestic violence (e.g. Trevillion, Oran, & Howard, 2013). Background economic factors that may or may not be associated with family factors include living in poverty (e.g. Burns & Esterhuizen, 2008), relative poverty and social inequality (e.g. Burns, Tomita, & Kapadia, 2014; Kirkbride, Jones, Ullrich, & Coid, 2014). In addition to these there are several types of interpersonal trauma that have been shown to impact on risk of psychosis such as childhood sexual, physical and

emotional abuse (e.g. Bebbington et al., 2011; Morrison, Read, & Turkington, 2005; Varese et al., 2012), physical and emotional neglect (e.g. Sar et al., 2010; Sitko, Bentall, Shevlin, O'Sullivan, & Sellwood, 2014), experiences of bullying (e.g. Bebbington et al., 2004), physical assault as an adult, being kidnapped, tortured, experiencing war or combat, and witnessing someone being seriously injured or killed (e.g. Scott, Chant, Andrews, Martin, & McGrath, 2007).

Based on the above evidence, it has been argued that psychosocial risk factors are likely to play a causal role in the development of psychotic experiences/psychosis (Bentall & Varese, 2012; Varese et al., 2012). Many of these psychosocial risk factors meet Hill's well-known criteria for causality (Hill, 1965). These criteria include strength of associations (odds ratio of > 2), consistency in the findings, temporal relationship (evidence that the risk factor preceded the effect), dose-response relations, coherence with other data (using different methodological designs), reversibility of effects (that is, the outcome becomes less likely when the risk factor is removed), and consideration of alternative explanations. This section will focus on psychosocial factors including urbanicity, poverty, deprivation, inequality, discrimination, victimisation, attachment and trauma. I will draw on syntheses of the evidence for each of these factors, and will demonstrate that Hill's criteria have, largely, been met.

1.2.3 *The urbanicity effect*

The association between the urban environment and psychosis has been well established (Allardyce et al., 2005; Burns & Esterhuizen, 2008; Harrison et al., 2003; Heinz, Deserno, & Reininghaus, 2013; Pedersen & Mortensen, 2001; Spauwen, Krabbendam, Lieb, Wittchen, & van Os, 2004). One of the earliest studies

investigating this association found more cases of psychiatric disorders in densely populated areas (Faris & Dunham, 1939). Several systematic reviews and meta-analyses suggest there is in fact a linear relationship between urbanicity and risk of psychosis. The risk was estimated to be 2.37 times higher for those in the most urban areas compared to their comparatives in the most rural areas (Vassos, Pedersen, Murray, Collier, & Lewis, 2012). Similarly, Kirkbride et al.'s (2012) recent systematic review and meta-analysis of incidence of schizophrenia and other psychoses in England between 1950 and 2009, found that the highest overall incidence of non-affective psychoses and schizophrenia was in London (England's most densely populated area). Kirkbride et al.'s meta regression found a significant linear association between these disorders and urbanicity. Interestingly, this finding did not extend to the affective psychoses (including bipolar disorder and depressive psychoses), suggesting that urbanicity has a specific association with non-affective psychoses. Studies specifically focusing on psychosis have found similar findings (Allardyce et al., 2005; Heinz et al., 2013), and identified a dose-response relationship between time spent in urban environments and psychosis (Pedersen & Mortensen, 2001) suggesting that there is something particularly toxic about this environment.

The impact of living in urban environments, although substantive, should not overshadow the negative impact of rural living. High rates of suicide among men have been reported in both the most and the least densely populated areas in Scotland (Stark, Hopkins, Gibbs, Belbin & Hay, 2007), although this finding is variable (see Smith, Humphres & Wilson, 2008). High rates of suicide have also been reported in farm workers (Boxer, Burnett & Swanson, 1995). This suggests that there is also something toxic about rural living. There are many obstacles to a good quality of life

in rural communities; of particular importance to mental health and suicide rates are isolation, pressures of work life, economic strain and inadequate access to services (see also Malmberg, Simkin, & Hawton, 1999).

1.2.4 Poverty, and deprivation and inequality

Poverty and low socioeconomic status (SES) are well-established risk factors for a wide range of physical and mental health problems (Jenkins et al., 2008; Kim, Kawachi, Hoorn, & Ezzati, 2008; Lorant et al., 2003; Murali & Oyebode, 2004; Weich & Lewis, 1998). In addition to the common psychiatric disorders, research has found these factors to place people at an increased risk of psychosis (Burns & Esterhuizen, 2008). Interestingly, a recent review of the evidence of parental SES at birth and risk of psychosis suggests that the literature is mixed, finding that seven studies showed an association between low SES and psychosis, four studies showed no association, and three studies showed an association with high SES (Kwok, 2014). This study did not meta-analyse their findings which could reveal a more definitive answer than the systematic review method employed.

Importantly, this association has been shown to be independent of genetic risk. Wicks, Hjern, and Dalman (2010) used data from Sweden to identify a total of 13,163 children born between 1955 and 1985 who were reared in adoptive families and established the household SES through census data. The authors linked this information with the national admissions to hospitals for non-affective psychoses and schizophrenia for the biological mothers of adoptees and the adoptees. Increased risks for nonaffective psychosis were found among adoptees (without biological parental history of psychosis) reared in families with disadvantaged SES, which consisted of adoptive parental unemployment (hazard ratio=2.0, 95% CI [1.0, 4.2]),

single-parent household (hazard ratio=1.2, 95% CI [0.6, 2.6]), and living in apartments (hazard ratio=1.3, 95 % CI [1.0, 1.8]). The risk increased for those individuals with genetic liability for psychosis (hazard ratio=4.7, 95% CI [3.1, 7.2]).

There is evidence to suggest that it is not poverty alone that is damaging to mental health, but relative poverty (experiencing poverty where there is a great amount of variability within society). Looking at the societal level, when disparities in income within countries are identified the impact of inequality is revealed; countries with greater levels of inequality experiencing more physical and mental health problems (Wilkinson & Pickett, 2009). When considering schizophrenia, recent research has found a strong association with income inequality using a wide variety of inequality measures. Studies investigating inequalities and deprivation can be measured at a national level (for example using the Gini coefficient: see Wilkinson & Pickett), or at a neighbourhood level (where a local Gini coefficient is derived, e.g. Kirkbride et al. 2012). Additionally studies have used census data to derive a composite score of deprivation and inequality. The association between inequality and psychosis has been identified at birth: Harrison, Gunnell, Glazebrook, Page, and Kwiecinski (2001) used a matched case-control design using a defined catchment area in Nottingham. Inequality at birth was assessed using mothers address from birth certificates, which was used to assign individuals to an area measure of socioeconomic deprivation based on census data and parental (father) occupation (i.e. social class). The risk of schizophrenia was highest for individuals with both high levels of inequality and low parental social class (OR = 8.1, 95% CI [2.7, 23.9]). This became non-significant when individuals met only one of these indicators (OR = 2.1, 95% CI [0.8, 5.5]).

Furthermore, Boydell, van Os, McKenzie, and Murray (2004) investigated inequality (measured by examining the distribution of deprivation scores within each electoral ward, using census information from the UK) and identified, using case records of schizophrenia, that the incidence of schizophrenia increased as inequality increased. This effect was observed only in the most deprived wards (IRR = 3.79, 95% CI [1.25, 11.49]). Burns and Esterhuizen (2008) investigated all people who presented to psychiatric services with a first episode of psychosis (FEP) during 2005 in South Africa based on clinical records and assigned each of their participants an inequality index based on the ratio of the mean income of the highest earners (top 10%) to the mean income of the lowest earners (bottom 10%) of their municipalities, of which there were seven. The authors found a significant association between incidence of FEP with both poverty and inequality. Moreover, these findings remained significant after accounting for gender, age, ethnicity, urbanicity and employment status.

A systematic review and meta-analysis of the evidence from England between 1950 and 2009 found that there were increased rates of non-affective psychoses reported independently of differences in the age, sex and ethnic population structure of different geographical areas, and correlated with a number of socio-environmental factors including ethnic density, social cohesion, social fragmentation, deprivation and inequality (Kirkbride et al., 2012). A more recent review compared income inequality, as measured by the Gini coefficient, across 26 countries. The findings suggest that individuals in countries characterised by a large rich-poor divide may be at an increased risk of schizophrenia (Burns et al., 2014). Perhaps more significant is the fact that the relationship between inequality and schizophrenia

remained significant after controlling for urbanicity, gross domestic product (GDP) per capita, migration and national unemployment rates.

Chapters 2, 3 and 4 of this thesis directly address the role of poverty and social inequality in psychosis and psychotic-like experiences, using student and epidemiological samples.

1.2.5 Ethnicity and migration

Cantor-Graae and Selten's (2005) meta-analytic review of migration and schizophrenia identified 18 studies (first-contact incidence and hospital based first admissions studies) eligible for inclusion. Almost all of the effect sizes implied a higher risk for migrants than for non-migrants. A risk of 2.7 (95% CI [2.3, 3.2]) was yielded for first-generation migrants (pooled from 40 effect sizes), whereas for second generation migrants the relative risk increased to 4.5 (95% CI [1.5, 13.1]). The relative risk for immigrants from developed countries was two times that of native-born populations. In Cantor-Graae and Selten's meta-analysis a higher risk ratio (4.8, 95% CI [3.7, 6.2]) was identified for migrants with black skin versus white and neither black nor white. This finding has largely been supported with a recent review finding that incidence of psychotic disorders was higher in low ethnic density areas than high ethnic areas, suggesting racism, social capital and social cohesion could be underlying mechanisms (Bosqui, Hoy, & Shannon, 2014). Overall, it seems unlikely that genetic and biological factors could explain this association given that overall risk in individual's home countries is not inflated, and general psychopathology remains largely equal across countries (van Os & Kapur, 2009). It rather supports evidence for a casual role of the social environment.

1.2.6 Victimization

Experiences of victimisation (e.g. bullying) have been associated with a wide range of poor mental health outcomes, such as substance use, depression, anxiety, antisocial personality and psychosis (Arseneault, Bowes, & Shakoor, 2010; Sourander et al., 2007; van Dam et al., 2012). A recent study has found associations between school mobility and psychotic-like symptoms in adolescence. One factor investigated was experiences of bullying at school. Unadjusted odds ratios suggest that being either a bully or a victim placed children at 2.29 (95% CI [1.78, 2.96]) risk of developing psychotic-like symptoms and the risk from being both a bully and a victim was 3.28 (95% CI [2.62, 4.75]) (Singh, Winsper, Wolke, & Bryson, 2014).

A previous longitudinal study investigating psychiatric outcomes for young men in Finland who experienced bullying, suggested they were at an increased risk of any psychiatric disorder (ORs range from 2.2, 95% CI [1.4, 3.5] to 4.5, 95% CI [2.6, 7.6]) (Sourander et al., 2007). When looking at psychotic disorders (including schizophrenia) the researchers found ORs were non-significant if individuals were frequently a bully or frequently a victim of bullying. Interestingly if they were frequently a bully and a victim the odds ratio increased to 8.9. However, this finding had large confidence intervals (ranging between 1.9 and 42.3) and this study regarded psychotic disorders as a distinct category, compared with their other groups (antisocial personality, substance use, depression and anxiety) and had a very low number of subjects which may explain this inflated odds ratio (Sourander et al., 2007).

Several systematic reviews and meta-analyses have been conducted investigating experiences of bullying. Varese et al. (2012) concluded that experiences of bullying OR was 2.39 (95% CI [1.83, 3.11]) for risk of psychosis. van Dam (2012) found four clinical studies and 10 general population studies, finding

mixed results in the clinical samples (possibly due to the small number of participants included). However, the nonclinical studies provided strong evidence of association between school bullying and the development of non-clinical psychotic symptoms (ORs ranging between 2.3, 95% CI [1.5, 3.4] and 2.7, 95% CI [2.1, 3.6]).

Furthermore, a systematic review conducted by Maniglio (2009) found that, subsequent to diagnosis, individuals with psychosis were at an increased risk of experiencing victimisation, finding a prevalence estimate of violent victimisation ranging between 4.3% to 35.04% and non-violent victimisation ranging from 7.7% to 27.99%. These rates were 2.3 -140.4 times higher than the general population risk. This indicates that individuals with a diagnosis of schizophrenia are more vulnerable to criminal victimisation. The researchers found that, as a result of these experiences, individuals reported more severe symptoms, homelessness and alcohol and/or illicit drug use, all of which undoubtedly will have an impact on recovery.

1.2.7 Attachment

Several studies have indicated that separation from caregivers or other events likely to disrupt attachment relationships in early life are risk factors for psychosis. For example, in a Finnish cohort study, risk of psychosis at 26-years was elevated in individuals whose mothers, during pregnancy, had indicated that the pregnancy was unwanted (Myhrman et al., 1996). In the UK Aetiology and Ethnicity of Schizophrenia and Other Psychoses (AESoP) study, separation from parents at an early age was found to be a risk factor for psychosis (Morgan et al., 2007).

It seems likely that these kinds of experiences will impact on attachment styles. These styles are developed early in childhood and are formed by the physical and emotional connection with one's caregiver (Bowlby, 1973). These connections

provide individuals with cognitive models or schemas about the self and about others. The schemas that develop as a result of these early experiences allow us to interpret, predict and connect with others as an adult (e.g. Malekpour, 2007). If caregivers provide interactions that are trustworthy, responsive and easily accessible, positive self and positive other schemas are formed, resulting in a secure attachment style. If a caregiver is unpredictable or unavailable, negative schemas are formed, producing insecure attachment styles (which are named slightly differently in different accounts but here I describe as anxious, avoidant and fearful). The anxious attachment style is associated with a positive other-model but a negative self-model, the avoidant attachment style is associated with a positive self-model and a negative other-model, and the disorganised attachment style is associated with both models being negative. Bartholomew and Horowitz (1991) showed that these four styles could be reduced to two dimensions: attachment anxiety (associated with negative models of the self) and attachment avoidance (associated with negative models of others).

A systematic review conducted by Korver-Nieberg et al. (2013) identified 29 studies assessing adult attachment in combination with psychotic experiences, both using clinical and non-clinical samples. They found that both insecure anxious and insecure avoidant attachment are associated with psychotic experiences. Furthermore, this review suggested that insecurely attached individuals were more likely to develop maladaptive coping strategies thus prolonging recovery from psychosis. A review by Gumley, Taylor, Schwannauer and Macbeth (2014) found evidence of small to moderate effect sizes that insecure attachment is related to positive (e.g. delusions, hallucinations, grandiosity) and negative (e.g. blunted affect, emotional withdrawal, stereotyped thinking) symptom severity, severity of

depression and quality of life. However they noted that more research was required due to methodological problems in researching attachment dimensions in psychoses. For example all of the studies but two included in their review were cross-sectional. All except three used participants with established or chronic psychosis and Gumley et al. therefore highlight the need for studying first episode experiences or “at risk” participants. Additionally, the flow of participants entering studies was under-reported. They noted additional methodological flaws, including insufficient descriptions of study inclusion and exclusion criteria, a lack of reporting of medication, diagnoses and education level of participants. Finally, consistent with these criticisms, there was a publication bias for significant findings as indicated by unpublished studies known to the authors.

Chapter 5 of this thesis addresses the relationship between adult attachment style and psychotic symptoms, using a large patient vs control sample.

1.2.8 Childhood trauma

Two meta-analyses have now been conducted investigating the causal role of childhood trauma on subsequent psychotic disorders (Matheson, Shepherd, Pinchbeck, Laurens, & Carr, 2013; Varese et al., 2012). Varese et al. (2012) meta-analysis scrutinised case-control, (n = 18), prospective and quasi-prospective studies (10) and population based cross-sectional studies (8). Pooling the different studies together revealed that sexual abuse odds ratio was 2.38 (95% CI [1.98, 2.87]) physical abuse was 2.95 (95% CI [2.25, 3.88]) and emotional abuse was 3.40 (95% CI [2.06, 5.62]). Moreover, they identified that 9 out of the 10 studies that investigated a dose-response relationship found one. For example, Shevlin et al. (2008) reported a linear dose-response relationship between hallucinations and

experiencing one type of trauma (OR = 2.53, 95% CI [1.12, 5.69]) to 5 types of trauma (OR = 53.26, 95% CI [14.55, 194.98]), suggesting a strong dose-response relationship between traumatic experiences and risk of psychosis. They indicated that assuming causality, the number of people with psychosis would be reduced by 33% if their historic trauma were removed, thus demonstrating its catastrophic impact (see also Read, 2013).

The second meta-analysis conducted by Matheson et al. (2013) identified 25 studies which included cohort, case-control and cross-sectional studies investigating childhood adversities (including sexual, physical abuse and neglect before the age of 18) and schizophrenia. They compared the results with data from non-psychiatric controls, affective psychosis, anxiety disorders, depressive disorders, dissociative and post-traumatic stress disorder (PTSD), other psychoses and personality disorder (PD). They found moderate to high odds ratios when comparing schizophrenia with non-psychiatric controls (OR = 3.60, 95% CI [2.08, 6.23]) and anxiety disorders (OR = 2.54, 95% CI [1.29 – 5.01]). No significant differences were obtained when comparing with affective psychosis (OR = 1.23, 95% CI [0.77, 1.97]), depressive disorder (OR = 1.37, 95% CI [0.53, 3.49]), dissociative disorders and/or PTSD (OR = 0.03, 95% CI [0.01, 0.15]), other psychoses (OR = 0.69, 95% CI [0.28, 1.68]) and personality disorders (OR = 0.65, 95% CI [0.09, 4.71]). It is interesting that the schizophrenia findings were most comparable with those from patients with dissociative disorder and/or PTSD.

1.3 Schizophrenia as an outcome measure

“The promise of the science of mental disorders is great. In the future, we hope to be able to identify disorders using biological and genetic markers that

provide precise diagnoses that can be delivered with complete reliability and validity. Yet this promise, which we have anticipated since the 1970s, remains disappointingly distant. We've been telling patients for several decades that we are waiting for biomarkers. We're still waiting. In the absence of such major discoveries, it is clinical experience and evidence, as well as growing empirical research that have advanced our understanding of disorders such as autism spectrum disorder, bipolar disorder, and schizophrenia.”

David Kupfer, Chair of the DSM-5 Task Force (2013)

To progress forward with research on the social determinants of psychosis we need to study the psychological mechanisms underlying these environmental and social risk factors. However, many of the psychosocial risk factors mentioned above have been implicated in multiple psychopathologies, and are not unique to psychosis. An important obstacle to a greater understanding of the risk factors for psychosis lies within the diagnosis of psychotic disorders (especially schizophrenia). McGrath (2005) discussed the basic requirements of science is *accurate* measurement. It would seem that investigating genetic, psychological or social risk factors for psychosis falls short because for so many years “schizophrenia” has been studied as a homogeneous and tangible phenomenon. However, as a concept schizophrenia suffers from many pitfalls that make research and intervention for those diagnosed challenging.

1.3.1 The historical concept of schizophrenia

Over one hundred years of research in schizophrenia has provided us with little confidence in the diagnostic systems used in psychiatry. David Kupfer (2013) Chair of the American Psychiatric Association’s (APA) Diagnostic and Statistical

Manual (DSM) V task force, says “we are still waiting” for reliable and valid diagnoses. This is perhaps unsurprising when we consider how diagnostic classification systems were created and evolved. Schizophrenia as a concept can be traced back to the late 1800’s when Emil Kraepelin first described what he then termed *dementia praecox*. He believed that through recognising clusters of symptoms with common outcomes it would be possible to identify pathological brain processes and also the aetiology of disorders (Kraepelin, 1915). The name of the hypothesised disorder was changed to “schizophrenia” by Bleuler (1950), a word derived from the Greek verb *schizen* indicating “splitting” and *phren* meaning “soul/spirit/mind”. The definition of schizophrenia has gone through several changes since the introduction of the term, with most psychiatrists viewing the condition as one associated with poor prognosis (see Andreasen & Carpenter, 1993).

Some commentators have suggested that diagnosis is a form of social control (Szasz, 1997, 2003), used as a tool to confine those who are different and nonconformist. Fabrega (1996) reviewed the historical and social development of psychiatric diagnoses. He argued that the key principles of psychiatry and classification of disorders were accepted as *fact* although they have been entirely shaped by historical events, cultural influences and political pressures. The most striking evidence of this comes from two famous developments. The first, was the successful removal of homosexuality from the DSM II edition in 1973 and ICD-10 edition in 1992 (see Mendelson, 2003) as a result of pressures from gay rights activists. Silverstein (2009) who was part of the committee and met with the APA in 1973 to remove homosexuality from the DSM argued that the diagnosis “was the child of morality and that Judeo-Christian values controlled psychiatric practise” (p. 123). The shift to the third edition of the DSM aimed to bring about a criteria-based,

multi-axial classification of mental disorders (Spitzer, Williams, & Skodol, 1980). However, the diagnosis PTSD entered the DSM III in 1987 after lobbying by anti-war psychiatrists, Vietnam veterans' committees, social workers, and psychologists (see Burstow, 2005; Scott, 1990), and later entered the ICD-10 in 1992 (Turnbull, 1998).

Most authorities have assumed that severe mental disorders are immune from the criticism and that they are socially constructed and designed for the purpose of social control (Szasz, 2003). The idea that "schizophrenia" is a scientifically reliable and valid diagnosis is disputable.

1.3.2 Reliability of schizophrenia

If we consider the reliability of schizophrenia (including the internal consistency, inter-rater reliability and test-retest reliability) problems immediately become evident. First the internal-consistency: to receive a DSM diagnosis of schizophrenia a patient needs two out of the five "characteristic symptoms" with the exception that, within the DSM-IV, only 1 "characteristic symptom" is required if either 'a voice is keeping up a running commentary on the person's thoughts or behaviour', 'there are two or more voices conversing with each other' or 'the delusions are bizarre' (see Read, 2013). Although this later categorisation has now been removed from the updated DSM V, it remains the case that there are multiple ways in which two people can meet the criteria for schizophrenia without sharing a common symptom.

There is no guarantee that those that do share common symptoms would receive the same diagnosis due to poor inter-rater reliability of diagnosis. Inter-rater reliability is a way of testing the consistency with which two individuals can give the

same diagnosis. This can be estimated through a statistical technique known as the kappa value (Cicchetti, 1994). Cicchetti states that, when the kappa coefficient is below .40, the level of clinical agreement is poor; when it is between .40 and .59, the level of clinical agreement is fair; when it is between .60 and .74, the level of clinical agreement is good; and when it is above .75, the level of clinical significance is excellent. In the current DSM V field trials it was estimated that the agreement between clinicians for schizophrenia was .46, which was described as “good agreement” (Freedman et al., 2013, p. 2).

The DSM-V field trials also provided test-retest reliability data which ranged from .46 (Regier et al., 2013) to .79 (Narrow et al., 2013) for psychosis. These were assessed from 4 hours to 2 weeks apart. It is not clear how informative this kind of analysis is as the course and outcome of schizophrenia is varied and the principle aim of diagnosis is to provide support and treatment for individuals in order to reduce symptoms and distress. Therefore diagnosis will have poor test-retest reliability under some circumstances, and especially when treatment is effective. Inevitably, many researchers have argued that schizophrenia is a meaningless concept, with blurred concepts and disjunctive categories (Bentall & Varese, 2012; Bentall, 2003; Kinderman, Read, Moncrieff, & Bentall, 2013; Read, 2013).

1.3.3 Validity of schizophrenia

Alongside the diagnostic problem of reliability is that of the validity. A diagnostic concept cannot be valid without first being reliable; therefore, it might be argued that investigating the validity of schizophrenia becomes somewhat meaningless due to the poor reliability data (Bentall, 2003; Kinderman et al., 2013).

However, for theoretical purposes, I will now focus on the predictive validity of schizophrenia.

It is important, for clinical and intervention purposes that schizophrenia has good predictive validity, so that the future course, outcome or recovery from the illness can be estimated. Although conventional views of schizophrenia suggest it has a poor prognosis, longitudinal research shows that there is huge variability in outcomes. A complication is that there is huge debate about what constitutes an important outcome measure for psychosis (Beck et al., 2012; Bracken et al., 2012; Longden, 2010). Strauss and Carpenter's (1972) early study found that outcomes can be measured as a continuum, and that the different types of outcomes (symptom changes, social functioning, occupational functioning and non-hospitalisation) were all partly interrelated but could also be independent of each other. This led them to conclude that "outcome" is a complex phenomenon, and the ability of a diagnosis to predict a specific outcome is often overstated.

Ciompi (1980) found "favourable outcomes" for 49% of his sample of 289 individuals meeting criteria for schizophrenia over an average follow up time of 36.9 years. Outcome was assessed in various ways, including admissions to hospital, housing situation (with family, by self, in community institutions or in hospital) and overall course of schizophrenia. Harrison (2001) found similar results using cross cultural data, and found that global outcomes at 15 and 25 years were favourable for over half of all people who were followed up. Here outcomes were measured by current functioning, course of illness, and symptoms.

More recently Jääskeläinen et al. (2013) conducted a systematic review and meta-analysis of 37 articles exploring recovery in schizophrenia and concluded that 1

in 7 individuals fully recover from schizophrenia (equating to around 13.5%). The authors definition of recovery was narrow requiring that individuals should have been recovered both clinically (symptoms) and socially (occupational capacity). Additionally, the improvements in at least 1 of the clinical or social outcomes should have persisted for at least 2 years, and there should be currently at most, mild symptoms.

Dillon (2012) discussed the importance of the subjective and unique experience in recovery, suggesting it cannot be assessed adequately by symptom reduction or occupational functioning alone. Personal experiences and perceived quality of life are highly important to good outcome. Moreover, many studies have looked at predictors of recovery, identifying psychosocial factors, such as the therapeutic alliance, self-esteem, sense of control, higher social economic status, sense of support, and reduced stigma (Ciompi, 1984; Harrison, Hopper, et al., 2001; Read, Haslam, Sayce, & Davies, 2006) as important factors that enable good outcome. This brings us to question the utility of the diagnosis, as receiving a diagnosis may actually prevent recovery as opposed to promote it (Beresford, 2013; Longden, 2010; Read et al., 2006).

1.3.4 Comorbidity

It was the initial aim of the diagnostic manuals to cluster psychiatric symptoms into unique diagnoses with distinct boundaries. However symptoms within schizophrenia (e.g. paranoia, hallucinations, depression) cross over and are comorbid with other diagnoses. Buckley, Miller, Lehrer, & Castle (2009) discussed how a large portion of those diagnosed with schizophrenia also met the criteria of other psychiatric diagnoses throughout the course of their lifetime. They found

comorbidities with depression, obsessive compulsive disorder, anxiety and panic disorders, substance abuse, and PTSD. This is a consistent finding, where symptoms appear to overlap and be present in multiple diagnoses, resulting in comorbidities.

Cramer, Waldorp, van der Maas and Borsboom (2010) used network analysis models to demonstrate how the current psychometric foundation on which diagnosis rests (using latent variable theory) is flawed, and that in fact distress originates from networks of symptoms that stand in direct, possibly causal, relations to one another. Comorbidity between mental disorders is then conceptualised as direct relations between symptoms of multiple disorders and conclusions can be based on the individuals' personal experience of distress not the overarching "disorder". I will return to this idea in the heterogeneity of schizophrenia section.

1.3.5 A continuum of experiences

In addition to the problems identified so far, current diagnostic systems have very clear cut off criteria for distinguishing between recognised mental disorders and normality. However, many have argued that experiences of psychosis lie on a continuum with normal functioning (Johns & van Os, 2001; van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). Indeed many individuals in the general population report psychosis-like experiences, with a median prevalence of 5-8% (van Os, 2009). They can be examined in terms of what are termed "schizotypal traits" (see Claridge et al., 1996; Mason, Claridge, & Jackson, 1995) and also by looking at individual psychotic-like symptoms, for example, paranoia (Freeman, Pugh, Vorontsova, Antley, & Slater, 2010) and hallucinatory experiences (Beavan, Read, & Cartwright, 2011). Psychosis-like experiences have been studied fruitfully in non-clinical studies (e.g. Armando et al., 2010; Kelleher et al., 2012) and have provided

researchers and clinicians with insights that would not have been possible using the diagnostic criteria as they currently stand.

1.3.6 Heterogeneity of schizophrenia

As discussed during the reliability section of this review, schizophrenia is diagnosed by recognising signs and symptoms based on clinical interviews, and if the appropriate number of observations are made then a diagnosis follows. There is great variability in the possible ways in which individuals can obtain a diagnosis of schizophrenia and, hence, a diagnosed patient may not share any symptoms with another individual with the same diagnosis. This has drastic implications for research and clinical intervention, which may be undermined if we organise people with different symptoms into the same classification.

Early factor analytical evidence suggested that there were only three distinct dimensions (positive symptoms, negative symptoms and cognitive disorganization) in schizophrenia (Liddle, 1987). Peralita and Cuesta (1999) found 11 interpretable first-order factors and four second-order factors using principal components analysis. However there have been many studies replicating a five factor model of psychotic experiences (Reininghaus, Priebe, & Bentall, 2013; van Os & Kapur, 2009). This model suggests that each current diagnostic category of psychosis (e.g. schizophrenia, bipolar disorder and schizoaffective disorder) can be expressed as a profile on five main dimensions: (i) positive symptoms (e.g. delusions and hallucinations); (ii) negative symptom (e.g. lack of motivation, reduction in spontaneous speech, and social withdrawal); (iii) cognitive impairment (e.g. difficulties in memory, attention, and executive functioning); (iv) manic symptoms (including hypomania); and (v) depression.

Researchers have argued that more meaningful information can be observed through studying these dimensions, observing interactions between specific symptoms and how they may increase the risk of other behaviours and symptoms (Borsboom & Cramer, 2013) as opposed to using an overarching diagnosis such as schizophrenia. It has been suggested elsewhere (Bentall, 2003; Bentall et al., 2014) that studying schizophrenia at the symptom level may be of particular utility as it appears that there are specific risk factors and mechanisms associated with specific symptoms (e.g. Bentall, Wickham, Shevlin, & Varese, 2012). It is important when investigating specific symptoms to control for their co-occurrence so as to identify the unique effect for that experience. For example, when this is done, childhood sexual abuse appears to confer a specific risk of hallucinations whereas attachment-disrupting events appear to confer a specific risk of paranoia (Bentall et al., 2012), effects that are not so readily apparent when first order associations between risk factors and symptoms are examined. However, some risk factors, for example urbanicity, appear to confer risk across the broad positive symptom dimension (Oher et al., 2014).

These kinds of specificities are important because they provide clues about the mechanisms that may give rise to symptoms. In addition it is plausible to assume that investigating psychological processes at the symptom level promotes the concept of normalisation thus the stigmatising of those that experience distress will be reduced. Many people can relate to experiences of paranoia, depression, and unusual experiences such as hearing voices, particularly when it is coupled with a psychosocial cause, but individuals fear “schizophrenia” and find it dangerous if they believe it be biological in cause (Rüsch, Todd, Bodenhausen, & Corrigan, 2010; Schomerus et al., 2012).

When listing Hill's (1965) criteria for inferring causality from epidemiological data earlier, I omitted two: specificity of effects (whether a risk factor is associated with some outcomes and not others) and the mechanisms by which the effects occur. It will be apparent that these two criteria are linked, in the sense that evidence of specificity may provide clues about mechanisms. To address this issue further chapters 3 to 6 of this thesis add to the existing literature by providing evidence of specificity and by identifying potential mechanisms that may be important.

1.4 Paranoia as an outcome measure

Karl Jaspers (1963) introduced the idea that delusions could not be understood in terms of the individual's personality or in terms of the individual's experiences, making them un-understandable. Nonetheless, the typical contents of delusions – for example, concerning persecution or grandiosity - have been recognised as reflecting the individual's position in the social universe, suggesting that they may not be as un-understandable as previously thought (Bentall, Kinderman, & Kaney, 1994).

The DSM-IV defines a delusion as “a false personal belief based on incorrect inference about external reality that is firmly sustained in spite of what almost everyone else believes and in spite of what usually constitutes incontrovertible and obvious proof or evidence to the contrary. The belief is not one ordinarily accepted by other members of the person's culture or subculture” (American Psychiatric Association, 1994 p. 765). This definition has been critiqued for its imprecise terminology, for example in terms of what is meant by “incorrect inference” or “incontrovertible and obvious proof or evidence” (e.g. Harper, 1992). The idea that

paranoia lies on a continuum, extending from normality to increasing levels of severity (van Os et al., 1999) suggests that this definition is inappropriate.

Experiences of mistrust, suspiciousness and unwarranted jealousy are not unique to mental illness, and can have adaptive qualities, for example, being suspicious of the intentions of others can be protective and has evolutionary origins (Green & Phillips, 2004). Between 10-15% of the general population experience paranoid thoughts (Freeman, 2007) and paranoia has therefore been studied fruitfully in both general population (Freeman et al., 2010; Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008) and student sample studies (Melo, Corcoran, Shryane, & Bentall, 2009; Pickering, Simpson, & Bentall, 2008).

Persecutory delusions are the most common type of delusion reported by individuals with psychosis (Jørgensen & Jensen, 1994). However, experiences of extreme paranoid ideation (i.e. persecutory delusions) are evident in multiple diagnoses for example, social anxiety (Michail & Birchwood, 2009), depression (Johnson, Horwath, & Weissman, 1991), and obsessive compulsive disorder (OCD) (Kozak & Foa, 1994). There is variability across a number of dimensions such as their bizarreness, the conviction with which paranoid beliefs are held, the extent to which the individual is preoccupied by them, and the extent to which they lead to distress (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Freeman, 2007).

Trower and Chadwick (1995) suggested that experiences of paranoia can be subdivided into two distinct topographies: “poor me” paranoia and “bad me” paranoia. Individuals with poor me paranoia believe the persecution is undeserved and unjustifiable; they blame and view others as being at fault. Conversely, individuals with “bad me” paranoia believe that persecution is deserved and

justifiable; they blame and view themselves as bad. These two forms of paranoia have gained support through research, but it has been found that the perception of the deservedness of persecution is unstable and fluctuates across time (Chadwick, Trower, Juusti-Butler, & Maguire, 2005; Melo et al., 2009; Melo, Taylor, & Bentall, 2006; Udachina, Varese, Oorschot, Myin-Germeys, & Bentall, 2012).

1.5 Risk factors for paranoia, and underlying psychological mechanisms

1.5.1 Victimisation and paranoia

Mirowsky and Ross (1983), using a population survey of residents of El Paso (USA) and Juarez (Mexico), found that paranoid beliefs were most prevalent in urban areas in which individuals felt powerless and victimised, and that external locus of control and lack of trust mediated this association. The association between experiences of victimisation and paranoia has been studied several times subsequently. Janssen et al. (2003) found that experiences of perceived discrimination predicted delusional ideation in their three year prospective study. Furthermore, Johns et al. (2004) found an association between paranoid thinking and anxiety, depression, victimisation experiences and stressful life events. Exposure to childhood bullying has been linked with positive symptoms of psychosis; Campbell and Morrison (2007) found that in children aged 14 to 16 who perceived themselves as being bullied were more likely to experience subsequent hallucinatory like experiences, paranoia and dissociation compared to those who were not bullied, demonstrating no specificity with paranoia, but with the positive dimension of psychosis. However the authors did not account for the co-occurrence between symptoms which may reflect this broad finding.

1.5.2 Attachment and attachment disrupting events and paranoia

There is compelling evidence of an association between insecure attachment and psychotic experiences (Dozier, Stovall, & Albus, 1999; Mickelson, Kessler, & Shaver, 1997) but only a handful of studies have investigated attachment at the symptom level (see Korver-Nieberg, Berry, et al., 2013 for a review), and most have failed to use appropriate statistical methods to control for comorbidity between symptoms and thus identify associations with specific symptoms. Using non-clinical samples and psychosis-proneness measures, Berry Barrowclough and Wearden (2008) reported first-order associations between insecure attachment and both paranoia and hallucinations but without controlling for comorbidity between them. MacBeth, Schwannauer and Gumley (2008) in a similar study, used structural equation modelling and reported a strong association between insecure attachment and paranoia and a much weaker association between attachment anxiety and hallucinations, but again did not take into account comorbidity between the two symptoms.

Ponizovosky, Vitenberg, Baumgarten-Katz and Grinshpoo (2013) measured attachment styles using the Relationship Questionnaire (RQ; Griffin & Bartholomew, 1994) and symptomatology in 100 outpatients with schizophrenia spectrum disorders, finding associations between the preoccupied attachment style and delusions and suspiciousness as measured by the Positive and Negative Syndrome Scale (Kay, Fiszbein, Opfer, Fiszbein, & Opler, 1987), whereas fearful attachment was associated with the severity of hallucinatory experiences. However, this study failed to statistically control for comorbidity between hallucinations and paranoia.

Using a non-clinical sample, Pickering, Simpson and Bentall (2008) found that both attachment anxiety and attachment avoidance predicted paranoid ideation

but not hallucination-proneness. They also found that negative self-esteem and an external locus of control (belief in powerful others) mediated the relationship between insecure attachment and paranoid ideation. These latter findings were considered important because other research has implicated negative self-esteem (Bentall & Fernyhough, 2008; Freeman & Garety, 2003; Freeman et al., 2005) and an external locus of control (Kaney & Bentall, 1989) in paranoid thinking. In a recent study of an epidemiological dataset it appeared that insecure attachment settings (growing up in local authority care) were associated with paranoia and not hallucinatory experiences (Bentall et al., 2012). Comparable findings were reported following an analysis of the United States (US) National Comorbidity Survey (NCS) epidemiological dataset where an association between neglect experiences in childhood and paranoia was found. Furthermore, this association was found to be fully mediated by both anxious and avoidant attachment styles (Sitko et al., 2014).

1.5.3 Urbanicity, deprivation and inequality

Disadvantaged areas have higher levels of assault, burglary, theft, graffiti, vandalism, derelict buildings and street gangs than less disadvantaged areas. These neighbourhoods can induce a sense of powerlessness and low levels of trust (Ross, Mirowsky, & Pribesh, 2001). In addition, people there are more likely to be unemployed or homeless, and to have experienced social isolation, restricted choices and resources (Cromby & Harper, 2009). Psychological research implicates negative social comparison and experiences of victimisation (arguably more likely in deprived and unequal neighbourhoods) in paranoia (Bentall et al., 2001; Ellett, Freeman, & Garety, 2008; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002). It seems plausible therefore that deprived areas will be more susceptible to paranoid beliefs,

which might be regarded as adaptive in these circumstances (Green & Phillips, 2004).

Experimental research has demonstrated that walking through a deprived urban neighbourhood can increase levels of anxiety, negative beliefs about others, jumping to conclusions and also paranoid thoughts in psychiatric patients (Ellett et al., 2008). Similar results have been identified with ordinary people, where walking through deprived urban areas lowered social trust and increased levels of paranoia (Nettle, Pepper, Jobling, & Schroeder, 2014).

1.5.4 Cognitive and emotional mechanisms

The five main cognitive mechanisms that have been associated with paranoid delusions are a tendency to jump to conclusions (Garety & Freeman, 1999), an impairment in the ability to understand others' mental states or theory of mind (ToM) (Corcoran, Mercer, & Frith, 1995; Korver-Nieberg, Fett, et al., 2013), a biased anticipation of threat (Freeman, 2007), dynamic attributional styles (Bentall & Kaney, 2005) and abnormal affect regulation as indicated by depression, anxiety and anger (Bentall & Kinderman, 1999).

As a result of these cognitive and emotional irregularities, maladaptive coping strategies and safety behaviours may develop, for example; avoidance behaviours such as avoiding meeting people or taking public transportation; escape behaviours such as fleeing what are believed to be threatening situations; protective behaviours such as checking that all the doors are locked and not answering the door; inconspicuous behaviours such as wearing a hat to decrease visibility and not making eye contact to avoid the attention of others; and aggressive behaviours such as confronting or shouting at other people (Garety, Kuipers, Fowler, Freeman, &

Bebbington, 2001). Although safety behaviours are intended to avert threat, they may result in poor threat appraisals (Gaynor, Ward, Garety, & Peters, 2013) and inhibit cognitive change by facilitating confirmatory evidence that a threat was in fact averted, leading to maintain the delusion and prevent disconfirmation (Morrison, 2001).

1.6 Hallucinations as an outcome measure

Hallucinations have been defined as any percept-like experiences which occur in the absence of appropriate stimuli, have the full force of the corresponding actual perception, and which are usually unamenable to direct and voluntary control (Slade & Bentall, 1988). Hallucinations can occur with all sensory modalities, with evidence suggesting that in developed countries auditory verbal hallucinations are the most commonly reported by psychiatry patients whereas developing countries experience more visual hallucinations (Al-Issa, 1977). Like paranoid thoughts, hallucinations are diagnostically nonspecific and have been found in a wide variety of diagnoses including OCD (Fontenelle et al., 2008), bipolar disorder (Hammersley et al., 2003), and PTSD (Butler, Mueser, Sprock, & Braff, 1996). This is perhaps unsurprising, given the overlapping of symptoms between diagnoses. In this review I will focus on auditory verbal hallucinations (AVH).

In addition to being prevalent amongst individuals with psychiatric diagnoses, AVH's are also reported by individuals who never seek help from psychiatric services (Lawrence, Jones & Cooper, 2010). Voices experienced in AVHs can vary in intensity, frequency, number of voices, sex of voices, and some report that the voices they experience are immensely distressing and frightening whereas others are reassured and comforted by them (Beavan et al., 2011). A large body of experimental evidence suggests that the formation of AVHs might result

from reality discrimination biases (sometimes called source monitoring biases); that is to say that individuals who experience hearing voices are misattributing internal cognitive events to sources that are external or alien to the self (Bentall, 1990). This finding has been replicated multiple times using various reality discrimination measures with both clinical patients and non-clinical individuals who report hearing voices (see Brookwell, Bentall, & Varese, 2013).

1.7 Risk factors for hallucinations, and underlying psychological mechanisms

1.7.1 Childhood Trauma and Hallucinations

The last ten years has seen growing evidence supporting the role trauma plays in experiences of hallucinations. Experiences of childhood sexual abuse and childhood physical abuse have received particular attention. A review carried out by Read, van Os, Morrison, and Ross (2005) found a strong relationship between childhood abuse and hallucinations, with various studies reporting between 15% and 71% of those who experience hallucinations having a history of either childhood sexual abuse (CSA), childhood physical abuse (CPA) or both. Furthermore McCarthy-Jones' (2011) review found that AVHs were more likely to be reported from individuals who experienced CSA than those without. Furthermore, the content of the AVHs were linked with the content of the CSA. The author highlights that although a clear association exists, there is not enough reliable quantitative evidence to suggest a causal relationship.

Whitfield, Dube, Felitti and Anda (2005) used data from the adverse childhood experiences (ACE) study which was collected between 1995 and 1997 where approximately 17,000 adults completed assessments. They found a significant

and graded dose-response relationship between hallucinations and a history of childhood trauma, trauma including emotional, physical, sexual abuse, battered mother, household substance abuse, mental illness present in the household, parental separation, incarceration of household member and history of alcohol or drug abuse in the household. This finding suggests that all forms of trauma are associated with the experiences of hallucinations. It is important to note that the authors did not account for the likely comorbidity between hallucinations and other symptoms, which may have revealed a slightly different picture.

Furthermore, Shevlin, Dorahy and Adamson's (2007) analysis of the NCS dataset from the US revealed that experiences of physical abuse, neglect, rape and molestation were significantly associated with visual hallucinations, whereas a specific relationship between childhood sexual abuse (rape and sexual molestation) was found with AVHs. In addition Shevlin et al. reported a dose-response relationship between traumas and both visual and auditory hallucinations, but suggested that this plateaued after three traumas as the increment was smallest between 3 and 4 trauma experiences. Although this association was found in the NCS the authors failed to account for the likely comorbidity between hallucinations and other symptoms.

Two recent studies using appropriate statistical techniques found specific associations when controlling for the co-occurrence of hallucinations and paranoia. Bentall et al. (2012) used the United Kingdom Adult Psychiatric Morbidity Survey 2007 to investigate associations between different traumas and specific symptoms. The analysis revealed that childhood rape significantly increased the risk of experiencing AVHs (OR = 6.09, 95% CI [1.38, 26.89] when demographic variables were included in the model). This has since been replicated in the NCS dataset;

following on from Shevlin et al. (2007) findings, Sitko et al. (2014) showed specific associations within the psychotic domain between sexual abuse (rape and sexual molestation) and hallucinations, whereas, as noted above, neglect was associated with paranoid beliefs, but only when co-occurring symptoms were controlled for.

van Nierop et al. (2014) identified several childhood traumas (including: emotional, physical, sexual and psychological abuse, growing up in foster care and death of a parent, sibling or close friend) and found no specific association between specific types of adversity and hallucinations or paranoia, although, on further scrutiny of the results included in this report, it appears that there were trends in the direction of specificity, for example the odds ratios for childhood sexual abuse and AVH were higher than that of paranoia. In addition, if the criterion p value was lowered from .001 to .05, growing up in foster care was significant for paranoia and not for AVHs (when both are assessed on interviews). It is unclear how the authors isolated each symptom, however it appears that they did not assess trauma as others have (e.g. Bentall et al., 2012; Sitko et al., 2014) and this may explain their non-significant finding.

Moskowitz (2008) suggested that the relationship between trauma and psychotic symptoms could be accounted for by dissociative experiences. Several studies have now been conducted supporting the notion that dissociation acts as a mediator between experiences of childhood trauma and hallucination proneness. For example, Varese, Barkus, and Bentall (2012) found, using 45 individuals with schizophrenia spectrum disorders and 20 healthy controls that the clinical group reported more dissociative tendencies and childhood sexual abuse. Moreover, dissociation positively mediated the effect of childhood trauma on hallucination-proneness. This mediational role was particularly robust for sexual abuse over other

types of trauma (emotional abuse, negative home environment and punishment).

Interestingly, there was no association between reality discrimination and dissociation, suggesting that they independently contributed to hallucinations.

Perona-Garcelán et al. (2012) obtained very similar findings and further demonstrated that dissociation was a potential mediator between childhood trauma and hallucinations, but not between childhood trauma and delusions using a sample of 71 individuals with psychoses diagnoses.

1.8 Aims and outline of the present thesis

The current literature on specific adversities and specific symptoms is in its infancy, particularly when underlying mediating mechanisms are considered. Much of the existing research has been compromised by a failure to consider the comorbidity between symptoms, and this is a particular issue when considering paranoia and hallucinations (specifically auditory verbal hallucinations), which both belong within the positive symptom dimension. The general aims of the present thesis are twofold. Some of the studies in this doctoral dissertation examine the specificity of the association between social adversities such as deprivation, and inequality and paranoia in non-clinical, clinical and epidemiological datasets. Furthermore, this PhD thesis aims to expand the findings of previous studies and search for potential mechanisms underlying these associations, by testing whether (i) there is a specific association between insecure attachment and paranoia, and (ii) by using mediation analysis to examine whether trust, lack of social support, stress, and negative self-esteem explain paranoid ideation and clinical paranoia but not hallucinatory experiences. Each of the following chapters consists of recently

published papers (Chapters 2 and 3), accepted manuscripts (Chapters 4 and 5) and recently submitted manuscripts (Chapter 6).

In Chapter 2, a measure of perceived relative deprivation during childhood is tested and validated using a non-clinical sample of students across three diverse universities. The objective of the study described in this chapter was to develop a measure of *perceived* inequality during childhood. A retrospective measure of relative deprivation in childhood would have obvious utility for research into the social origins of mental illness. The need for such a measure stems from the current reliance on objective measures of deprivation and inequality to establish links with physical and mental health outcomes. These measures do not address the subjective experience of the individual, which from a theoretical point of view is likely to be paramount, especially in the determination of mental health.

The study presented in Chapter 3 used the perceived inequality in childhood scale developed in Chapter 2 to test the association with mental health outcomes (paranoia, hallucinations and wellbeing) using a sample of students from the three universities. In addition mediation analysis was employed to test whether the association between perceived relative deprivation in childhood and adult mental health outcomes is mediated by a general belief in justice, personal belief in injustice, lack of trust and low social rank in an attempt to explain the association between relative deprivation and poor mental health outcomes.

The epidemiological study presented in Chapter 4 replicates the findings from previous literature demonstrating an association between social deprivation, psychosis and depression. However, this study then examines the impact of social deprivation on specific symptoms (paranoia, depression, hallucinations and mania) in order to examine whether the broad diagnostic categories actually mask specific

associations. In addition, the mediating roles of stress, lack of trust, lack of support and discrimination were tested.

The study presented in Chapter 5 combined two datasets with clinical participants and non-clinical participants from the general population. The aim of this study was to replicate in a large patient sample the work of Pickering et al (2008) who investigated the role of insecure attachment dimensions with certain symptoms of psychosis (i.e. paranoia and not hallucinatory experiences). In addition I tested the mediating role of negative self-esteem and locus of control.

The clinical study presented in chapter 6 uses a large sample of individuals diagnosed with schizophrenia spectrum disorders (n = 72) and individuals from the general population (n = 72) to further investigate the specific association between different types of victimisation and trauma with psychotic experiences (specifically paranoia and AVHs). Additionally, this study investigates the mediating role of perceived injustice for the self in the relationship between the traumas and the dependent variables, in accordance with findings from chapter 3.

In Chapter 7, an integrative summary of the results of the studies is given, alongside a general discussion of the theoretical, methodological and clinical implications of the studies presented in this thesis.

1.8.1 Co-author roles

All co-authors are identified with a footnote for each Chapter. Professor Mark Shevlin was a co-author on three of the Chapters presented in this thesis (Chapters 2, 3 and 4). Mark provided statistical guidance in using Mplus and provided me with the epidemiological data used in Chapter 4. Professor Tom Dickins and Dr. Minna Lyons were also invited to be co-authors for Chapter 3 as they became the point of

contact for recruitment from those universities (an online study). All data collection and analysis were completed by myself under the supervision of Professor Richard Bentall.

Dr Peter Taylor was invited as a co-author for Chapter 4 of this thesis as he was a local source of statistical guidance. He also proof read this Chapter for publication. Kasia Sitko, a fellow PhD student was invited to co-author Chapter 5 as her key interests and PhD focused on attachment styles in psychosis, she also provided me with resources and helped in the analysis process of this Chapter. I collected half of the data used in this design. The other half came from NIHR funded research on subjective judgements of perceived recovery from psychosis led by Professor Tony Morrison.

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Chapter 2

Development and validation of a measure of perceived relative deprivation in childhood¹

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2.1 Abstract

Childhood adversity is known to impact psychological functioning and physical health in later life, but research into the mechanisms responsible has been impeded by the absence of a suitable retrospective measure of perceived relative deprivation in childhood. We developed and validated scores of the Perceived Inequality in Childhood Scale (PICS). In total, 683 students from Liverpool University, Liverpool Hope University and the University of East London were sampled by means of online methods. The data were separated using odd-even methods and an exploratory factor analysis identified a 2 factor solution: perceived relative deprivation (12 items) and family social capital (4 items). The measure was then subjected to confirmatory factor analysis and a 3 factor structure was revealed. The scale was further validated against Index of Multiple Deprivation (IMD) scores of childhood addresses. The PICS is a brief, practical scale suitable for both small and large-scale research studies.

Key words: relative deprivation, social inequality, measure, childhood, validation, development

2.2 Introduction

Economic and social disadvantage are well known risk factors for a wide range of negative social, psychological and physiological outcome (see Wilkinson & Pickett, 2009). More recently, these experiences have been implicated in psychiatric disorders. Multiple studies have identified how the experience of deprivation and inequality, using a multitude of techniques, is associated with psychosis (e.g. Burns & Esterhuizen, 2008). Perhaps more importantly childhood experiences of inequality have been identified as paramount (Wicks, Hjern, & Dalman, 2010). However there are few measures available for the investigation of childhood experiences of inequality.

Epidemiological studies have employed various objective measures to assess the relationship between deprivation and health outcomes. The Gini coefficient measures income inequality and is a derived statistic between 0 and 1, where 0 represents total equality and 1 represents total inequality. It has been used in a wide range of research that has looked at health and mental wellbeing disparities across the world and can assess at the community or population-wide level (Weich, Lewis, & Jenkins, 2001; Wilkinson & Pickett, 2009). Similarly, the Yitzhaki index (Yitzhaki, 1979) is an income based measure of relative deprivation, defined as a “function of the cumulative difference between the income of an individual and that of all those with greater incomes within a reference group. This value is then divided by the number of people in the reference group” (Adjaye-Gbewonyo & Kawachi, 2012, p. 132).

The English Indices of Deprivation 2010 (Department for communities and local Government, 2011) was developed by the British government to assess the need

for resources across Britain. This measure is an extension of an earlier version (Index of Multiple Deprivation; IMD 2004) and utilises 38 indicators separated into seven domains: income, employment, health and disability, education skills and training, barriers to housing and other services, crime and living environment. When put together these indices create a general IMD 2010 score, which provides detailed information of both local and global levels of deprivation and has been used to identify relationships with various health outcomes. Other measures of deprivation and inequality have been developed based on UK census data and include the Townsend Material Deprivation score (Townsend, 1987), Jarman Underprivileged Area Score (Jarman, 1984) and the Carstairs Index (Carstairs & Morris, 1990), to name a few (see Demography & Geography Statistics Team, 2002).

These measures, although highlighting the importance of social deprivation for both physical and mental health outcomes, do not address the subjective experience of the individual, which from a theoretical point of view is likely to be paramount, especially in the determination of mental health. If, as has been claimed by Wilkinson and Pickett (2009), social inequalities are more important in determining socially important outcomes than absolute wealth and opportunities, it is apparent that the perception of being socially disadvantaged (especially during childhood) is likely to be the first and important stage in the chain of mechanisms that leads to poor outcomes. Indeed, it is difficult to conceive of a mechanism linking inequality (rather than wealth) to psychological outcomes, which does not require disadvantage relative to others to be detected by the individual. Research into the mechanisms linking childhood social deprivation to mental and physical health in adulthood is therefore likely to be facilitated from the development of a suitable retrospective measure of perceived or subjective deprivation relative to others.

2.2.1 *Development of the Perceived inequality in Childhood Scale*

We sought to design a retrospective measure of perceived relative deprivation (PRD) during childhood (under 16 years old): the Perceived Inequality in Childhood Scale (PICS). The measure we developed was designed to be quick to administer for use in small or large scale studies and was divided into two sections: objective experiences of deprivation and perceived experiences of deprivation in comparison to childhood peers. Objective items referred to those aspects of deprivation utilised in other measures: place of residence, overcrowding (number of bedrooms versus number of individuals in a household), benefits received and parental occupation. Perceived items asked individuals, ‘in comparison to others in your school and neighbourhood how would you rate your...’ on the following set of variables: stability of family, hobby opportunities, time spent with parents, relative wealth, clothes, houses, holidays, presents and cars owned.

A pilot study of 194 (60 males, 134 females, mean age = 23.94, age range = 18 – 45, SD = 6.93) students at the University of Wales, Bangor, was used to assess the scores of the PICS factor structure, reliability and concurrent validity. Preliminary analysis revealed a two-factor solution, and we named the factors *perceived relative deprivation* (PRD; including those items in which individuals compared themselves to neighbours on economic and material variables; wealth, houses, cars, holidays, presents and clothes), and *family social capital* (items comparing with neighbours on hobby opportunities, parents involvement in education, stability of the family environment, time spent with parents and extended family). At this stage the scores of the scale demonstrated some evidence for test-retest reliability (N = 79 for retest after 1 month; PRD, $r = .91$, 95% CI [0.86, 0.94]; perceived family social capital, $r = .81$, 95% CI [0.72, 0.87] and validity against a

parallel parent-completed PICS for the PRD items ($N = 27$, $r = .47$, 95% CI [0.11, 0.72]).

In light of these preliminary findings we sought to improve the scale, we were interested in comparing a different reference group for judgments of relative advantage and disadvantage. In the age of mass media, it is possible that people judge themselves against a broader selection of individuals. Hence, we added items asking participants to make their judgments in comparison not only with the neighbourhood they grew up in, but also with broader society (see Appendix A).

2.3 Method

2.3.1 Participants

Students were recruited from Liverpool University (LU; $N = 408$, 115 males, 293 female, mean age = 21.03, $SD = 3.96$), University of East London (UEL; $N = 131$, 15 males, 116 females, mean age = 26.64, $SD = 9.05$) and Liverpool Hope University (LHU; $N = 144$, 26 males, 118 female, mean age = 24.10, $SD = 8.69$). LU and LHU students were invited to take part in the online study via a virtual announcement board and mass emails to each department. Each student was entered in to a lottery draw to win £100. UEL students were invited to take part via a physical announcement board and were offered course credits for completion of the online study. The online survey was offered to all students over a four week period at each university.

An odd-even split was used to conduct the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). For the EFA there were 204 students from LU (57 males, 147 females, mean age = 20.94, $SD = 3.71$), 65 students from UEL (7 male, 58 female, mean age = 25.31, $SD = 7.80$), and 72 students from LHU (15 male,

57 female, means age = 23.21, SD = 7.91). For the CFA there were 204 students from LU (58 male, 148 female, mean age = 21.13, SD = 4.21), 66 students from UEL (8 male, 58 female, means age = 27.95, SD = 10.01), and 72 students from LHU (11 male, 61 female, mean age = 25.00, SD = 9.37). Participant demographics are described in Table 2.1.

2.3.2 *Procedure and scale*

The expanded Perceived Inequality in Childhood Scale (PICS) used 43 items separated into two sections; the first required self-report of factual information about the first 16 years of an individual's life. These questions aimed to assess objective data related to economic circumstances, for example, enquiring as to place of residence, how many people lived there, number of bedrooms, and what occupations parents had (26 items). The second section included seventeen items, the first eleven statements enquire "compared to other children in your school and neighbourhood, how would you rate your..." on the following set of indices: wealth, Christmas and birthday presents, number of holidays, number of cars, quality of homes, clothes, stability of home, hobby opportunities presented by parents, time spent with parents, parental involvement in education and time spent with the extended family (the last two of these items were not included in the earlier version of the scale). Items that related to material inequalities were then repeated (6 items) with a second reference category: participants were asked, 'in relation to other families in the country how did you rate your...'

Table 2.1

Descriptive information of students based on the odd-even split of the data, including university attended, age range, sex, ethnicity, and benefits received.

		EFA	CFA
		N	N
University	UoL	204	204
	LHU	72	72
	UEL	65	66
Sex	Male	79	77
	Female	262	265
Age	Mean	22.25	23.26
	SD	5.97	7.45
	Median	20	20
	Range	18 - 50	18 - 65
Received benefits	Yes	72	57
	No	186	190
	Don't know	68	66
	Missing	15	29
Ethnicity	White British	239	230
	White Irish	7	10
	Other white background	26	31
	Asian or Asian British - Indian	4	7
	Asian or Asian British - Pakistani	4	4
	Asian or Asian British - Bangladeshi	6	3
	Other Asian background	6	3
	Chinese	13	10
	Black or Black British – Caribbean	8	5
	Black or Black British – African	5	15
	Other black background	1	4
	White and Black Caribbean	6	2
	White and Black African	3	0
	White and Asian	2	6
	Other mixed background	5	4
	Did not disclose	5	3
Missing	1	5	

Participants were required to respond to each of these items using a 5-point likert scale (e.g. 1 = very poor, 2 = not as good, 3 = as good, 4 = slighter better, 5 = the best). The response set altered depending on the specific item; for example the questions relating to clothes were responded to as follows: 1 = second hand clothes, 2 = hand me downs, 3 = the same, 4 = slightly better, 5 = the latest fashion. The subscales PRD to neighbourhood and wider society were scored out of 30, where a score closer to 0 indicate greater feelings of deprivation when compared to their reference group. A higher score indicates those that feel better off when compared to their reference group. The subscale perceived family social capital was scored out of 25, where a score < 15 and closer to 0 indicates poor perceived family social capital.

IMD scores from 2004 were obtained from the office of national statistics (ONS) accessible via www.neighbourhood.statistics.gov.uk, for each individual aged 18 to 22 who provided postcode data (N = 173). These scores allowed us to obtain an objective measure of deprivation that could be compared to PICS scores of those participants who had been aged 8 to 12 in 2001/2002 (when IMD data were collected). IMD scores are based on super output areas (SOA), which are geographical areas designed for small area statistics.

2.3.3 *Analytical Strategy*

We used exploratory and confirmatory factor analyses to assess the structure of the expanded perceived items on the PICS (17 items). Exploratory analysis was conducted using principal axis factoring (PAF) using SPSS. We used three tests to identify the number of factors to retain for PAF: minimum average partials (MAP; Zwick & Velicer, 1986), parallel analysis (PA; Horn, 1965), and Cattell's (1966) scree test. PA suggested rotating 8 factors (Table 2.2), MAP revealed 1

component associated with the smallest average squared correlation, and scree 2 factors. It has been reported that PA overestimates the number of factors to rotate when items share variability (Zwick & Velicer, 1986). Hence, the extreme similarities between the items referring to the two reference groups may explain the large number of factors identified by PA. To examine this, items involving ‘comparison to wider society...’ were removed from the PA and a 2 factor solution remained. We therefore chose to rotate 2 factors.

Models 1 and 2 of the confirmatory factor analysis (CFA) were specified based on results found in the exploratory analysis alone while Models 3 and 4 were specified priori drawing from theory and previous research. All CFA analyses were conducted with Mplus 6.11 (Muthén & Muthén, 1998 - 2011), using maximum likelihood estimation with robust standard errors (MLR). As proposed by Hu and Bentler (1999) and Hoyle and Panter (1995) the goodness of fit for each model was assessed using the Satorra-Bentler chi-square, the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and the standardised root-mean residual (SRMR). A non-significant chi-square, values greater than .90 for the CFI and TLI, and a SRMR less than .08 are considered to reflect acceptable model fit. In addition, the root-mean-square error of approximation (RMSEA; Steiger, 1990) was calculated; a value less than .05 indicates close fit and values up to .08 indicate reasonable errors of approximation in the population (Jöreskog & Sörbom, 1993). Concurrent and discriminate validity of the scores of the PICS were assessed using objective measures of deprivation; benefits received and IMD scores.

2.4 Results

2.4.1 Exploratory Factor Analysis (EFA)

PAF was used to extract 2 factors, which were subjected to promax rotation with Kaiser Normalisation. This has been described as a safer method as it allows for factors to be correlated (Preacher & MacCallum, 2003). The extraction of two factors after rotation provided a solution that accounted for 44.3% of the total variance. Consistent with our pilot study, the factors were identified as PRD and perceived family social capital. The correlation between the factors was $r = .53$. All items demonstrated satisfactory loadings ($\pm .4$) with the exception of one of the new family social capital items (time with extended family). It is possible that, unlike the other items in the subscale, this item was heavily influenced by cultural factors. This item was removed and subsequent analyses completed without it (interfactor correlations and factor loadings can be found in Table 2.3 and Table 2.4).

Table 2.2

Parallel analysis principal axis factoring and raw data permutations matrix for factor retention.

Root	Raw data eigenvalues	Means random data eigenvalues	Percentile random data eigenvalues
1	6.25	0.46	0.55
2	1.12	0.38	0.45
3	0.92	0.31	0.37
4	0.80	0.25	0.31
5	0.64	0.20	0.25
6	0.51	0.16	0.20
7	0.40	0.11	0.15
8	0.23	0.07	0.11
9	0.02	0.03	0.06

Table 2.3

Factor loadings for exploratory factor analysis with promax rotation of PICS items.

PICS items	Pattern matrix		Structure matrix	
	Factor 1	Factor 2	Factor 1	Factor 2
Wealth(2)	.84	-.11	.79	.34
Presents(2)	.73	-.03	.65	.23
Cars(2)	.73	-.07	.70	.32
Houses(2)	.72	.11	.71	.36
Holiday(2)	.69	.04	.71	.40
Wealth(1)	.68	.15	.76	.51
Clothes(2)	.65	-.12	.58	.22
Cars(1)	.63	.08	.67	.42
Presents(1)	.60	-.04	.57	.27
Holidays(1)	.55	.19	.65	.48
Houses(1)	.55	.15	.63	.44
Clothes (1)	.49	-.05	.46	.21
Education	-.16	.74	.23	.66
Time	.18	.68	.18	.58
Opportunities	-.31	.51	.58	.67
Stability	.28	.42	.50	.57
Cumulative Variance explained (post rotation)	37.77	44.31	37.77	44.31
Cronbach's alpha	.90	.71	.90	.71

Note: Factor loadings above .4 are in bold.

Table 2.4

Summary of EFA intercorrelations of PICS Items.

PICS items	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Stability	-														
2. Opportunities	.48*	-													
3. Time	.30*	.29*	-												
4. Education	.26*	.43*	.50*	-											
5. Wealth(1)	.51*	.55*	.14*	.18*	-										
6. Holidays(1)	.36*	.43*	.20*	.23*	.54*	-									
7. Presents (1)	.23*	.36*	.06	.15*	.40*	.48*	-								
8. Houses(1)	.41*	.41*	.15*	.21*	.58*	.42*	.36*	-							
9. Cars(1)	.38*	.40*	.12*	.19*	.56*	.42*	.38*	.50*	-						
10. Clothes(1)	.22*	.26*	.07	.11*	.34*	.32*	.32*	.24*	.29*	-					
11. Wealth(2)	.41*	.41*	.11*	.08	.69*	.42*	.33*	.46*	.46*	.32*	-				
12. Holidays(2)	.32*	.39*	.16*	.21*	.48*	.78*	.39*	.36*	.36*	.26*	.58*	-			
13. Presents(2)	.20*	.33*	.06	.16*	.37*	.34*	.73*	.32*	.35*	.24*	.53*	.52*	-		
14. Houses(2)	.37*	.38*	.10	.15*	.51*	.36*	.33*	.40*	.80*	.25*	.59*	.45*	.45*	-	
15. Cars(2)	.38*	.35*	.13*	.15*	.49*	.37*	.25*	.60*	.39*	.22*	.66*	.55*	.49*	.53*	-
16. Clothes(2)	.22*	.27*	.14*	.10*	.36*	.29*	.29*	.31*	.33*	.70*	.47*	.40*	.40*	.40*	.44*

*Note: * $p < .05$*

2.4.2 *Confirmatory Factor Analysis*

Kurtosis and Skewness of the data are reported in Table 2.5. Model 1 had a factor structure based on the EFA, with separate latent variables for PRD and perceived family social capital. This model demonstrated poor model fit criteria ($\chi^2(102) = 1114.39$, $p < .01$, SRMR = .09, RMSEA = .17, CFI = .59, TLI = .52). Inspection of the modification indices indicated that the poor fit was attributable to large residuals for items from the 'global' and 'neighbourhood' items that measured the same entity (wealth, Christmas and birthday presents, holidays, etc). The modification indices for these parameters ranged from 30 to 174. Therefore, model 2 incorporated correlated errors between these items, but also demonstrated poor model fit statistics ($\chi^2(97) = 441.74$, $p < .01$, SRMR = .06, RMSEA = .10, CFI = .86, TLI = .93). Model 3 separated the types of perceived deprivation for 'global' and 'neighbourhood' into latent variables and incorporated correlated errors between items that measured the same entity (wealth, Christmas and birthday presents, holidays, etc). This model demonstrated excellent model fit criteria ($\chi^2(95) = 183.77$, $p < .01$, SRMR = .06, RMSEA = .05, CFI = .96, TLI = .96). A final model was considered for comparison, allowing all item variables to fall under a single latent variable. This model demonstrated poor model fit ($\chi^2(104) = 1227.22$, $p < .01$, SRMR = .10, RMSEA = .18, CFI = .55, TLI = .48) and so was rejected in favour of Model 3 (see Figure 1.1 for the model series). Figure 2.2 demonstrates the factor structure for the final model for the PICS (model 3). All items demonstrate satisfactory loadings and were statistically significant ($p < .01$). There is a significant positive correlation between the PRD factors ($r = .79$), PRD to neighbourhood and family social capital ($r = .55$), and PRD to wider society and family social capital ($r = .47$).

Table 2.6 gives mean scores of the PICS subscales by university, sex, ethnicity, number of moves and benefits, using data from all participants. There was no significant difference in scores between males and females (neighbourhood deprivation: $t(678) = -.13, p = .90, d = -.01$; global deprivation $t(678) = -.55, p = .58, d = .05$; social capital $t(678) = -.56, p = .58, d = -.05$. The same is true for university attended and ethnicity. Mean scores of the two subscales ‘global’ and ‘neighbourhood’ deprivation also did not differ significantly, suggesting that with this population group the addition of global comparisons is not required.

Table 2.5

Means, skewness and kurtosis of the items for the confirmatory factor analysis (standard deviation and standard error in parenthesis).

Item	N	Mean (SD)	Skewness (SE)	Kurtosis (SE)
Stability	340	3.49 (1.14)	-0.36 (0.13)	-0.66 (0.26)
Opportunities	340	3.46 (1.12)	-0.14 (0.13)	-0.80 (0.26)
Time	340	3.26 (1.13)	-0.17 (0.13)	-0.68 (0.26)
Education	340	3.48 (1.11)	-0.36 (0.13)	-0.45 (0.26)
Wealth(1)	340	3.05 (0.83)	-0.21 (0.13)	-0.14 (0.26)
Holidays(1)	340	3.01 (1.30)	-0.15 (0.13)	-0.99 (0.26)
Presents (1)	340	3.15 (0.97)	-0.01 (0.13)	0.19 (0.26)
Houses(1)	340	3.25 (0.84)	0.09 (0.13)	-0.40 (0.26)
Cars(1)	340	2.81 (0.99)	-0.01 (0.13)	-0.17 (0.26)
Clothes(1)	340	3.09 (0.78)	0.17 (0.13)	1.68 (0.26)
Wealth(2)	340	3.03 (0.86)	-0.16 (0.13)	-0.15 (0.26)
Holidays(2)	340	2.92 (1.24)	-0.14 (0.13)	-0.92 (0.26)
Presents(2)	340	3.12 (0.97)	-0.09 (0.13)	0.11 (0.26)
Houses(2)	340	3.78 (0.98)	-0.06 (0.13)	-0.33 (0.26)
Cars(2)	340	3.14 (0.90)	-0.00 (0.13)	-0.60 (0.26)
Clothes(2)	340	3.11 (0.79)	-0.05 (0.13)	1.41 (0.26)

2.4.3 *Internal consistency and Validation against benefits received*

Internal consistencies for the subscales were good in accordance with Nunnally and Bernstein (1994): perceived family social capital ($\alpha = .75$); PRD to neighbourhood ($\alpha = .77$); and PRD to wider society ($\alpha = .83$).

Participants who received benefits reported greater PRD to neighbourhood ($M = 15.88, SD = 4.12$), than those who did not ($M = 19.12, SD = 3.71$), $t(503) = 8.31, p < .01, d = .83$. The same was found for PRD to wider society ($M = 15.55, SD = 3.96$ vs $M = 18.97, SD = 4.19$), $t(503) = 8.10, p < .01, d = .84$. Participants with families in receipt of benefits reported lower perceived family social capital ($M = 11.84, SD = 3.34$), than those whose families did not ($M = 14.18, SD = 3.10$), $t(503) = 7.22, p < .01, d = .73$.

2.4.4 *Validation against the Index of Multiple Deprivation*

There was a negative correlation between IMD scores and PRD to neighbourhood $r_s = -.28, 95\% \text{ CI } [-0.41, -0.14]$. In addition, there is a negative correlation between IMD scores PRD to wider society, $r_s = -.38, 95\% \text{ CI } [-.050, -0.25]$. As expected, the IMD scores did not significantly correlate with perceived family social capital, $r_s = -.12, 95\% \text{ CI } [-0.26, 0.03]$.

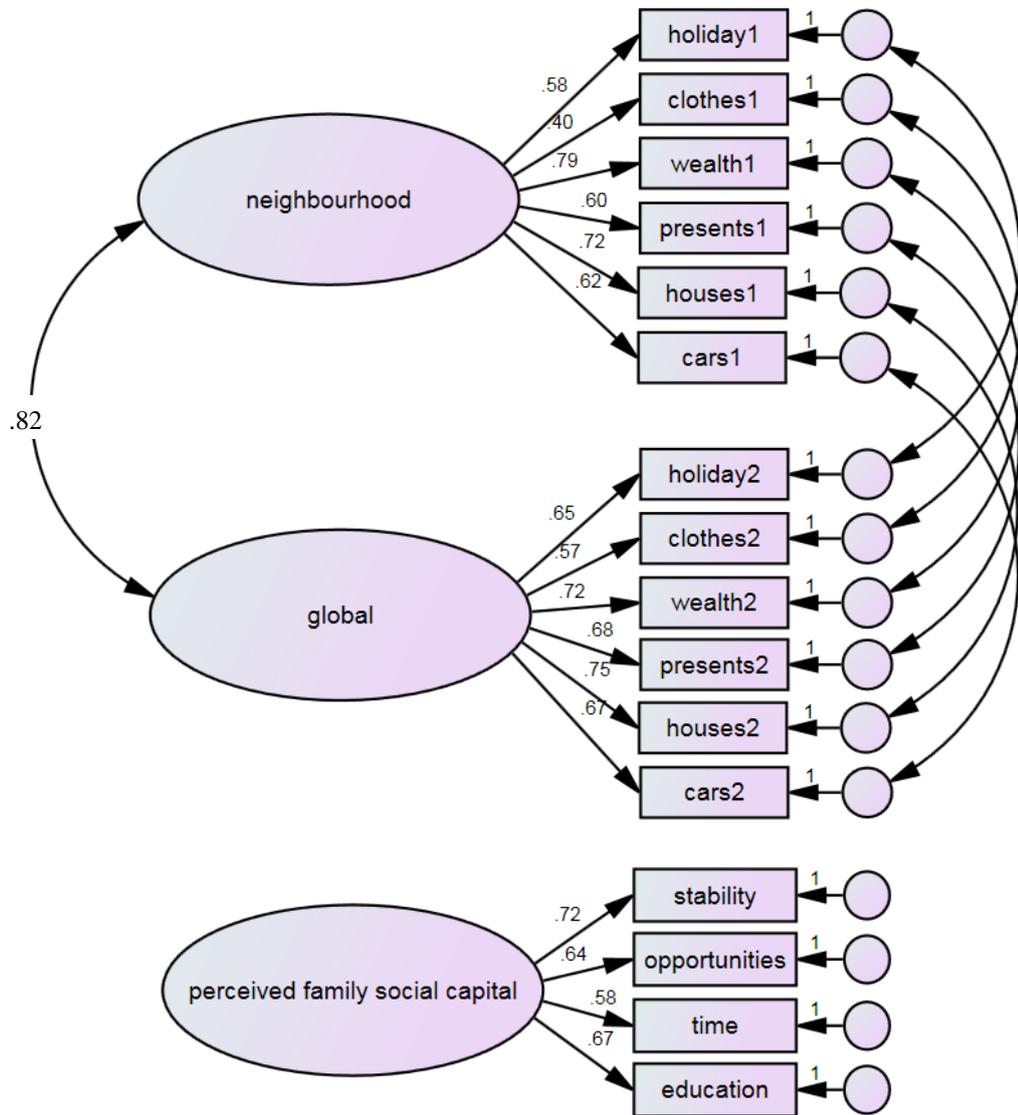


Figure 2.2

The final model with covarying arrows (model 3 in Figure 2.1). The model demonstrates the standardised regression coefficient estimates for each latent variable in the model. All factor loadings are significant, $p < .05$.

Table 2.6

Summary of descriptive data and socioeconomic factors taken from the PICS. Mean scores are shown for the subscales of the PICS (perceived inequality in childhood scale, standard deviation are shown in parentheses).

		N	PICS		
			Neighbourhood	Global	SocCap
University	UoL	408	18.73 (3.82)	18.77 (4.20)	14.02 (2.98)
	Hu	144	18.23 (4.03)	17.60 (3.94)	13.26 (3.52)
	UeL	131	17.28 (4.15)	16.65 (4.33)	12.74 (3.45)
Sex	Male	156	18.31 (3.90)	18.28 (4.15)	13.49 (2.82)
	Female	524	18.36 (3.99)	18.07 (4.29)	13.65 (3.35)
Ethnicity	White British	466	18.74 (3.77)	18.50 (4.01)	13.76 (3.25)
	White Irish	17	18.18 (3.61)	17.88 (4.06)	14.12 (3.06)
	Other White Background	57	18.14 (4.85)	18.11 (5.22)	13.02 (2.98)
	White and Black Caribbean	8	14.75 (2.38)	13.88 (3.04)	11.38 (1.30)
	White and Asian	8	17.63 (4.37)	18.13 (5.33)	13.88 (5.06)
	White and Black African	3	17.33 (6.81)	17.00 (2.65)	11.67 (4.09)
	Other Mixed Background	9	16.33 (2.65)	17.22 (2.95)	13.00 (2.96)
	Asian or Asian British - Indian	11	17.55 (4.03)	16.73 (4.05)	15.00 (2.41)

	Asian or Asian British - Pakistani	8	17.38 (3.29)	16.38 (2.26)	11.88 (3.04)
	Asian or Asian British - Bangladeshi	9	19.56 (3.71)	19.44 (2.88)	15.22 (2.39)
	Other Asian Background	9	18.22 (3.53)	17.78 (3.49)	14.00 (2.83)
	Chinese	23	16.96 (4.03)	17.74 (4.33)	12.74 (2.80)
	Black or Black British - Caribbean	13	15.69 (5.06)	14.62 (5.21)	13.46 (3.46)
	Black or Black British - African	20	17.15 (4.37)	15.95 (5.18)	13.80 (3.74)
	Other black background	5	18.20 (4.55)	16.60 (6.39)	12.80 (4.09)
	Other ethnic background	4	18.50 (4.36)	18.50 (4.04)	13.25 (0.50)
	Unknown ethnic origin	4	14.50 (2.65)	13.00 (1.83)	11.00 (2.31)
	Yes	129	15.88 (4.12)	15.55 (3.97)	11.84 (3.34)
Receiving benefits	No	376	19.12 (3.72)	18.97 (4.19)	14.18 (3.11)
	Don't know	134	18.34 (3.76)	17.98 (3.94)	13.63 (2.87)
	0-1	351	18.87 (3.79)	18.52 (3.92)	14.22 (2.93)
Number of times moved house	2-3	165	18.08 (3.88)	17.79 (4.07)	13.51 (3.47)
	4+	158	17.58 (4.26)	17.72 (4.99)	12.47 (3.23)

2.5 Discussion

We have developed a brief self-report measure of PRD that can be used by researchers interested in the relationship between childhood adversity and adult psychological phenomena. The CFA exposed 3 factors, whilst the EFA was not able to model the shared ‘method’ variance between the neighbourhood and global item pairs. The correlated errors between the item pairs increase the observed correlations, making a one factor solution seem likely. Without conducting the CFA separation of the neighbourhood and global factor would not have been exposed. CFA confirmed a meaningful structure, with subscales measuring PRD and perceived family social capital (quality of relationships).

Scores of the measure suggest good internal consistency. We have also presented evidence of the concurrent validity of scores from the scale using two indices, differences between scores of participants classified according to objective indices of wealth (parental receipt of benefits). Although these observations must be considered preliminary, PRD to neighbourhood and wider society significantly correlated with IMD scores, indicating that the measure has validity against a well-established objective measure of deprivation.

Furthermore, as we had expected (because there is no obvious reason why relative economic advantage/disadvantage would correlate with the quality of family relationships) the perceived family social capital subscale was not associated with IMD scores, confirming discriminant validity of the subscale scores. It could be argued that validity against these objective indices is not crucial as our concern has been to measure *perceptions* of childhood social disadvantage.

The impact of childhood disadvantage on mental and physical health is an important public health issue that has major societal, public health and, political implications. Epidemiological studies have shown that individuals low in the social hierarchy (Marmot et al., 2010) and living in unequal societies have impaired physical and mental health (Wilkinson & Pickett, 2009). It is clear that social disadvantage experienced during childhood is especially important (Wicks et al., 2010). However, most of the available evidence is epidemiological and mechanisms mediating these relationships have remained largely a matter of speculation. Because the PICS is short (taking 5-10 minutes to complete) it may be suitable for inclusion in large scale survey studies investigating psychological and biological mechanisms linking social disadvantage to negative health outcomes. Its ease of use also makes it suitable for use with clinical populations. The scale can be viewed in Appendix A and is available from the authors on request.

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Chapter 3

Why does relative deprivation affect mental health? The role of justice, trust and social rank in psychological wellbeing and paranoid ideation²

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Chapter 4

The impact of social deprivation on paranoia, hallucinations, mania and depression: The role of discrimination, social support, stress and trust.³

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4.1 Abstract

The negative implications of living in a socially unequal society are now well documented. However, there is poor understanding of the pathways from specific environmental risk to symptoms. Here we examine the associations between social deprivation, depression, and psychotic symptoms using the 2007 Adult Psychiatric Morbidity Survey, a cross-sectional dataset including 7,353 individuals. In addition we looked at the mediating role of stress, discrimination, trust and lack of social support. We found that the participants' neighbourhood index of multiple deprivation (IMD) significantly predicted psychosis and depression. On inspection of specific psychotic symptoms, IMD predicted paranoia, but not hallucinations or hypomania. Discrimination, stress and trust partially mediated the relationship between IMD and paranoid ideation. Discrimination, stress, trust and a lack of social support fully mediated the relationship between IMD and depression. Future research should focus on the role deprivation and social inequalities plays in specific manifestations of psychopathology and investigate mechanisms to explain those associations that occur. Targeting the mediating mechanisms through appropriate psychological intervention may go some way to dampen the negative consequences of living in an unjust society; ameliorating economic injustice may improve population mental health.

4.2 Introduction

4.2.1 Social deprivation, inequality and psychosis

Since the 1970s, in much of the developed world, the wealthiest have become increasingly rich but the wealth of the collective poor has remained unchanged (Toynbee & Walker, 2008). The negative implications for health and wellbeing of this increasing inequality are now well documented (Kirkbride, 2009; Marmot et al., 1991, 2010; Wilkinson & Pickett, 2009a). Research has identified a wide range of poor physical and psychological outcomes associated with inequality and social deprivation, including obesity (Lee, 2011), cardiovascular disease (Kim, Kawachi, Hoorn, & Ezzati, 2008), anxiety (Fryers, Melzer, Jenkins, & Brugha, 2005), depression (Lorant et al., 2007), suicide (Gilman et al., 2013) and also severe mental health diagnoses, including psychosis (Kirkbride & Jones, 2011). The economic consequences of these inequalities are vast. Marmot (2010) has estimated that, in the United Kingdom (UK) alone, the healthcare costs associated with social and economic deprivation exceed £5.5 billion per year. However, the mechanisms responsible for these associations are poorly understood. It seems likely that social stressors impacting on emotional regulation play an important role (Dickerson & Kemeny, 2004; Marwaha, Broome, Bebbington, Kuipers, & Freeman, 2014; Wilkinson & Pickett, 2009b; Zimmerman & Bell, 2006). Here we examine associations between indices of deprivation, and serious mental illness, investigating associations with specific symptoms in the non-affective psychosis spectrum, and also with depression and mania. In addition we consider the mediating role of stress, discrimination, trust and lack of social support.

Links between economic deprivation and poor psychological functioning are now well established, with associations found for multiple psychopathologies (Fryers et al., 2005; Gilman et al., 2013; Kirkbride, Jones, Ullrich, & Coid, 2014; Lorant et al., 2003). Economically deprived areas have excessive numbers of diagnosed individuals with depression (Andersen, Thielen, Nygaard, & Diderichsen, 2009) and also psychosis (Croudace, Kayne, Jones, & Harrison, 2000; Crump, Sundquist, Sundquist, & Winkleby, 2011; Fone & Dunstan, 2006). In the case of depression it is estimated that living in deprivation, poverty and feeling financial strain are all significant risk factors (Lorant et al., 2007). In the case of psychosis, a significant proportion of the variance (8%) in incidence rates is attributed to characteristics associated with neighbourhood level and environmental characteristics (Kirkbride, 2010). A recent analysis has suggested that a one standard deviation increase in deprivation in England may confer an increased relative risk of psychosis of 1.28 (Kirkbride et al., 2014).

These associations have often been explained in terms of reverse causality on the grounds that individuals with a deteriorating mental state seek out environments that are typically urban and deprived due to downward social drift (e.g. Goldberg & Morrison, 1963). However this explanation seems unlikely as research indicates an association before the onset of the illness and especially with deprivation during childhood (Wicks, Hjern, Gunnell, Lewis, & Dalman, 2005) with one study finding associations at birth (Harrison, Gunnell, Glazebrook, Page, & Kwiecinski, 2001). There is the possibility that drift may originate in earlier generations, accounting for these findings. However, a dose-response relationship has been detected between deprivation and psychosis, with those who spend most time in urban and deprived environments being at highest risk (Heinz, Deserno, & Reininghaus, 2013; Pedersen

& Mortensen, 2001). Moreover, research that has controlled for possible genetic confounding suggests that growing up in deprivation puts individuals at a higher risk of a schizophrenia diagnosis, regardless of genetic risk, and perhaps more importantly for intervention strategies, that growing up with high socioeconomic status (SES) is a protective factor for those who are at genetic risk (Wicks, Hjern, & Dalman, 2010).

Recent studies have suggested that inequality (living in circumstances in which there are large variations in economic wellbeing) may confer risk that is additional to the risk of deprivation alone (Burns & Esterhuizen, 2008; Burns, Tomita, & Kapadia, 2014). Kirkbride et al. (2014) investigated the association of social inequality with incidence rates of affective and non-affective psychosis. They used the index of multiple deprivation (IMD; a small area statistic made available by the UK Office of National Statistics) and local Gini coefficients calculated by comparing variation in deprivation within each neighbourhood at a lower, nested level of geography, and found that both were associated with non-affective psychosis but not with affective psychosis. More recently, Tsai et al. (2014), in a 10-year longitudinal study found that a combination of individual and neighbourhood economic status predicted extremely poor outcomes for psychosis, so that schizophrenia patients with low SES living in deprived neighbourhoods were at 18-22% higher risk of death than those with high SES living in advantaged neighbourhoods. Schizophrenia patients with low SES living in advantaged neighbourhoods also had better outcomes than their counterparts in disadvantaged neighbourhoods.

One limitation of the above research is that it has generally employed broad diagnostic categories as outcome variables. In the case of psychosis, especially, such

categories are problematic because they encompass heterogeneous phenomena, leading some to argue that psychopathology is better understood in terms of a small number of dimensions (van Os & Kapur, 2009) or at the symptom level (Bentall, 2003). Indeed, existing evidence suggests that some environmental factors may confer risk of specific symptoms, for example that childhood sexual abuse confers a specific risk of auditory verbal hallucinations (AVHs) whereas attachment-disrupting events confer a specific risk of paranoia (Bentall, Wickham, Shevlin, & Varese, 2012; Sitko, Bentall, Shevlin, O'Sullivan, & Sellwood, 2014). However, other risk factors, for example, urbanicity (Oher et al., 2014), appear to confer risk across the broad positive symptom dimension. Oher et al. (2014) considered the association between deprivation and psychotic symptoms in people with first episode psychosis. They found that there were higher levels of reality distortion and depressive symptoms in the most densely populated areas, however no clear association was observed for paranoia. In addition, it was associated with hallucinations. In some cases, for example perceived discrimination, the data is inconsistent, with some studies suggesting an association with all positive symptoms (Cooper et al., 2008) and some suggesting a specific association with non-clinical but not clinical paranoia (Combs, 2006; Rippy & Newman, 2006). These kinds of specificities are important because they provide clues about the mechanisms that may give rise to symptoms. In this paper, we consider whether deprivation might be linked to specific psychotic symptoms.

It seems reasonable to hypothesise that paranoid beliefs may be particularly linked to deprivation because psychological research implicates negative social comparison and experiences of victimisation (arguably more likely in deprived and unequal neighbourhoods) in these beliefs (Bentall, Corcoran, Howard, Blackwood, &

Kinderman, 2001; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002).

Consistent with this hypothesis, Mirowsky and Ross (1983), in a population survey of residents of El Paso (USA) and Juarez (Mexico) found that paranoid beliefs were associated with urban areas in which individuals felt powerless and victimised, and that external locus of control and lack of trust mediated this association. In Chapter 3 I described a large student study (Wickham, Lyons, Dickins, Shyrane and Bentall, 2014). Here I found that recalled relative deprivation in childhood was associated with paranoid beliefs and hallucination-proneness in early adulthood. However, on investigating possible mechanisms to explain this association (beliefs about injustice, trust and social rank) this study found that these variables were significant mediators for paranoid beliefs but not for hallucination-proneness. Finally, experimental studies have demonstrated that walking through a deprived urban neighbourhood can provoke paranoid thoughts in both psychiatric patients (Ellett, Freeman, & Garety, 2008) and ordinary people (Nettle, Pepper, Jobling, & Schroeder, 2014).

4.2.2 Underlying mechanisms between inequality and psychosis

Several underlying mechanism have been hypothesised to explain the pathways from environment risks to psychosis. Impaired nutrition (Harrison et al., 2003) and infections (Yolken & Torrey, 2008) have been suggested to play a role, but with varying and unreliable findings (Brown & Derkits, 2010; Mednick, Machon, Huttunen, & Bonett, 1988; Varma et al., 1997). Given that that stress is implicated in a range of mental illnesses and, in particular, psychosis (Marwaha et al., 2014; Walker & Diforio, 1997; Walker, Mittal, & Tessner, 2008) an alternative possibility is that experiences of deprivation, especially in highly unequal societies such as the UK or the US, are stress-inducing. Concepts such as status anxiety (Marmot, 2006; SA; Singh-Manoux, Marmot, & Adler, 2001), social defeat (SD; Selten & Cantor-

Graae, 2005) and social exclusion (SE; Barry, 2002) have all been proposed as potential mechanisms. Although these are conceptually different, a common theme is the perception of being disadvantaged compared to others and hence excluded. The SD hypothesis, in particular, has gone to some lengths to explain the role of not only deprivation but of other risk factors for psychosis such as childhood trauma, urban upbringing, low IQ, migration and illicit drug use (Selten & Cantor-Graae, 2005; Selten, van der Ven, Rutten, & Cantor-Graae, 2013). A recent review suggests that the impact of population density, social fragmentation and deprivation on risk of psychosis may not be directly causal, but explained or modified by individual level social stressors (i.e. cannabis use, social adversity, exclusion and discrimination). However the authors of the review note that good research is lacking in this area (Heinz et al., 2013).

In this study, we aimed to assess the association between deprivation as measured by the index of multiple deprivation (IMD) and specific mental health outcomes, using data from the 2007 Adult Psychiatric Morbidity Survey (APMS2007; McManus, Meltzer, Brugha, & Bebbington, 2009). For reasons reviewed above, we hypothesised deprivation to be associated with paranoia. In the light of previous research (e.g. Galea et al., 2007), we also predicted deprivation to be associated with depression. Predictions about hallucinations had to be more tentative. On the one hand, in our previous research shown in Chapter 3 (Wickham et al., 2014) with student participants we did find a modest association between IMD of neighbourhood during childhood and hallucination-proneness. However, research on the cognitive processes involved in AVHs has implicated impaired source monitoring as a crucial mechanism (Brookwell, Bentall, & Varese, 2013) and there was no reason to predict that this mechanism would be affected by current exposure

to deprived urban environments. Hence we anticipated that any association between deprivation and AVHs would be small or non-existent. Given the lack of association between manic symptoms and urbanicity (Kaymaz et al., 2007; Sherazi, McKeon, McDonough, & Kennedy, 2006), we also did not predict an association between these symptoms and deprivation.

We also tested four potential mediators of the predicted relationships which were available in APMS2007 and which we selected on the basis of previous research. Because discrimination has been implicated in psychosis in some studies (Cooper et al., 2008) and paranoia in others (Combs, 2006; Rippey & Newman, 2006) this was included. Trust was included in the light of evidence that it might be specifically implicated in paranoia (Ellett et al., 2008; Mirowsky & Ross, 1983). Finally, lack of social support and stress have been implicated in paranoia (Freeman et al., 2011; Gayer-Anderson & Morgan, 2013) and so were considered as mediators.

Although our main research focus is the positive symptoms of psychosis, because depression has also been linked to poverty (Doucet, 2003; Lorant et al., 2007) and social deprivation (Aylaz, Aktürk, Erci, Öztürk, & Aslan, 2012; Gray, Hellzèn, Romild, & Stordal, 2012) we included it in our models. Finally, because mania was also assessed in APMS2007, and because the research linking urbanicity to affective psychosis and bipolar disorder has been inconsistent (Kirkbride et al., 2012, 2014), we also considered it in our analyses.

4.3 Method

4.3.1 Ethics statement

The current study used secondary data therefore direct ethical approval was not required. However the original data collection (APMS2007) received ethical

approval from the Royal Free Hospital and Medical School Research Ethics Committee (reference number 06/Q0501/71). Written consent was obtained from all participants.

4.3.2 *Sample*

The APMS2007 was carried out between October 2006 and December 2007 by the National Centre for Social Research and the University of Leicester. The survey was commissioned by the NHS Information Centre for Health and Social Care and employed a multistage stratified probability sampling design. Individuals aged 16 years and above living in private households were identified for interview in England using postcodes. From 13,171 eligible households, 7,353 individuals completed the first phase (although a second phase involved clinical interviews with a subsample, these data are not used in this study, with the exception that they contributed to the definition of probable psychosis; see below). Researchers administered computer-assisted interviews and self-completion questionnaires using laptops to obtain data on topics including physical health, mental health, service use, religion, social capital, discrimination and sexual abuse. For more information, see McManus et al. (2009).

4.3.3 *Dependent variables*

Psychosis: The APMS2007 screened for psychosis experiences during phase one using the Psychosis Screening Questionnaire (PSQ; Bebbington & Nayani, 1995), and then interviewed a subsample of participants with the Schedule for Clinical Assessment in Neuropsychiatry (SCAN; Wing et al., 1990) in phase two. Probable psychosis and definite psychosis were binary variables derived from phase one and two data.

Probable psychosis was derived by all those who screened positive for psychosis at phase one from the PSQ and during the SCAN assessment at phase two. These were scored as probable psychosis (given a score of 1). In addition, those who did not have a SCAN assessment but met two or more positive psychosis screening criteria on the basis of their questionnaire responses were also assigned a probable psychosis outcome. A score of 0 was given to individuals who only met one positive screening criteria at phase one and who did not have a SCAN assessment, and also to all those who screened as having no psychosis experiences at phase one. The scoring of definite psychosis employed the same strategy as probable psychosis but a different restrained weighting strategy was applied to take account of non-response in phase two (see McManus et al., 2009). This is considered a more conservative estimate of psychotic experiences.

Paranoia, AVHs and Mania: The PSQ (Bebbington & Nayani, 1995) has 5 sections to identify psychotic-like experiences that may have occurred within the past year: mania/hypomania, thought control, paranoia, strange experiences, and AVHs. Each section has an initial question followed by one or two follow-up questions to determine severity. For present purposes, paranoia, AVHs and mania/hypomania sections were of interest, and were scored as binary variables, scoring the highest level of severity as 1, and all others as 0. Here, we are using a narrow definition of paranoia, encompassing thoughts of deliberate acts of harm and plotting against an individual as has been used in a previous publication using this dataset (Bentall et al., 2012).

The highest severity of paranoia was assessed using the question, “Have there been times that you felt that a group of people was plotting to cause you serious harm or injury?” The highest severity of auditory-verbal hallucination (AVH) was

identified by respondents answering yes to the question: “Did you at any time hear voices saying quite a few words or sentences when there was no one around that might account for it?” The highest severity of mania/hypomania was assessed using the question, “Did people around you think it [being happy, for no reason, for days without a break] was strange or complain about it?”

Depression: A binary score for depression (1 = depression, 0 = absent) was derived from the phase one Clinical Interview Scale – Revised (CIS-R, see Lewis, Pelosi, Araya, & Dunn, 1992). This score was derived from the APMS2007 coding script which included many variables from the CIS-R, including depressive ideas and depressive moods, but also fatigue and appetite. The final depression score encompasses mild, moderate and severe depression.

4.3.4 *Mediating variables*

Stress: One item from the social functioning section of the APMS2007 asked individuals whether they saw their tasks at home and at work as very stressful. Individuals answered on a 4-point Likert scale from 0 “not at all” to 3 “most of the time”.

Social Support: Seven items were used to identify the level of social support each respondent felt that they had from family and friends. Participants were asked to respond “not true” “partly true” or “certainly true” to a series of statements, including whether family and friends did things to make them happy, made them feel loved, could be relied on no matter what, would see that they were taken care of no matter what, accepted them just the way they are, made them feel an important part of their lives, and gave them support and encouragement. Each respondent could

have a score between 0 and 14, creating a 15-point scale. In the current analysis, internal consistency is good (Cronbach's $\alpha = .88$).

Discrimination: An eight point scale was derived based on cumulative experiences of discrimination in the last 12 months. This was assessed using eight items from the discrimination section of the APMS2007. Respondents were asked to answer yes (1) or no (0) to identify if they had been unfairly treated in the last 12 months due to skin colour/ethnicity, sex, religious beliefs, age, mental health, other health problems or disability or sexual orientation.

4.3.5 Independent variable

The Index of Multiple Deprivation (IMD): The IMD 2004 data were collected for the APMS2007. This is a derived measure of social and economic deprivation based on seven domains or neighbourhood variables: income; employment; health and disability; education, skills and training; barriers to housing and services; living environment; and crime. Data for the IMD 2004 was collected between 1997 and 2003 and the APMS2007 reported a 5 point scale, where 1 (0.59 – 8.35) represents the least deprived and 5 (34.21- 86.36) represents most deprived.

Covariates: Covariates included in the analyses encompassed age (range = 16 to 95 with a mean of 46.35, SD = 18.60). Sex was added as a categorical variable covariate where 48.6% of respondents were male (1 = male, 0 = female). Ethnicity was also added as a categorical variable where 0 equated to white British and 1 equalled other ethnicity. In this dataset 84.6% of respondents were white British. Drug use with the last year was added as a covariate, this was added as a binary variable (1 = yes and 0 = no). In this sample 92% of the total sample reported using any drug in the year leading up to the interview. Highest education level achieved

was also entered into the analysis, this included 6 categorical variables from degree (18.6%), teaching, HND and nursing (7.3%), A levels (12.7%), GCSE or equivalent (24.5%), foreign or other (3.9%) and no qualification (30.8%), with 2.3% missing data. Finally AVHs were entered as a covariate in the mediation analysis, this was to address the issue of co-occurrence of symptoms, particularly between paranoia and AVHs as has been previously identified and used in these large epidemiological datasets (see Bentall et al., 2012, Sitko et al., 2014)

4.3.6 Statistical Analyses

Descriptive statistics were produced using SPSS 21 and regression and multivariate mediation models were specified and estimated using Mplus6.1. Logistic regressions were carried out to assess the association between the independent variable (IV) IMD and the dependent variables (DV) mental health outcomes (probable psychosis, definite psychosis, depression, paranoia, AVHs and mania/hypomania). This was completed three times. In the first regression IMD was regressed to definitive psychosis, as this required different weighting than for other DVs. The second regression allowed IMD to predict probable psychosis, and the final regression allowed IMD to predict to all other DVs (depression, paranoia, AVHs and mania/hypomania). All regressions used the appropriate weighting for survey design and non-response in order to be representative of English population (see McManus et al., 2009).

Mediation was investigated using multivariate binary logistic regression models estimated in Mplus 6.1 (Muthén & Muthén, 1998 - 2013) using robust maximum likelihood estimation. In an initial model, direct paths between the IMD and the symptoms associated with IMD were computed. Model 2 added the direct

paths from covariates to symptoms including age, sex, ethnicity and AVHs. AVHs were added as a covariate due to its shared variance with both paranoia and depression (Bentall et al., 2012; Sitko et al., 2014). All parameters were estimated simultaneously so that the differences in the estimates for the IMD variable between model 1 and model 2 showed the effects of controlling for comorbidity between symptoms and other potential confounders. In model 3, discrimination, stress, lack of support and trust variables were introduced in the model as mediators between IMD and symptom outcome variables, and the mediating variables were allowed to covary. The effects from IMD to the mediating variables were linear regression estimates and the effects from the mediators to the symptoms were logistic estimates reported as odds ratios (see Figure 4.1).

The adequacy of each model was assessed by examining three information theory based fit statistics: the Akaike Information Criterion (AIC; Akaike, 1987), the Bayesian Information Criterion (BIC; Schwarz, 1978), and the sample size adjusted Bayesian Information Criterion (ssaBIC; Sclove, 1987) with lower values indicating better model fit. These fit statistics balance model fit with parsimony in order to determine the optimum model. In addition, chi-square difference tests were used to determine the best fitting model.

4.4 Results

Simple bivariate associations between IMD and mental health outcomes are summarised in Table 4.1. The general trend suggests that as deprivation increases the presence of mental health difficulties also increases. This is reflected in the logistic regression analyses (Table 4.2), when controlling for age, sex, ethnicity, drug use in the last year and education level achieved, IMD predicts definite and probable

psychosis ($\beta = .34, p < .01$; $\beta = .26, p < .01$ respectively), as well as depression ($\beta = .16, p < .001$). However when we investigated specific symptoms experienced within psychosis (paranoia, AVHs and mania/hypomania) direct associations were found for paranoia ($\beta = .15, p < .01$) and not for either AVHs or mania/hypomania.

The odds ratios (ORs) from the multivariate binary logistic regression analysis are presented in Table 4.3. Model 1 estimated the direct effect of IMD on paranoia and depression. For this model the likelihood ratio chi-square was statistically significant ($X^2 = 54.94, df = 12, p < .01$). The addition of the covariates (model 2; change in $X^2(\Delta X^2) = 186.61$, change in df (Δdf) = 12, $p < .01$) and the mediator variables (model 3; $\Delta X^2 = 2583.82, \Delta df = 38, p < .01$) made significant improvements to the overall model.

Table 4.1

Simple bivariate associations, showing percentages (%) and actual numbers (n) between the index of multiple deprivation (IMD) and mental health outcomes (psychosis, depression, paranoia, auditory-verbal hallucinations (AVHs) and mania).

Diagnoses/Symptom	Level of deprivation											
	Least deprived						Most deprived					
	0.59 > 8.35		8.35 > 13.72		13.72 > 21.16		21.16 > 34.21		34.21 > 86.36		Total	
	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)	%	(n)
Definite Psychosis	4.3	(1)	8.7	(2)	17.4	(4)	17.4	(4)	52.2	(12)	100	(23)
Probable Psychosis	5.0	(2)	10.0	(4)	22.5	(9)	22.5	(9)	40.0	(16)	100	(40)
Depression	12.5	(32)	11.0	(28)	14.9	(38)	27.5	(70)	34.1	(87)	100	(255)
Paranoia	6.4	(8)	9.6	(12)	24.8	(31)	28.0	(35)	31.2	(39)	100	(125)
AVHs	14.7	(10)	10.3	(7)	20.6	(14)	26.5	(18)	27.9	(19)	100	(68)
Hypomania	9.1	(4)	15.9	(7)	22.7	(10)	22.7	(10)	29.5	(13)	100	(44)

Table 4.2

Summary of logistic regression analysis for variables predicting mental health outcomes, controlling for background variables (age, sex, ethnicity, education and drug use).

Index of Multiple Deprivation to:	Unstandardised		Standardised		OR (95% CI)
	β	SE	β	SE	
Definite Psychosis	.57*	.20	.34*	.11	1.8* (1.2 – 2.6)
Probable Psychosis	.39*	.14	.26*	.08	1.5** (1.1 – 1.9)
Depression	.21**	.06	.16**	.04	1.2** (1.1 – 1.4)
Paranoia	.22*	.08	.15*	.05	1.2** (1.1 – 1.5)
AVHs	.12	.11	.09	.08	1.1 (0.9 – 1.4)
Mania	.09	.14	.06	.10	1.1 (0.8 – 1.4)

*Note: **p <.001, *p < .01 Definitive Psychosis was weighted using specific weight designed for this variable; all other variables were weighted using phase one data weights.*

Table 4.3

Logistic regression odds ratios of symptoms by IMD and fit indices for the mediation model

Variable		Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Paranoia	IMD	1.44** (1.25 – 1.66)	1.26** (1.07 – 1.47)	1.19* (1.02 – 1.40)
	Age	-	0.97** (0.96 – 0.99)	0.99* (0.97 – 1.00)
	Sex	-	1.35 (0.88 – 2.09)	1.36 (0.87 – 2.11)
	Ethnicity	-	2.47** (1.48 – 4.13)	2.24** (1.32 – 3.78)
	Education	-	0.93 (0.83 – 1.04)	0.97 (1.14 – 3.63)
	Drug use	-	2.35** (1.34 – 4.11)	2.03 (1.14 – 3.63)
	AVHs	-	22.78** (10.21–50.85)	12.08** (5.07 – 28.81)
	Discrimination	-	-	1.47** (1.07 – 2.03)
	Stress	-	-	1.41** (1.13 – 1.75)
	Trust	-	-	1.45** (1.19 - 1.76)
	Support	-	-	1.05 (0.98 – 1.14)
	Depression	IMD	1.29** (1.16 – 1.44)	1.23** (1.09 – 1.39)
Age		-	0.99** (0.99 – 1.00)	1.01 (1.00 – 1.02)
Sex		-	0.66** (0.49 – 0.90)	0.63 (0.45 – 0.87)
Ethnicity		-	0.85 (0.53 – 1.38)	0.62 (0.37 – 1.05)
Education		-	0.88** (0.81 – 0.95)	0.91* (0.84 – 0.99)
Drug use		-	2.02 (1.29 – 3.18)	1.54 (0.92 – 2.57)
AVHs		-	7.18** (3.43 – 15.02)	2.15 (0.92 – 5.01)
Discrimination		-	-	1.96** (1.56 – 2.46)
Stress		-	-	2.30** (1.95 – 2.70)
Trust		-	-	1.34** (1.18 – 1.53)
Support		-	-	1.10** (1.04 – 1.16)
Loglikelihood		-39894	-39801	-38509
# Free Parameters	12	24	62	
AIC	79813	79650	77142	
BIC	79895	79815	77568	
ssaBIC	79857	79739	77371	

*Note: ** $p < .01$, * $p < .05$. IMD (Index of multiple deprivation), AVHs (auditory-verbal hallucinations), AIC = Akaike information criterion, BIC = Bayesian information criterion, SSABIC = sample size adjusted BIC*

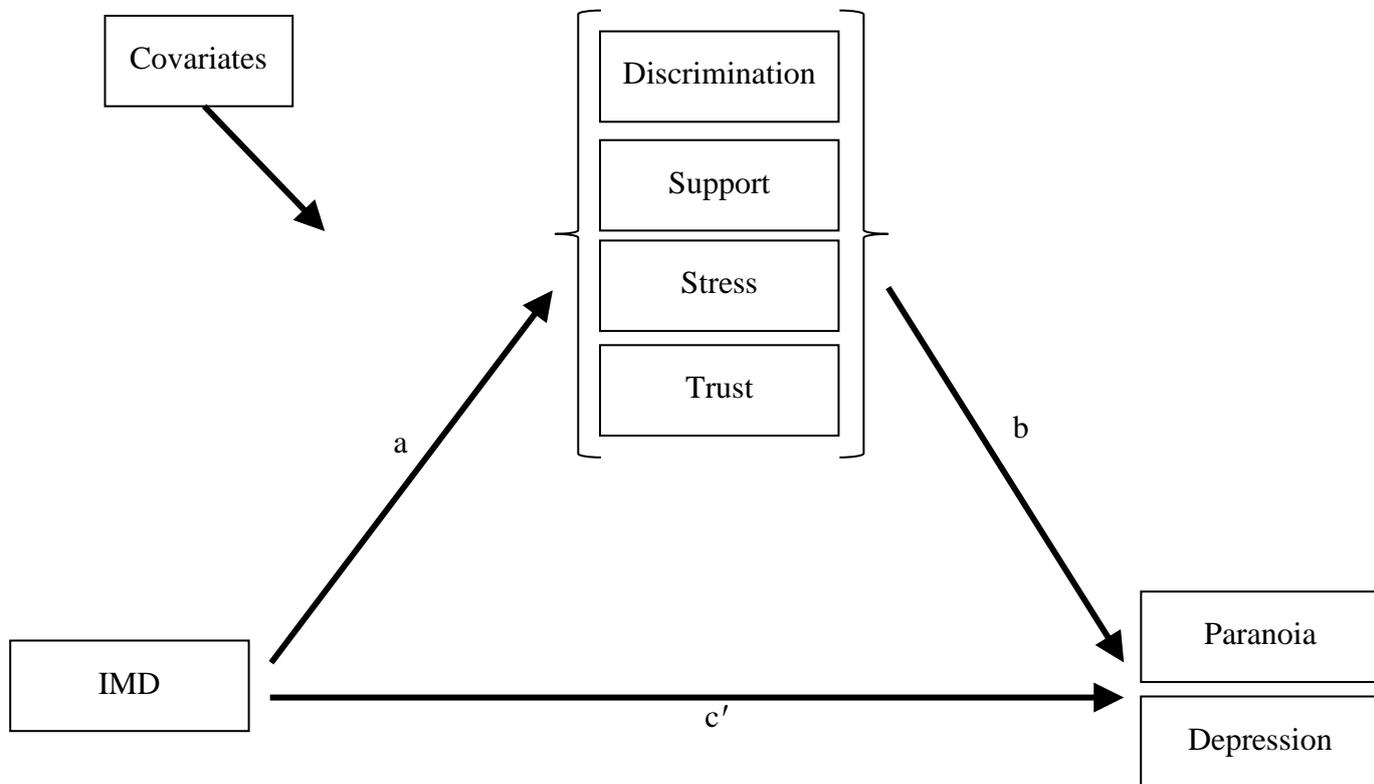


Figure 4.1

Illustration of the final model (model 3) used in the analysis. Please note that the mediators representing discrimination, support, stress and trust were allowed to covary. Covariates included age, sex, ethnicity and hallucinatory experiences. The mediating variables (discrimination, support, stress and trust) were regressed onto the IV - the index of multiple deprivation (IMD) variable (path a). The DVs (paranoia and depression) were regressed onto the mediating variables (path b) and the DVs were also regressed onto the IV IMD (path c') simultaneously. The effects from IMD to the mediating variables were linear regression estimates and the effects from the mediators to the symptoms were logistic estimates reported as odds ratios.

In model 1, the IMD variable significantly predicted each symptom (paranoia and depression). The effect was highest for paranoia, with an OR of 1.44 (95% CI [1.25, 1.66]). The OR for depression was 1.29 (95% CI [1.16, 1.44]). The introduction of the covariate variables in model 2 resulted in a slight decrease in the ORs, however remained statistically significant (paranoia OR 1.26, 95% CI [1.07, 1.47]; depression OR 1.23, 95% CI [1.09, 1.39])

In model 3, the IMD variables significantly predicted the mediating variables stress, (standardised $B = 0.03$, $SE=0.01$, $p = .01$) lack of trust ($B = 0.23$, $SE=0.01$, $p < .001$), lack of social support ($B = 0.04$, $SE=0.01$, $p < .001$), and discrimination ($B = 0.03$, $SE=0.01$, $p = .02$). Each of the potential mediators significantly predicted the symptom measures with the exception of the path from lack of support to paranoia, which was non-significant. The largest effect for paranoia was discrimination (OR = 1.47, 95% CI [1.07, 2.03]) and the smallest effect was stress (OR = 1.41, 95% CI [1.13, 1.75]). With the DV depression, the largest effect was between stress and depression (OR = 2.30, 95% CI [1.95, 2.70]). The smallest effect was between lack of social support and depression (OR = 1.10, 95% CI [1.04, 1.16]). Model 3 indicates that *partial mediation* occurred between IMD and paranoia through discrimination, stress and lack of trust. This is due to the fact that c' (the relationship between IMD and paranoia) remained significant, but reduced between models 2 and 3 (from OR = 1.26, $p < .01$, to OR = 1.19, $p < .05$). However, in the case of depression, *full mediation* occurred between IMD and depression through discrimination, stress, lack of trust and support. This was because model 3 shows that c' became non-significant when the mediators were included.

4.5 Discussion

Consistent with our first hypothesis neighbourhood deprivation significantly predicted psychosis and depression. When focussing on specific symptoms, again as we hypothesised, IMD was associated with both paranoia and depression, but not with AVHs or mania. In our multivariate mediation model, when controlling for comorbidity between the symptoms and other background variables (age, sex, ethnicity, drug use and education level), IMD was associated with all four mediators; lack of trust, social support and stress and discrimination. Examination of the final model (model 3) indicated that the ORs for the direct effects between deprivation and symptoms reduced once the mediators were entered into the model. In the case of depression the OR became statistically non-significant indicating full mediation between IMD and depression through discrimination, trust, lack of support and stress (Baron & Kenny, 1986). In the case of paranoia, the OR reduced in magnitude but remained statistically significant therefore indicating partial mediation through discrimination, trust, and stress. Overall, this study is generally consistent with previous findings of an association between social and economic deprivation and psychosis (Burns & Esterhuizen, 2008; Burns et al., 2014; Kirkbride et al., 2014; Kirkbride & Jones, 2011; Wicks et al., 2010) but our analyses add to previous studies by indicating that this association relates to specific symptoms and can be at least partially explained by several potential underlying mechanisms.

The absence of significant affects for both hallucinations and mania are as worthy of note as the positive findings. As discussed earlier, impairment in the ability to discriminate between self-generated thoughts and external verbal stimuli, a process known as source monitoring, is a crucial mechanism in vulnerability to auditory hallucinations (Bentall, 1990; Brookwell et al., 2013). Although it is well

known that childhood trauma is associated with hallucinations in adulthood (Bentall et al., 2012), and although we had previously found an association between childhood IMD and hallucination-proneness in early adulthood, there was no reason to believe that source monitoring would be affected by current exposure to urban environments as measured in this study.

Very little is known about environmental risk factors for mania, but there is evidence that manic episodes can be triggered by goal achievement life events (Johnson et al., 2000) which are, if anything, less likely to be experienced in deprived versus affluent areas. Previous research has failed to find any association between bipolar disorder and urban environments (Kirkbride et al., 2012) and our findings appear to confirm this observation.

Two findings from covariates included in our analyses are also worth considering. Female sex was associated with an increased risk of depression, as shown in many previous studies (Nolen-Hoeksema, 2001). This observation therefore testifies to the validity of our approach. Perhaps more intriguingly, belonging to an ethnic minority group was strongly associated with paranoia but not depression. It has been well-demonstrated that ethnic minority status is a risk factor for psychosis (Veling, 2013) but we are not aware of attempts to tease out which positive symptoms of psychosis are most sensitive to this effect. Because this observation emerged in models which also include trust, stress, social support and discrimination, the implication is that this increased risk from ethnicity cannot be explained by these variables. Further research is required with other datasets to determine whether a specific link between ethnic status and paranoia can be replicated, and what mechanisms might be involved.

A number of limitations to the study need to be considered. Firstly, the PSQ used in the APMS2007 dataset concerns experiences in the last year, rather than across the lifetime. It is possible that people classified as not experiencing paranoia or AVHs in our analyses in fact had these experiences in the more distant past. However, it is worth noting that focusing on recent experiences of psychosis as opposed to lifetime experiences will have most likely led us to underestimate the association between deprivation and symptoms. Second, the measure of social deprivation used in the APMS2007 dataset, IMD scores was divided into quintiles, producing an ordinal scale; due to data protection restrictions raw IMD data was unavailable to us. This loss of information may have attenuated some relationships. Moreover, the measure pertained to current living circumstances, rather than those of, say, childhood or the time of onset of psychotic experiences. Hence we hypothesise that the findings reflect the provocation of psychotic symptoms by the current environment (as in the case of the experimental studies of the effects of the urban environment on paranoia, (Ellett et al., 2008; Nettle et al., 2014), rather than developmental pathways to psychotic symptoms. Third, the reliability of our measure of stress may be compromised as it used a single item relating to work stress. Arguably, the findings related to stress need to be assessed using an established measure of stress to incorporate other forms of stress (e.g. emotional and home stressors).

Fourth, and perhaps most importantly, the present study is cross-sectional and correlational, and direction of causality cannot be tested using the statistical models we have employed. Therefore, we cannot exclude the possibility that symptoms may affect people's judgments about discrimination, trust, stress and social support or, indeed, that, when answering questions about paranoia and depression, feelings of

discrimination, mistrust, stress and the experience of poor social support influenced their answers. Indeed, it could be argued that there is conceptual overlap between mistrust and paranoia and that, therefore, a close association between the two was inevitable. (We think this argument is harder to make about the other mediators.)

With respect to our mediational models, there is no certainty that our mediators were temporally consequent to exposure to a deprived environments or that they preceded the onset of symptoms. However, it seems unlikely that people suffering specifically from paranoia and depression (as opposed to AVHs and mania/hypomania) would seek out deprived neighbourhoods to live in. Moreover, our findings are not only consistent with our mediational hypotheses, but also with our previous findings from Chapter 3 on the relationship between perceived relative deprivation and paranoia (Wickham et al., 2014), with current understandings of the psychological mechanisms underlying paranoid beliefs (Bentall et al., 2001; Freeman et al., 2002), and, as already noted, with experimental studies which show that short-term exposure to deprived environments tends to provoke paranoid thoughts (Ellett et al., 2008; Nettle et al., 2014). A further caveat is that epidemiological findings, particularly involving mediation analysis (Bullock, Green, & Ha, 2010), are vulnerable to unmeasured covariates. This is a problem in most areas of research that can only be addressed by considering other potential covariates in future studies.

It might be argued that our results offer some support to the SD hypothesis and related concepts (Selten & Cantor-Graae, 2005; Selten et al., 2013), suggesting that living at the bottom end of an unequal society breeds stress and a lack of trust and support a constellation of experiences which might be described as socially defeating. However, one criticism of the SD model is that it is fairly non-specific in

terms of what characterises social defeat, which symptoms are most affected, and likely mediating mechanisms.

To our knowledge this is the first study to test for specific symptom relationships (paranoia and depression) with deprivation, as opposed to the broadly defined diagnostic categories which have been identified as particularly problematic when researching social determinants of psychopathological phenomena (Harper, 2011). It will be useful to replicate these findings in other samples to further assess the specific associations identified here. Longitudinal designs would also help clarify the direction of causality. If supported by future research the present findings have important social implications.

Although the effects found in paranoid and depressive symptoms in this study might be described as modest, at the population level the impact of deprivation on mental health is potentially large. If we consider the UK as an example, the inevitable outcome of experiences of deprivation indicates that more people are being pushed towards mental illness (Dorling, 2011). In much of the developed world, income inequalities have increased since the 1970s with current disparities at an all-time high (Marmot et al., 2010). It may be possible that efforts to reverse this trend, for example through progressive taxation or through enhanced benefits to poor families will, in the long-term, positively impact on public mental health but devising such policies, and gaining popular support for their implementation may prove to be a very considerable challenge for all concerned, particularly as individuals tend to justify the status quo in more unequal societies (Dorling, 2010; Kay et al., 2009). It may be more viable to tackle the social stressors that inequality produces through psychological treatments (e.g. cognitive-behaviour therapy (CBT) and interpersonal psychotherapy) which already aim to address self-esteem and are thought to be

effective in depression (Cuijpers, van Straten, Andersson, & van Oppen, 2008), and in the case of CBT, effective for psychosis (CBTp; Wykes, Steel, Everitt, & Tarrrier, 2008). It is possible that these might be enhanced by specifically targeting the mediating mechanisms outlined in the current study, namely support, trust and stress. At a societal level, our findings suggest that public mental health might be promoted by either addressing inequalities, ameliorating the social stressors that arise from inequalities, or both.

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Chapter 5

Insecure attachment is associated with paranoia but not hallucinations in psychotic patients: The mediating role of negative self-esteem⁴

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5.1 Abstract

A growing body of research has investigated associations between insecure attachment styles and psychosis. However, despite good theoretical and epidemiological reasons for hypothesising that insecure attachment may be specifically implicated in paranoid delusions, little research has been carried out investigating the role it plays in specific symptoms. The present study examined the relationship between attachment style, paranoid beliefs and hallucinatory experiences in a sample of 176 people with a diagnosis of schizophrenia spectrum disorders and 113 healthy controls. The study also investigated the mediating role of negative self-esteem in this association. Insecure attachment predicted paranoia but not hallucinations after comorbidity between the symptoms were controlled for. Negative self-esteem partially mediated the association between attachment anxiety and clinical paranoia, and fully mediated the relationship between attachment avoidance and clinical paranoia. There may be utility in exploring attachment representations in psychological treatments for paranoid patients.

Keywords: Paranoia, attachment, hallucinations, self-esteem, mediation

5.2 Introduction

Research has pointed to the possible role of insecure attachment styles in psychotic disorders such as schizophrenia and bipolar disorder (Berry, Wearden, Barrowclough, & Liversidge, 2006; Dozier, 1990; Mickelson, Kessler, & Shaver, 1997; Morriss, van der Gucht, Lancaster, & Bentall, 2009). However, it has been argued that different symptoms of psychosis, such as paranoia and hallucinations, may reflect different cognitive and emotional mechanisms in response to different kinds of adverse life experiences (Bentall & Fernyhough, 2008). In this study we examine whether insecure attachment in patients with psychosis might be specifically associated with paranoid symptoms and explore the role of negative self-esteem and locus of control as potential underlying mechanisms to explain the association.

‘Attachment style’ is a central concept of attachment theory, which focuses on the emotional bond that develops between an infant and their primary caregiver, establishing feelings of safety and security. Bowlby (1969, 1973) argued that this initial bond continues to be important across the life span and affects subsequent psychological functioning, including interpersonal relationships and the interpretation of others’ intentions. Bartholomew and Horowitz (1991) built on the idea of Bowlby’s “internal working models” of the self and other, suggesting that each of these models can be viewed as positive or negative. For example, if a caregiver provides interactions that are trustworthy, responsive and easily accessible, positive self and positive other models are formed, resulting in a secure attachment style. If a caregiver is unpredictable or unavailable, negative models are formed, producing insecure attachment styles. These positive or negative self and other models yield four theoretical attachment styles which are named slightly differently

in different accounts but here we describe as secure, preoccupied, dismissive and fearful.

It has been proposed that these four attachment styles can be explored by reducing them to two dimensions: attachment anxiety (associated with model of the self) and attachment avoidance (associated with model of others). In secure attachment both models are positive. The preoccupied attachment style is associated with a positive other-model and a negative self-model, the dismissive style with a positive self-model and a negative other-model, while, in the case of fearful attachment, both models are negative. Assessing attachment dimensionally rather than categorically is less restrictive, as the styles can vary in degree rather than by kind (Mikulincer & Shaver, 2007).

Although, working models developed early in childhood are presumed to act as templates for future relationships, some research has suggested that attachment styles may not be entirely stable, trait-like phenomena (Fraley, Vicary, Brumbaugh, & Roisman, 2011). Indeed, Bowlby (1969) hypothesised that, although people are more likely to integrate new information into their existing attachment styles, individuals are also capable of changing their attachment styles or vary in the degree to which they fluctuate within the dimensions. Hence, there is evidence that the assumptions individuals make about others and the self can be disrupted or challenged as a result of both positive experiences but also adverse experiences such as sexual, physical and emotional abuse (Read & Gumley 2008).

Insecure attachment styles can be thought of adaptive strategies in response to unpredictable and rejecting social environments. However empirical research has shown that they are associated with various kinds of adulthood psychopathology (Dozier, Stovall, Albus, Cassidy, & Shaver, 1999; Mickelson et al., 1997), including

anxiety (Warren, Huston, Egeland, & Sroufe, 1997), depression (Fowler, Allen, Oldham, & Frueh, 2013), obsessive compulsive disorder (OCD; Carpenter & Chung, 2011), and post-traumatic stress disorder (PTSD; Muller, Sicoli, & Lemieux, 2000; Ortigo, Westen, Defife, & Bradley, 2013). It is possible that the apparent association between insecure attachment and so many broad diagnoses may reflect symptom overlap and comorbidity (Buckley, Miller, Lehrer, & Castle, 2009), rather than true associations with discrete disorders.

Insecure attachment has also been associated with severe mental health diagnoses such as bipolar disorder (Morriss et al., 2009) and schizophrenia (Mickelson et al., 1997). Indeed, a high proportion of those diagnosed with schizophrenia show evidence of insecure attachment (Berry, Barrowclough, & Wearden, 2007; Dozier, Cue, & Barnett, 1994; Dozier, Stevenson, Lee, & Velligan, 1991). Consistent with this observation, epidemiological and cohort studies have shown that psychosis in adulthood is associated with potentially attachment-threatening events in childhood such as being born of an unwanted pregnancy (Myhrman, Rantakallio, Isohanni, Jones, & Partanen, 1996), suffering loss or separation from a parent (Morgan et al., 2007) and a wide range of traumatic childhood events (Varese et al., 2012). Importantly, there is some evidence that attachment-threatening events such as being brought up in a children's home (Bentall, Wickham, Shevlin, & Varese, 2012) and experiencing parental neglect (Sitko, Bentall, Shevlin, O'Sullivan, & Sellwood, 2014) are specifically associated with paranoid symptoms. These findings make sense if it is assumed that these types of experiences establish internal working models which, on the one hand, allow the individual to anticipate and avoid unsatisfactory relationships in the future but, on the other hand, confer a legacy of enduring mistrust of others.

Only a handful of studies have investigated attachment at the symptom level in relation to psychosis (see Korver-Nieberg, Berry, Meijer, & de Haan, 2013 for a recent review), and most have failed to use appropriate statistical methods to identify specific associations with symptoms. Using non-clinical samples and psychosis-proneness measures, Berry, Barrowclough and Wearden.(2008) reported first-order associations between insecure attachment and both paranoia and hallucinations but without controlling for comorbidity between them. MacBeth, Schwannauer and Gumley (2008) in a similar study, used structural equation modelling and reported a strong association between insecure attachment and paranoia and a much weaker association between attachment anxiety and hallucinations, but again did not take into account comorbidity between the two symptoms.

To our knowledge, only five studies have so far investigated the association between insecure attachment and psychotic symptoms in clinical samples. Using an interview measure, MacBeth, Gumley, Scwannauer and Fisher (2011) failed to find any association with positive symptoms but this might reflect their small sample size (N = 34) and low levels of positive symptoms in the sample. Using the same measure, Gumley et al. (2014) found that, contrary to their prediction attachment did not predict positive symptom recovery in their first episode sample. However, the authors did find a significant relationship between attachment and positive symptoms at 12 months. This relationship was mediated by insight at baseline.

Somewhat different findings have been obtained in studies using self-report measures of attachment. Berry et al. (2008), using a questionnaire especially designed for use with psychotic patients, found that attachment styles were stable over a one-month follow-up, and that avoidant attachment was strongly associated with paranoia, even after adjusting for overall symptom severity, but they did not

consider hallucinations in their analysis. Berry, Wearden, Barrowclough, Oakland, and Bradley (2012) later found that attachment anxiety was positively correlated with the severity of distress in relation to hallucinations and that attachment avoidance was associated with experiencing 'rejection or criticism' and 'threat' when hearing voices, but again did not investigate whether insecure attachment was associated with the occurrence of hallucinations. Finally, Ponizovsky, Vitenberg, Baumgarten-Katz, and Grinshpoon. (2013) measured attachment styles using Bartholomew and Horowitz's (1991) Relationship Questionnaire (RQ) and symptomatology in 100 outpatients with schizophrenia spectrum disorders, finding associations between the preoccupied attachment style and delusions and suspiciousness as measured by the Positive and Negative Syndrome Scale (Kay, Fiszbein, Opfer, Fiszbein, & Opler, 1987), whereas fearful attachment was associated with the severity of hallucinatory experiences. However, this study also failed to statistically control for comorbidity between hallucinations and paranoia.

We are aware of three studies that have specifically assessed the specificity of insecure attachment for paranoia. First, in a study of over 500 students, Pickering, Simpson and Bentall (2008) found that both attachment anxiety and attachment avoidance predicted paranoid ideation but not hallucination-proneness. They also found that negative self-esteem and an external locus of control (belief in powerful others) mediated the relationship between insecure attachment and paranoid ideation. These latter findings were considered important because other research has implicated negative self-esteem (Bentall & Fernyhough, 2008; Freeman et al., 1998, 2005) and an external locus of control (Kaney & Bentall, 1989) in paranoid thinking. Second, Meins, Jones, Fernyhough, Hurndall and Koronis (2008) found that paranoia was the only positive trait within schizotypy that was associated with perceptions of

attachment relationships using their student sample of 154 individuals. They found that individuals who reported higher attachment anxiety (but not avoidance) in peer relationships were more suspicious/paranoid, and higher levels of this trait were found if individuals perceived either parent to have been less caring. Third, in our recent study of the National Comorbidity Survey epidemiological sample, we found that the association between neglect experiences in childhood and paranoia was fully mediated by both anxious and avoidant attachment styles. An observed association between childhood sexual abuse and hallucinatory experiences could not be explained in terms of insecure attachment (Sitko et al., 2014).

If insecure attachment is an important component in the psychological pathway to paranoia, this would have implications for the treatment of paranoid patients, suggesting a focus on attachment-related processes, and also for preventative interventions and mental health promotion. Although available research findings seem to support this specific association, the strongest evidence is from epidemiological studies and studies of other non-clinical samples. Evidence from patient samples is limited and compromised by the failure to adjust for comorbidity with other symptoms. In this study, we therefore report an investigation of attachment styles in a large sample of patients with psychosis. We predict that insecure attachment will be associated with paranoia but not hallucinatory experiences. We further tested whether the association between insecure attachment and paranoia was mediated by negative self-esteem and belief in powerful others as reported in the non-clinical study by Pickering et al. (2008).

5.3 Methods

5.3.1 Participants

Two datasets that employed the same measures were combined for the purposes of the current analysis. Both studies recruited unselected patients currently diagnosed with a schizophrenia spectrum disorder from National Health Service (NHS) psychiatric facilities and voluntary organizations in the North West of England and North Wales. The first dataset was obtained from a study of psychosocial and neuropsychiatric predictors of recovery from psychosis (Morrison et al., 2013) and the second from a study investigating the relationship between negative childhood experiences and adulthood psychosis conducted by the first author. The only difference in inclusion criteria was that a minimum age of 17 was required for the first study and a minimum age of 18 for the second (decisions made by separate ethics committees). Participants were aged 17-77, all had sufficient understanding of English to provide informed consent and complete the measures.

A total of 176 clinical participants (123 male, 53 female) provided data. Diagnoses were as follows: schizophrenia ($n=122$), schizoaffective disorder (17), substance-induced psychosis (6), unspecified non-organic psychosis (15), acute and transient psychotic disorder (12), and delusional disorder (4). Clinical participants were recruited from early intervention services (40); other community based mental health teams (113); voluntary organisations (11); and inpatient units (12). Individuals were excluded if they lack capacity to consent or if they had insufficient understanding of the English language to complete the questionnaire items. The clinical participants varied in their educational achievement, with 25 failing to complete secondary education, 73 completing secondary education, 49 completing further vocational training and 26 completing higher education (data missing for three participants). Four were working, 15 undertook voluntary work, 7 were students and 8 were registered as disabled. 10 were married, 8 were divorced

and 7 were cohabiting (data missing for 2). 140 patients were in receipt of antipsychotic drugs (data missing for 21).

One hundred and thirteen healthy controls comprised a convenience sample recruited from local fire services; staff working in the NHS and the University of Liverpool via posters; and acquaintances of the research team using a snowballing method. The comparison participants completed the study in the same way as the clinical sample, directly with the researcher, and were given £20 as compensation for their time. Fifty nine were male and 54 female, with a mean age of 37.73 years ($SD = 12.11$). Individuals were excluded from the healthy control group if they had a lifetime diagnosis of schizophrenia spectrum disorders (ascertained by questioning) or if they had insufficient understanding of the English language to complete the questionnaire items. None had failed to complete secondary education, 17 had no education beyond secondary school, 37 had completed further vocational training and 51 had completed higher education (data missing from 8). 92 were working, 9 were students and the rest were unemployed. 31 were married, 6 were divorced, and 18 were cohabiting (data missing for 4).

Independent sample *t*-tests revealed no difference between the groups in age, $t = 0.9$ (285), $p = .93$. There was an over representation of males in both groups ($\chi^2 = 9.22$, $p < .05$). The control participants were more likely to be have gained higher or further education compared to the clinical sample ($\chi^2 = 44.09$ (1), $p < .001$). The control participants were also more likely to be either married or cohabiting than single or divorced compared to the clinical sample ($\chi^2 = 46.39$ (1), $p < .001$).

5.3.2 Measures

The *Persecution and Deservedness Scale* (PaDS; Melo, Corcoran, Shryane, & Bentall, 2009) is a trait measure of paranoid thinking and the perception that

persecution is deserved ('deservedness'). The scale uses 10 items to measure persecution ($\alpha = .91$, in the current study), and 10 secondary questions on levels of deservedness. For the purpose of this study we only used the persecutory items, for example, 'I often find it hard to think of anything other than the negative ideas others have about me.' Participants answer on a 5-point Likert scale from 0 (certainly false) to 4 (certainly true). The measure has been utilised in both clinical (Valiente et al., 2011) and non-clinical samples (Pickering et al., 2008) to assess persecutory thinking.

The Positive and Negative Symptom Scale (PANSS) was also used to assess the presence and severity of positive symptoms in the week preceding the interview in both samples, and was administered by trained interviewers. Each symptom is scored on a scale ranging from 1 (symptom absent) to 7 (extreme symptom severity). The PANSS subscales have good reliability and validity. The PANSS scores for suspiciousness and hallucinations were used in the present analysis.

The *Multi-dimensional Locus of Control Scale (MLCS; Levenson, 1973)* is a 24-item locus of control questionnaire with three subscales measuring internality (α in the present study .58), belief in powerful others ($\alpha = .77$) and belief in chance ($\alpha = .75$). Responses to items on this questionnaire are obtained on five-point scales ('agree strongly', 'agree somewhat', 'neither agree nor disagree', 'disagree somewhat' and 'disagree strongly').

The *Self-Esteem Rating Scale (SERS; Lecomte, Corbière, & Laisné, 2006)* is a 20-item measure of explicit self-esteem, assessing both positive (10 items) and negative beliefs about the self (10 items). Participants rate how often each of the statements reflects their feelings about the self on a 7-point Likert scale from 'never'

to 'always'. Cronbach's alpha values for the positive (SEp) and negative (SEn) scales for this sample are $\alpha = .92$ and $\alpha = .91$ respectively.

The *Relationship Questionnaire* (RQ; Bartholomew & Horowitz, 1991) is a 4-item self-report questionnaire designed to measure four attachment styles: secure, anxious, avoidant and fearful. Participants were required to read each statement used to describe the differing attachment styles, choose the style considered to be most self-descriptive, and rate on a 7-point Likert scale from 1 ('not at all like me') to 7 ('very much like me') how each relationship style describes them. The scale with the highest score is used to assign each participant to an attachment style category (in the event of a tie, the self-chosen style is used). Scores on the four attachment styles can be combined to yield scores on two dimensions: attachment anxiety (relating to a negative self-model) and attachment avoidance (relating to a negative others-model). For analysis purposes we used these dimensions as recommended by Griffin and Bartholomew (1994).

5.3.3 *Statistical Analysis*

We compared both groups on the attachment measures to determine whether attachment styles differed between psychotic patients and controls. Further analyses addressed the associations between the attachment variables and the hallucinations and paranoia in patients and controls separately, to determine whether the predicted specific associations could be found in each group. After examining direct effects, we tested a mediating model using only the clinical sample of 176 individuals, including those variables which showed the expected associations with paranoia (see below). In all analyses undertaken missing data were handled using listwise deletion. The model was estimated twice, using the different measures of paranoia, PANSS-

suspiciousness and PaDS, as the dependent variable (DV); in all analysis comorbidity was controlled for alongside, age, and sex.

Descriptive and correlational analyses were conducted using SPSS v21, whilst regression and mediation analyses were specified using Mplus 6.11 (Muthén & Muthén, 1998 - 2014). The mediation models were estimated using the maximum likelihood (ML) estimator. The statistical significance of mediating and indirect effects were assessed using bootstrapped bias-corrected percentile based confidence intervals of 5000 bootstrap draws. If zero was not within the 95% intervals of the bootstrapped samples, then the mediating/indirect effect was considered statistically significant (Preacher & Hayes, 2008).

5.4 Results

5.4.1 Descriptive and correlational analysis

Table 5.1 shows mean and standard deviations for age and the psychological variables utilised in the analysis against the four different attachment styles assigned to participants in the two groups (clinical versus non-clinical) . 25.6% of the clinical sample described their general attachment style as secure, 37.2% as fearful, 9.9% as preoccupied and 27.3% were dismissive (2.3% missing data). In comparison 55.4% of the non-clinical sample described their general relationship style as secure, 14.3% as fearful, 7.1% as preoccupied and 23.2% as dismissive (0.9% missing data). There was a highly significant association between group and endorsed attachment style, ($\chi^2 = 29.79 (3) p < .001$). No significant differences were observed between the sexes in the clinical group for attachment style category ($\chi^2 = 5.25 (3) p = .15$). However, in the control group males were more likely to see themselves as either secure or dismissive than preoccupied or fearful, whereas females were more likely

see themselves as either secure or fearful rather than dismissive and preoccupied (χ^2
=12.13 (3) $p < .01$).

Table 5.1

Mean and standard deviations for the four attachment styles in the clinical and non-clinical group, also showing age and psychological variables.

Variables	Clinical				Non-Clinical			
	Secure	Fearful	Preoccupied	Dismissive	Secure	Fearful	Preoccupied	Dismissive
	(n = 44)	(n = 63)	(n = 17)	(n = 48)	(n = 62)	(n = 16)	(n = 8)	(n = 24)
	M (SD)							
Age	37.53 (11.21)	36.86 (11.64)	39.35 (11.80)	39.13 (12.53)	38.28 (11.22)	35.81 (11.71)	39.25 (17.65)	36.71 (13.23)
Paranoia	PANSS	1.95 (1.46)	3.48 (1.71)	2.53 (1.59)	2.49 (1.49)	1.10 (0.30)	1.75 (1.00)	1.38 (0.71)
	PaDs	11.64 (9.69)	22.76 (10.50)	21.47 (11.19)	14.83 (9.92)	5.85 (5.85)	11.06 (9.63)	10.13 (8.75)
Hallucinations	PANSS	2.27 (1.65)	3.08 (1.74)	3.06 (1.85)	2.62 (1.73)	1.11 (0.55)	1.19 (0.54)	1.25 (0.68)
Self-esteem	Negative	24.58 (10.57)	38.81 (13.04)	36.47 (16.34)	29.85 (10.59)	23.25 (8.12)	32.07 (13.72)	28.41 (10.26)
	Positive	48.80 (8.64)	37.36 (11.89)	39.00 (12.82)	43.48 (12.07)	54.34 (7.09)	48.69 (7.93)	49.71 (7.98)
MLQ	Internality	29.58 (4.43)	27.51 (4.11)	27.40 (4.85)	28.65 (4.61)	29.74 (3.19)	28.50 (4.27)	28.79 (3.16)
	Powerful	22.47 (5.85)	24.35 (6.08)	26.06 (5.58)	23.15 (6.22)	19.69 (4.71)	20.81 (5.23)	20.42 (4.92)
	Chance	23.07 (5.31)	26.33 (4.23)	25.00 (5.85)	24.65 (5.22)	20.18 (4.41)	24.00 (5.37)	22.54 (5.18)

Note: PANSS (Positive and Negative Symptom Scale); PaDS (Persecution and Deservedness Scale); MLQS (Multi-dimensional Locus of Control Scale)

Correlation data for all variables used in the study is shown in Table 5.2. Looking at the clinical sample alone, both attachment dimensions (anxiety and avoidance) correlated with paranoia (PaDS: $r = .44$ and $r = .21$, $p < .01$; PANSS-suspiciousness: $r = .34$ and $r = .23$, $p < .01$ respectively). However, no significant correlations were found between the attachment dimensions and hallucinatory experiences. Negative self-esteem significantly correlated with both paranoia ($r = .51$ to $.66$, $p < .01$) and hallucinatory experiences ($r = .45$, $p < .01$). Interestingly belief in powerful others was weakly correlated with both measures of paranoia ($r = .24$, $p < .01$ for PANSS-suspiciousness and $.39$, $p < .01$ for PaDS) and hallucinatory experiences ($r = .28$, $p < .01$). However, it was not significantly associated with either attachment dimension. The results found in the non-clinical sample reflect those found in the clinical population in the majority of the correlations.

5.4.2 *Regression analysis: Attachment and paranoia*

Regression analysis confirmed that insecure attachment was a significant predictor of paranoia but not of hallucinatory experiences. In the clinical sample, after controlling for hallucinatory experiences, attachment anxiety predicted paranoia (standardised $\beta = .27$, $SE = .06$, $p < .001$), as did attachment avoidance ($\beta = .15$, $SE = .06$, $p = .016$), $R^2 = .31$, when using PANSS-suspiciousness as the DV. Interestingly, after controlling for hallucinatory experiences in the non-clinical sample, only attachment anxiety predicted paranoia ($\beta = .28$, $SE = .10$, $p < .01$) and attachment avoidance did not ($\beta = .04$, $SE = .10$, $p = .75$), $R^2 = .14$, when using PANSS-suspiciousness as an outcome.

Table 5.2

Correlation matrix between attachment anxious and avoidance, psychological variables and positive symptoms of psychosis.

		Clinical sample									Non-clinical sample									Total sample								
		1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.	5.	6.	7.	8.	9.	1.	2.	3.	4.	5.	6.	7.	8.	9.
1.	Attachment anxiety	-								-										-								
2.	Attachment avoidance	.10	-							.13	-									.16*	-							
3.	Positive self esteem	-.36**	-.32**	-						-.41**	-.25**	-								-.43**	-.35**	-						
4.	Negative self esteem	.39**	.33**	-.54**	-					.34**	.28**	-.56**	-							.42**	.35**	-.59**	-					
5.	MLQ Internality	-.26**	-.18*	.47**	-.36**	-				-.42**	-.15	.25**	-.26**	-						-.32**	-.19*	.41**	-.34**	-				
6.	MLQ Powerful others	.16	.10	-.13	.30*	-.01	-			.05	-.02	-.04	.27**	.03	-					.19**	.12*	-.22**	.35**	-.03	-			
7.	MLQ Chance	.15	.17*	-.05	.28**	-.03	.59**	-		.15	.18	-.11	.43**	-.14	.51**	-				.21**	.23**	-.18**	.38**	-.09	.60**	-		
8.	Hallucinations	.15	.16*	-.26**	.44**	-.19**	.27**	.18*	-	.02	.08	-.08	.07	-.13	.03	.02	-			.22**	.22**	-.39**	.44**	-.19**	.33**	.27**	-	
9.	Persecution (PANSS)	.34**	.24**	-.42**	.51**	-.27**	.24**	.28**	.43**	-	.29**	.10	-.15	.23*	-.05	.17	.23*	.26**	-	.39**	.27**	-.50**	.51**	-.24**	.32**	.35**	.55**	-
10.	Persecutions (PaDS)	.44**	.21**	-.38**	.66**	-.27**	.38**	.36**	.56**	.62**	.37**	.20*	-.48**	.68**	-.11	.28**	.39**	.01	.32**	.47**	.27**	-.51**	.69**	-.23**	.44**	.44**	.59**	.65**

Note: ** $p < .01$, * $p < .05$.

When using the PaDS as the DV only attachment anxiety significantly predicted paranoia in the clinical sample when controlling for hallucinations, $\beta = .35$, $SE = .06$, $p < .001$, and the effect for attachment avoidance did not reach significance, $\beta = .10$, $SE = .06$, $p = .09$. However, in the control sample both attachment dimensions predicted paranoia (attachment anxiety: $\beta = .35$, $SE = .09$, $p < .001$ and attachment avoidance: $\beta = .16$, $SE = .07$, $p = .03$).

5.4.3 Regression analysis: Attachment and hallucinatory experiences

When PANSS-suspiciousness was controlled for, neither attachment anxiety nor attachment avoidance predicted hallucinations in the clinical sample, ($\beta = .00$, $SE = .07$, $p = .99$ and $\beta = .05$, $SE = .07$, $p = .51$ respectively). The same was also true for the non-clinical sample ($\beta = -.07$, $SE = .11$, $p = .55$ and $\beta = .07$, $SE = .16$, $p = .67$ respectively). Similar results were obtained when the PaDS was used as the control measure of paranoia. A summary of these findings can be seen in Table 5.3.

5.4.4 Mediation Analysis

We carried out mediation analysis only on the clinical sample. As no significant relationship was found between beliefs in powerful others and the attachment dimensions, this variable was not considered for the mediation analysis as recommended by Baron and Kenny (1986). We specified direct effects from the independent variables (IVs), attachment anxiety and attachment avoidance to the remaining mediating variable, negative self-esteem (path a). We specified direct effects from the mediating variable to the DV, paranoia (path b). Finally we specified direct effects from the IVs to the DV paranoia (path c'). Control variables included age, sex and hallucinatory experiences (see Figure 5.1). The unstandardised and

standardised estimates of the direct and indirect effects of the mediation models are shown in Table 5.4.

Table 5.3

Results of the regression analysis between the attachment dimensions, and positive symptoms of psychosis for each group.

			Clinical sample				Non clinical sample				Total sample			
			Unstandardised		Standardised		Unstandardised		Standardised		Unstandardised		Standardised	
			β	SE	β	SE	β	SE	β	SE	β	SE	β	SE
Paranoia (PANSS)	on	Hallucinations	.38***	.06	.39***	.06	.26 *	.12	.24*	.12	.47***	.05	.48***	.05
		Att anxiety	.09***	.02	.27***	.06	.04*	.02	.28**	.10	.08***	.02	.26***	.05
		Att avoidance	.06*	.03	.15*	.06	.01	.02	.04	.12	.05**	.02	.13**	.05
R-Squared					.30***	.05			.14	.07			.41***	.05
Paranoia (PaDS)	on	Hallucinations	3.21***	.38	.50***	.05	-.14	1.05	-.01	.08	3.36***	.32	.49***	.05
		Att anxiety	.80***	.13	.36***	.06	.67***	.18	.35***	.09	.81***	.10	.35***	.05
		Att avoidance	.28	.17	.10	.06	.34*	.15	.16*	.07	.32*	.13	.11*	.05
R-Squared					.46***	.05			.16**	.06			.48***	.04
Hallucinations	on	Paranoia (PANSS)	.46***	.07	.44***	.07	.24	.13	.26	.13	.57***	.06	.55***	.05
		Att anxiety	.00	.03	.00	.07	-.01	.02	-.07	.11	.00	.02	.01	.05
		Att avoidance	.02	.03	.05	.07	.01	.03	.07	.16	.03	.02	.07	.06
R-Squared					.21***	.06			.07	.07			.33***	.05
Hallucinations	on	Paranoia (PaDS)	.10***	.01	.60***	.05	-.00	.01	-.01	.09	.09***	.01	.61***	.05
		Att anxiety	-.04	.02	-.13	.07	.00	.02	.01	.11	-.03	.02	-.08	.05
		Att avoidance	.02	.03	.04	.06	.01	.03	.08	.16	.03	.02	.06	.05
R-Squared					.33***	.06			.01	.03			.35***	.05

*Note: *** $p < .001$, ** $p < .01$, * $p < .05$*

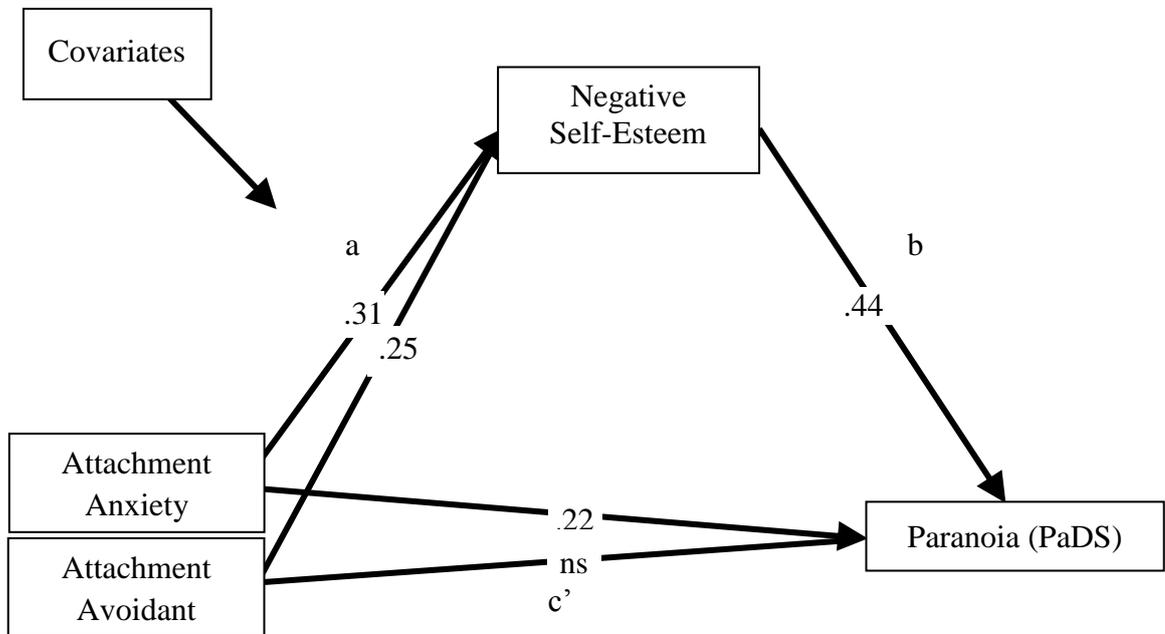
Table 5.4

Results of direct and indirect effects between attachment anxious, attachment avoidance, negative self-esteem, and paranoia, whilst controlling for age, sex and hallucinatory experiences.

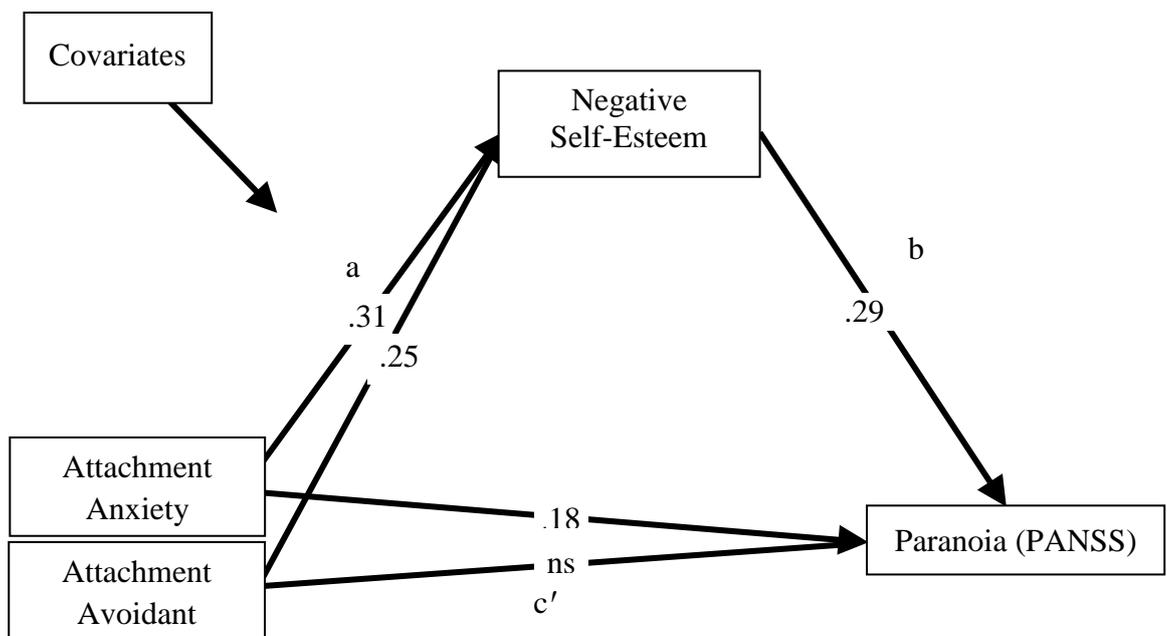
Model A			B	SE	95% CI	β
	<i>Path a</i>					
Neg self-esteem	on	Att anxiety	0.82	0.17	0.48 – 1.16	0.31***
		Att avoidance	0.89	0.23	0.44 – 1.34	0.25***
		Hallucinations	2.55	0.53	1.51 – 3.59	0.33***
		Age	-0.09	0.06	-0.21 – 0.04	-0.08
		Sex	1.19	1.85	-2.43 – 4.81	0.04
	<i>Path b</i>					
Paranoia (PaDS)	on	Neg self-esteem	0.37	0.06	0.26 – 0.48	0.44***
	<i>Path c'</i>					
Paranoia (PaDS)	on	Att anxiety	0.51	0.13	0.25 – 0.77	0.23***
		Att avoidance	-0.06	0.17	-0.40 – 0.27	-0.02
		Hallucinations	2.18	0.36	1.48 – 2.89	0.34***
		Age	-0.03	0.05	-0.12 – 0.06	-0.03
		Sex	-0.92	1.27	-3.42 – 1.57	-0.04
	<i>Total indirect effect</i>					
		Att anxiety – Neg self-esteem – Paranoia	0.30	0.08	0.15 – 0.46	0.14***
		Att avoidance – Neg self-esteem – Paranoia	0.30	0.08	0.14 – 0.53	0.14***
Model B						
	<i>Path a</i>					
Negative self-esteem	on	Att anxiety	0.83	0.17	0.49 – 1.15	0.31***
		Att avoidance	0.88	0.23	0.43 – 1.35	0.25***
		Hallucinations	2.59	0.53	1.52 – 3.61	0.34***
		Age	-0.09	0.07	-0.21 – 0.04	-0.08
		Sex	0.92	1.80	-2.53 – 4.69	0.03
	<i>Path b</i>					
Paranoia (PANSS)	on	Neg self-esteem	0.04	0.01	0.02 – 0.05	0.29***
	<i>Path c'</i>					
Paranoia (PANSS)	on	Att anxiety	0.06	0.02	0.01 – 0.11	0.18*
		Att avoidance	0.03	0.03	-0.02 – 0.09	0.07
		Hallucinations	0.28	0.07	0.14 – 0.40	0.28***
		Age	-0.01	0.01	-0.03 – 0.01	-0.05
		Sex	0.11	0.23	-0.32 – 0.62	0.03
	<i>Total indirect effect</i>					
		Att anxiety – Neg self-esteem – Paranoia	0.03	0.01	0.01 – 0.05	0.09**
		Att avoidance – Neg self-esteem – Paranoia	0.03	0.01	0.01 – 0.06	0.07**

*Note: *** $p < .001$, ** $p < .01$, * $p < .05$*

Partial mediation was observed for the relationship between attachment anxiety and paranoia through negative self-esteem using the PaDS as the DV, $\beta = .14$, $SE = .03$, $p < .001$ and also using the PANSS as the DV, $\beta = .09$, $SE = .03$, $p = .003$. Full mediation occurred between attachment avoidance and paranoia through negative self-esteem using the PaDS as the DV, $\beta = .11$, $SE = .03$, $p = .001$, and also using the PANSS as the DV, $\beta = .07$, $SE = .03$, $p = .010$ (see Figure 5.1).



Attachment Anxious – Negative self-esteem – Paranoia, $\beta = .14$, SE = .03, $p < .001$
 Attachment Avoidant – Negative self-esteem – Paranoia, $\beta = .11$, SE = .03, $p = .001$



Attachment Anxious – Negative self-esteem – Paranoia, $\beta = .09$, SE = .03, $p = .006$
 Attachment Avoidant – Negative self-esteem – Paranoia, $\beta = .07$, SE = .03, $p = .010$

Figure 5.1

Visual representation of the mediation model using the PANSS and PaDS scales for paranoia as the dependent variable. The model controlled for age, sex and hallucinatory experiences (covariates).

5.5 Discussion

Our understanding of the psychotic disorders may be progressed by studying mechanisms that are specific to each symptom (Bentall & Fernyhough, 2008; Fibiger, 2012). As expected, we found strong associations between the insecure attachment dimensions, negative self-esteem and paranoia. Our regression analyses, which controlled for comorbidity between paranoia and hallucinations confirmed that the insecure attachment dimensions were significant predictors of the former but not the latter, in both the clinical and non-clinical samples. Just as importantly, as we had predicted, we found that insecure attachment was not associated with hallucinations.

A secondary aim of our study was to investigate the possible mediating role of negative self-esteem and belief in powerful others. In fact, the latter variable, although correlated with paranoia, did not prove to play a mediating role between insecure attachment and paranoia in our clinical participants. However, in line with Pickering et al.'s (2008) findings, we found that negative self-esteem mediated the relationship between the insecure attachment dimensions and paranoid symptoms, partially for attachment anxiety and fully for attachment avoidance.

These data are consistent with previous studies that have implicated insecure attachment in psychosis (Berry et al., 2006; Berry, Wearden, & Barrowclough, 2007; Dozier et al., 1991, 1999; Mickelson et al., 1997) but advance our understanding by demonstrating some degree of specificity for paranoid delusions. It might be argued that this finding is unsurprising as the RQ taps into mistrust of others, which is almost a defining feature of paranoia. However, in response we observe that (i) previous researchers studying attachment in relationship to psychosis have not hypothesised the specific associations we have tested here; (ii) an association, even if thought to be self-evident, must be demonstrated empirically because supposedly

self-evident associations do not always survive testing; (iii) none of the RQ items have obvious paranoid content and, indeed, mistrust is mentioned in only one item; and (iv) our findings are consistent with our previous epidemiological analyses which show a close association between paranoid symptoms and attachment-threatening early life events (Bentall et al. 2012; Sitko et al. 2014).

It is notable that attachment anxiety and attachment avoidance, rather than either of these forms of insecure attachment, were both associated with paranoia. According to Bartholomew and Horowitz (1991) the former is associated with a negative view of the self and the latter with a negative view of others, but the associations between both types of insecure attachment and paranoia were mediated (partially in the case of attachment anxiety, fully in the case of attachment avoidance) by negative self-esteem. These findings are consistent with evidence that negative self-esteem plays an important role in paranoid beliefs (Bentall, 2009; Freeman & Garety, 2003; Freeman et al., 2005; Pickering et al., 2008), and suggest that these beliefs are associated with schematic representations, not only of others as untrustworthy, but of the self as unlovable. It is not clear from these data how these schemas unfold developmentally although, as noted above, we have hypothesised that they are promoted by attachment disrupting events in childhood such as being raised in an institution or being neglected.

There are some important limitations to this study which we would like to acknowledge. First, the present analysis used cross-sectional data and direction of causality cannot be tested using the statistical models we have employed. Complete backward causation seems unlikely, however, as previous research suggests that indices of many of the mechanisms we have investigated predate the onset of psychosis. As already noted, in our previous research we have shown that

attachment-disrupting events in childhood predict paranoid symptoms but not hallucinations in adulthood (Bentall et al. 2012; Sitko et al. 2014.). Other researchers have reported associations between other childhood markers of disrupted attachment, for example being unwanted at childbirth (Myhrman et al., 1996) or early separation from parents (Morgan et al., 2007) and future psychosis, although specificity for paranoia was not tested in these studies. Longitudinal research has also shown that low self-esteem is predictive of incident psychotic symptoms in a general population sample (Krabbendam et al., 2002), although specificity for paranoia was again not tested. However, we cannot completely exclude the possibility of some backward causation, as a diagnosis of schizophrenia may give rise to negative self-esteem (perhaps linked to social and self-stigma) and this may in turn affect the way that individuals think about their attachments to others. Future studies might attempt more robust tests of causality, for example by conducting appropriately sophisticated analyses on longitudinal datasets, and by exploiting ‘natural experiments’ such as prospective studies of children who have been reared in adverse circumstances.

A further limitation is that our measure of hallucinations, the PANSS, measured only current hallucinatory experiences and it is possible that some association with hallucinations might have been found over a longer time period. However, as noted above, when specificity has been tested, attachment-disrupting events in childhood have not been associated with hallucinations in adults and, moreover, Pickering et al. (2008) did not find an association between insecure attachment and a trait measure of hallucination-proneness in a large non-clinical sample, although an association with paranoia was found. A final limitation that needs to be addressed by further research is the use of the 4-item RQ to derive attachment dimensions. The measure, although routinely used by researchers to

assess attachment styles may be insufficient to address the complexities and progression of attachment in adulthood.

The likely role of attachment processes in paranoid delusions has important clinical implications. If this study is supported by future research, consideration might be given to how to protect young people who are exposed to attachment-threatening experiences, for example children raised in children's homes. It may also be beneficial to adapt therapies to address attachment-related cognitions specifically, especially when working with paranoid patients. By assessing attachment styles in individuals with paranoia it may be possible to enhance the therapeutic alliance between practitioner and client and also enable clinicians to target psychological interventions based on their client's internal working models of themselves and of others.

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Chapter 6

Are specific early-life adversities associated with specific symptoms of psychosis? A patient study considering just world beliefs as a mediator⁵

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6.1 Abstract

Epidemiological studies have suggested that there may be associations between specific adversities and specific symptoms. There is also evidence that belief about justice may play a role in paranoid symptoms. The aims of this study were to determine whether these associations could be replicated in a patient sample. We also determined whether beliefs about a just world played a specific role in the relationship between adversity and paranoia. We examined associations between childhood experiences of sexual, physical and emotional abuse, physical and emotional neglect, and bullying and paranoid beliefs and hallucinations in 144 individuals; 72 individuals with a diagnosis of schizophrenia spectrum disorders and 72 comparison controls. Participants also completed questionnaire measures of personal and general just world beliefs. There was a dose-response relationship between cumulative trauma and psychosis. When controlling for comorbidity between symptoms, childhood sexual abuse predicted hallucinatory experiences and experiences of childhood emotional neglect predicted paranoia. The relationship between neglect and paranoia was mediated by a perception of personal injustice. The findings replicate in a patient sample previous observations from epidemiological research. Specific adversity-symptom associations may be accounted for in terms of specific psychological mechanisms.

6.2 Introduction

Childhood adversities have been implicated as risk factors for multiple mental health diagnoses, with associations found with depression (Heim, Newport, Mletzko, Miller, & Nemeroff, 2008; Hill, 2003), anxiety disorders, eating disorders, post-traumatic stress disorder and attempted suicide (see Chen et al., 2010).

Although the association between childhood adversities and psychosis has taken longer to be accepted, in the last decade a wealth of literature has reported evidence of these (see Read, 2013). The causal significance of these findings have been questioned by some researchers, for example on the grounds that there may be a genetic liability for exposure leading to backwards causation (Sideli, Mule, La Barbera, & Murray, 2012), or because recall of trauma is unreliable in individuals with psychosis (Susser & Widom, 2012) there is evidence that recall of traumatic events is reliable across time, and are corroborated against alternate means, such as clinical case notes (see Fisher et al., 2011). Some studies have used prospective designs, for example, based on birth cohorts (Mäkikyrö et al., 1998) or samples of youth known to be exposed to trauma (e.g. Cutajar et al. 2010), and some have used genetically sensitive designs (Alemany et al., 2013) to demonstrate the causal relationship between adversity and psychosis. Moreover, the consistency of the observed associations has largely been confirmed by meta-analyses.

Varese et al. (2012) meta-analysis scrutinised case-control, (n = 18), prospective and quasi-prospective studies (10) and population based cross-sectional studies (8). Pooling the different studies together revealed that childhood sexual abuse (CSA), physical abuse and emotional abuse were all significantly associated with psychosis (odds ratio ranging between 2.38, 95% CI [1.98, 2.87] and 3.40, 95% CI [2.06, 5.62]). Moreover, they identified that 9 out of the 10 studies that

investigated a dose-response relationship found one. They indicate that assuming causality, the number of people with psychosis would be reduced by 33% if their historic trauma were removed, thus demonstrating its catastrophic impact (see also Read, 2013).

Matheson et al. (2013) identified 25 studies which included cohort, case-control and cross-sectional studies investigated childhood adversities (including sexual abuse, physical abuse and neglect before the age of 18) and schizophrenia, and compared the results with data from non-psychiatric controls, affective psychosis, anxiety disorders, depressive disorders, dissociative and post-traumatic stress disorder (PTSD), other psychoses and personality disorder (PD). They found moderate to high odds ratios when comparing schizophrenia with non-psychiatric controls (OR = 3.60, 95% CI [2.08, 6.23]) and anxiety disorders (OR = 2.54, 95% CI [1.29 – 5.01]). No significant differences were obtained when comparing with affective psychosis, depressive disorder, dissociative disorders and/or PTSD, other psychoses and PD.

Finally, van Dam et al. (2012) conducted a systematic review and meta-analysis of studies of bullying and concluded from the four clinical studies that the findings were mixed and therefore no definitive conclusions could be drawn (possibly due to the small number of studies included). However, the nonclinical studies provided strong evidence of associations between school bullying and development of non-clinical psychotic symptoms (adjusted OR = 2.3, 95% CI [1.5-3.4]).

6.2.1 Specific associations

Recent research suggests that, although childhood adversity is a risk factor for a wide range of psychopathology, within the psychotic domain some specificity can be observed between risk factors and specific symptoms, raising questions about the mechanisms that might be involved. As hallucinations and paranoid delusions often occur together (see van Os & Kapur, 2009), we can consider four recent epidemiological studies which have investigated this specificity when the co-occurrence of symptoms is controlled. Bentall et al. (2012) used data from the 2007 Adult Psychiatric Morbidity Survey to assess the association between childhood traumas (including childhood rape, sexual touch, sexual talking, physical abuse, bullying, being brought up in institutional care and local authority care) and hallucinatory experiences and paranoid ideation. Bivariate analyses suggested that all risk factors were associated with both symptoms. However, childhood rape was associated only with hallucinations (OR 8.9, 95% CI [1.86–42.44]) once co-occurring paranoia was controlled for. Being brought up in institutional care (OR 11.08, 95% CI [3.26–37.62]) was specifically associated with paranoia once comorbid hallucinations had been controlled for.

Sitko et al. (2014) replicated this finding using an American epidemiological dataset (National Comorbidity Survey, N = 5,877). Childhood traumas investigated included witnessing a killing, rape, sexual molestation, assault, physical abuse, neglect, and being held captive. Once the co-occurrence of symptoms was statistically controlled for, CSA (rape and sexual molestation) was associated with hallucinatory experiences and neglect was specifically associated with paranoia within the psychotic domain. However both kinds of adversity also predicted depression.

More recently, Shevlin (in submission) further tested the association between adversity and psychosis, whilst statistically controlling for adult adverse environment using data from the survey of psychiatric morbidity among prisoners in England and Wales (N = 3,142). They found that the association between bullying and paranoia gave the highest odds ratio (OR = 1.99, 95% CI [1.60, 2.48]). For hallucinations, experiences of sexual abuse gave the highest odds ratio (OR = 2.37, 95% CI [1.38, 4.09]).

One recent epidemiological study has claimed not to replicate these specific associations. van Nierop et al. (2014) used the Netherlands Mental Health Survey and Incidence Study (NEMESIS) -1 and NEMESIS -2 data and found that associations between childhood trauma (emotional neglect, physical abuse, psychological abuse and sexual abuse) and psychosis symptoms showed no evidence of specific traumas relating to specific symptoms, rather, they were significant across all psychotic symptoms. This finding may be a result of using different statistical techniques. Furthermore inspection of their data tables suggests that there was an association between neglect and self-reported delusions and a trend towards an association between CSA and self-reported hallucinations (although these associations were not maintained with a subsample of participants who were interviewed).

6.2.2 Underlying mechanisms

Investigating potential underlying mechanisms between trauma and specific symptoms may help in understanding the psychological processes involved in the development of the relevant symptoms. There is evidence that dissociative responses, which may be particularly common in victims of sexual abuse, are closely associated with hallucinations and hence may explain the association between childhood trauma

and this kind of symptom (Perona-Garcelán et al., 2012; Varese, Barkus, & Bentall, 2012). In the case of paranoia, Sitko et al. (2014) identified insecure attachment styles as an important mediating mechanism, suggesting that there is something specific about experiencing neglect and other attachment-challenging experiences that impacts on how individuals interact and perceive others, thereby affecting liability to paranoid ideation. This latter hypothesis is consistent with the observation that being brought up in institutional care is a risk factor for paranoia (Bentall et al. 2012), and also with cognitive models which implicate dysfunctional schemas about the self and others in paranoid thinking (Bentall, Kinderman, & Kaney, 1994; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002).

Of particular relevance to the present study is the finding that beliefs about injustice may play a role in paranoid thinking. A strong belief in a just world (BJW; the belief that people get what they deserve and deserve what they get; Lerner, 1980) appears to have adaptive qualities as it allows individuals to feel in control, motivates striving and enhances feelings of self-worth (see Furnham, 2003 for a detailed review). Hence, when confronted with evidence that the world is unjust, individuals typically adjust their beliefs to preserve their BJW, for example by derogating victims (Montada & Lerner, 1998). Valiente (2010) found that individuals who are currently paranoid have a strong belief that the world is unjust for themselves (personal BJW) but their general BJW is maintained. In our recent non-clinical study presented in Chapter 3, poor personal BJW was found to mediate the association between perceived childhood deprivation and paranoid ideation (Wickham, Lyons, Dickins, Shyrane, & Bentall, 2014). It seems plausible that experiences of trauma (childhood sexual, physical emotional abuse, neglect and bullying) would shatter

individual's beliefs that the world is just, but potentially only for themselves and not for others in general.

The aim of the present study was to investigate whether there is specificity between adversity (physical abuse, sexual abuse, emotional abuse, emotional neglect, physical neglect and bullying) and symptoms in a sample of individuals currently diagnosed with schizophrenia spectrum disorders (SSD) and a comparison group from the general population. We also consider whether personal BJW could act as a mediator in the case of paranoia.

6.3 Method

6.3.1 Participants

We recruited 144 participants. All were compensated for their time and had a minimum age of 18 (for ethical reasons).

72 (46 males, 26 females) were unselected patients with SSD with a mean age of 43.46 (SD = 11.17). Diagnoses were paranoid schizophrenia ($n = 17$), schizophrenia (40), schizoaffective disorder (10), substance-induced psychosis (3), unspecified non-organic psychosis (1). Clinical participants were recruited from community based mental health teams (40), inpatient units (21) and voluntary organisations (11) from the North West of England and North Wales. They varied in their educational achievement, with 44 leaving school by 16 years of age, 8 leaving school at 18, 4 completing further vocational training and 9 completing higher education (data missing for 7 participants). 8 were married, 3 were divorced, 1 was widowed, and 4 were cohabiting (data missing for 2), whilst the rest were single. All but 3 were in recipient of anti-psychotic medication. Patients were excluded if they

lacked the capacity to consent or if they had insufficient understanding of the English language to complete the questionnaire items.

We also recruited a comparison sample of 72 individuals, with a mean age of 39.94 years ($SD = 12.07$, 31 males, 41 female). They were recruited from staff working in local hospital and universities via posters; and from acquaintances of the research team using a snowballing method. The comparison participants completed the study in the same way as the clinical sample, directly with the researcher.

Individuals were excluded from the comparison group if they had a lifetime diagnosis of schizophrenia spectrum disorders (ascertained by questioning) or if they had insufficient understanding of the English language to complete the questionnaire items. 53 control participants had received no lifetime diagnosis of any mental health condition and the rest reported the following historical diagnoses: depression (12), anxiety (1), anxiety and depression (4), OCD and Tourette syndrome (1) and resolved PTSD (1). 19 had no education beyond secondary school, 15 had completed further vocational training and 33 had completed higher education (data missing from 4). 28 were single, 24 were married, 8 were divorced, 1 was widowed and 8 were cohabiting (data missing for 3).

There was no difference between the groups in age, $t = 1.80$ (142), $p = .07$. There was an over representation of males in the clinical group, and an over representation of females in the comparison group ($\chi^2 = 6.28$, $p < .05$). The comparison participants were more likely to be have gained higher or further education compared to the clinical sample ($\chi^2 = 33.16$ (1), $p < .001$) and were also more likely to be either married or cohabiting than single, divorced or widowed ($\chi^2 = 12.81$ (1), $p < .001$).

6.3.2 Measures

The Positive and Negative Symptom Scales (PANSS; Kay, Fiszbein, Opfer, Fiszbein, & Opler, 1987) were used to assess the presence and severity of positive symptoms in the week preceding the interview in both samples, and was administered by a trained interviewer. Thirty symptoms (positive, negative and general psychopathology) are scored on a scale ranging from 1 (symptom absent) to 7 (extreme symptom severity). The PANSS subscales have good reliability and validity (Kay et al., 1987). The PANSS scores for suspiciousness/persecution and hallucinations were used in the present analysis to indicate current paranoia and current hallucinatory experiences.

Childhood Trauma Questionnaire-Short Form (CTQ; Bernstein et al., 1994) measures childhood experiences of trauma and maltreatment. There are 5 subscales: emotional abuse (in this study, $\alpha = .91$), physical abuse ($\alpha = .88$), sexual abuse ($\alpha = .96$), emotional neglect ($\alpha = .85$) and physical neglect ($\alpha = .68$) and individuals responded by indicating the extent to which an experience had occurred to them whilst growing up using a 5 point scale ranging from 1 (never true) to 5 (very often true). The measure has good sensitivity and satisfactory specificity when self-reported, and has demonstrated convergent and discriminant validity (Bernstein et al., 2003).

Retrospective Bullying Questionnaire (RBQ; Schäfer et al., 2004) measures experiences of victimisation during primary and secondary school. Individuals are asked if they experienced physical (hit/punched and stolen from), verbal (called names and threatened) and indirect (had lies told about them and had been excluded) forms of bullying during school, using yes/no responses. These questions were

followed by 5- point scales assessing how often each type of bullying occurred (ranging from 0 -never to 4-constantly), the perceived severity of each kind of bullying (ranging from 0 - I wasn't bullied to 4 - extremely serious). The frequency and severity scores were highly correlated ($r = .89$ to $r = .91$, $p < .01$). Therefore, for the purposes of this analysis the severity of bullying measure was used.

The General Beliefs in a Just World Scale (GBJW; Dalbert et al., 1987) is a 6-item scale measuring individuals' belief in a just world in general ($\alpha = .79$ in present study), for example, 'I believe that, by and large, people get what they deserve'. The scale uses a six point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

The Personal Belief in a Just World Scale (PBJW; Dalbert, 1999) has 7-items which measure individuals' belief that the world a just place for the self ($\alpha = .84$ in present study), e.g. "I am usually treated fairly". Participants answered using a six-point scale from 1 (strongly disagree) to 6 (strongly agree).

6.3.3 Statistical Analysis

All analyses were conducted using SPSS v21. Correlational analyses were conducted to assess the relationship between variables. Hierarchical binary logistic regressions were conducted with diagnosis as the dependent variables (DV). Covariates age and sex were entered in the first block. The trauma variables were then entered into the second block (physical abuse, sexual abuse, emotional abuse, physical neglect, emotional neglect and bullying).

Based on the results of the logistic regression, multiple linear regressions were then conducted with the clinical sample. Covariates age, sex and co-occurrence between symptoms (paranoia and hallucinations) were entered into the first block.

The trauma variables that were significant predictors in the hierarchical logistic regression were entered in the second block (sexual abuse and emotional neglect).

To assess the cumulative effect of exposure to trauma on obtaining a diagnosis of SSD, the lowest level of cut off scores were used, so if participants endorsed low to moderate scores for any of the subscales in the CTQ that trauma was coded as present (see Bernstein et al., 1994; Reichert, 2013). Therefore binary variables were created for trauma subtypes. Cut-off scores were as follows: 9 or higher for emotional abuse, 8 or higher for physical abuse, 6 or higher for sexual abuse, 10 or higher for emotional neglect, and 8 or higher for physical neglect (Reichert, 2013). A cut-off score for the bullying item was used, with individuals scoring 10 or higher in severity. Trauma experiences were then totalled and the total scores were divided into 4 categories (0 equalled no trauma, 1 equalled 1 to 2 trauma experiences, 2 equalled 3 to 4 trauma experiences and 3 equalled 5 to 6 trauma experiences). These were entered into a binary logistic regression with diagnosis as the DV and cumulative trauma as the independent variable (IV). A simple contrast was used specifying the first level (no trauma) as the reference category. All other categories of the predictor variables were compared with the reference category, providing an estimate of the likelihood of obtaining a diagnosis of schizophrenia spectrum disorders for each number of traumas compared with the trauma free group.

The mediating impact of personal BJW and general BJW were assessed using the PROCESS macro on SPSS v21 (Hayes, 2013). The mediation model was estimated using maximum likelihood (ML) estimators. The statistical significance of mediating and indirect effects were assessed using bootstrapped bias-corrected percentile based confidence intervals of 10,000 bootstrap draws. If zero was not within the 95% intervals of the bootstrapped samples, then the mediating/indirect

effect was considered statistically significant (Preacher & Hayes, 2008). After examining direct effects, we tested a mediating model using only the clinical sample of 72 individuals (which after listwise deletion reduced to 50), including those variables which showed the expected association with paranoia (see below). The model was estimated twice, using the different DVs (PANSS suspiciousness and hallucinations), in all analysis comorbidity was controlled for alongside, age, and sex.

6.4 Results

Table 6.1 shows the correlation matrix between childhood traumas, suspiciousness/persecution (paranoia) and hallucinations for the total sample, comparison sample and the clinical sample. Alongside this it shows the means and standard deviations for both samples. Looking at the total sample, as expected the trauma variables significantly correlate with each other, suggesting that childhood experiences of trauma co-occur. The highest correlation was between childhood physical and emotional abuse and the smallest was between childhood emotional neglect (CEN) and bullying. Interestingly, paranoia correlated highly with each of the trauma variables as did hallucinations. As anticipated, paranoia and hallucinatory experiences were also highly correlated.

All trauma variables significantly correlated in the clinical sample with the exception of the relationship between bullying and emotional neglect, which was non-significant. Interestingly, paranoia correlated with all trauma variables except for CSA, whilst hallucinatory experiences correlated with all trauma variables except for physical abuse and emotional neglect.

In the comparison sample, CSA did not correlate with bullying, physical neglect and emotional neglect, possibly reflecting the sample's infrequent

experiences of CSA. However, all other trauma experiences were significantly correlated. However neither paranoia nor hallucinatory experiences were associated with any of the trauma variables (with the exception of physical neglect, which was associated with paranoia). When the total sample was analysed, it reflected the results found in the clinical sample alone, and correlations were present between the traumas and symptoms.

Table 6.1

Correlation matrix of the trauma variables with paranoia and hallucinations, separated using the total sample, comparison sample and the clinical sample

	Childhood trauma	Total sample							Comparison sample							Clinical sample									
		1.	2.	3.	4.	5.	6.	7.	1.	2.	3.	4.	5.	6.	7.	Means (SD)	1.	2.	3.	4.	5.	6.	7.	Means (SD)	
1.	Physical abuse	-							-							6.5 (3.5)	-								9.0 (5.6)
2.	Sexual abuse	.66**	-						.52**	-						5.6 (2.8)	.67**	-							8.9 (6.8)
3.	Emotional neglect	.62**	.45**	-					.47**	.21	-					7.9 (3.5)	.64**	.43**	-						11.8 (5.6)
4.	Physical neglect	.68**	.57**	.67**	-				.68**	.12	.47**	-				6.3 (2.2)	.66**	.66**	.70**	-					8.0 (4.2)
5.	Emotional abuse	.76**	.64**	.71**	.64**	-			.70**	.40**	.63**	.56**	-			7.8 (4.5)	.77**	.70**	.70**	.65**	-				11.2 (6.4)
6.	Bullying	.45**	.37**	.34**	.36**	.52**	-		.36**	.00	.40**	.36**	.43**	-		4.9 (4.6)	.43**	.41**	.22	.30**	.51**	-			8.4 (8.7)
7.	Paranoia	.39**	.34**	.44**	.42**	.42**	.44**	-	.21	.02	.07	.30*	.08	.10	-	1.3 (0.7)	.34**	.24	.36**	.36**	.41**	.44**	-		2.7 (1.5)
8.	Hallucinations	.37**	.40**	.34**	.27**	.43**	.40**	.54**	.16	.14	.08	.10	.17	.07	.36**	1.2 (0.5)	.31**	.32**	.19	.18	.40**	.38**	.34**		2.8 (1.7)

*Note: *** $p < .001$, ** $p < .01$, * $p < .05$*

6.4.1 *Logistic regression for psychosis*

Binary logistic regression using diagnosis as the DV revealed CSA ($B = .16$, $SE = .07$), $p < .05$, $OR = 1.18$, 95% CI , 1.03 – 1.35) and CEN ($B = .17$, $SE = .07$), $p < .05$, $OR = 1.19$, 95% CI , 1.04 – 1.36) were significant predictors of lifetime diagnosis of schizophrenia spectrum disorders, all other trauma predictors were non-significant.

Table 6.2

Results from the multiple logistic regression using the clinical sample (n = 72).

		AVH			Paranoia		
		B	SE B	β	B	SE B	β
Step 1	Constant	1.27	1.01		1.97	0.83	
	Age	0.01	0.02	.08	-0.00	0.02	-.03
	Sex	-0.07	0.48	-.02	0.40	0.40	.13
	Symptom*	0.34	0.15	.30*	0.25	0.11	.29*
	R ²	.09			.10		
Step 2	Constant	0.74	1.04		1.16	0.86	
	Age	0.01	0.02	.09	-0.00	0.02	-.03
	Sex	-0.30	0.48	-.08	0.37	0.40	.12
	Symptom*	0.27	0.16	.23	0.19	0.12	.22
	CSA	0.07	0.04	.30*	-0.00	0.03	-.01
	CEN	0.00	0.01	.02	0.08	0.04	.33*
R ²	.17			.20			

Note: Symptom indicates the control for co-occurrence between symptoms, in the first regression (AVH; Hallucinations) this was paranoia, and in the second regression (paranoia) this was hallucinations. CSA (childhood sexual abuse); CEN (childhood emotional neglect) *p < .05*

6.4.2 Linear regression of paranoia and hallucinations

Table 6.2 shows the results of the multiple linear regressions. CEN significantly predicted paranoia when hallucinations were controlled for but failed to predict hallucinations when paranoia was controlled for. CSA predicted hallucinations when paranoia was controlled for but failed to predict paranoid beliefs when hallucinations was controlled for.

6.4.3 Dose-response analysis

On considering the effect of cumulative trauma on a diagnosis, Table 6.3 shows the odds ratios, which become significant at 3 to 4 types of trauma (OR = 3.93), increasing to an OR of 7.8 for five to six types of trauma, indicating a linear (dose-response) relationship.

Table 6.3

Frequency distribution of trauma and unadjusted odds ratios for cumulative trauma.

Traumas	Trauma Frequency (%)	Psychosis cases	Unadjusted OR (95% CI) for psychosis
0	51 (35.4)	15 (20.8)	-
1-2	39 (22.2)	19 (26.4)	2.28 (0.96 – 5.44)
3-4	29 (18.1)	18 (25.0)	3.93* (1.50 – 10.28)
5-6	17 (11.1)	13 (18.1)	7.80 ** (2.19 – 27.84)

*Note: OR (odds ratio) CI (confidence interval). *p <.01, **p<.001.*

6.4.4 *The role of belief in injustice*

On investigating the direct paths used in the mediation analysis ($n = 50$ after listwise deletion), childhood emotional neglect was associated with personal BJW ($B = -.47, SE = .22, p < .05$) but not general BJW ($B = -.22, SE = .22, p = .32$) (path a). Interestingly, both personal BJW and general BJW were significantly associated with current paranoia (path b); however these associations indicate that individuals that are currently paranoid have an excessive belief that the world is just for people generally ($B = .06, SE = .03, p < .05$) but that for them personally the world is unjust ($B = -.07, SE = .03, p < .05$).

The relationship between childhood emotional neglect and paranoia (mediating path c') was also significant ($B = .11, SE = .03, p < .05$). This suggests that the association between childhood emotional neglect and paranoia was *partially* mediated by a personal BJW, (indirect effect of personal BJW: $B = .032, SE = .02, 95\% CI [.00, .08]$). General BJW was not a significant mediating variable (Figure 6.1).

Interestingly, when the model was recalculated with hallucinations as the DV, and CSA was the IV, the only significant path was the direct path from CSA to hallucinations ($B = .08, SE = .04, p < .05$). Personal BJW and general BJW were not acceptable mediating variables.

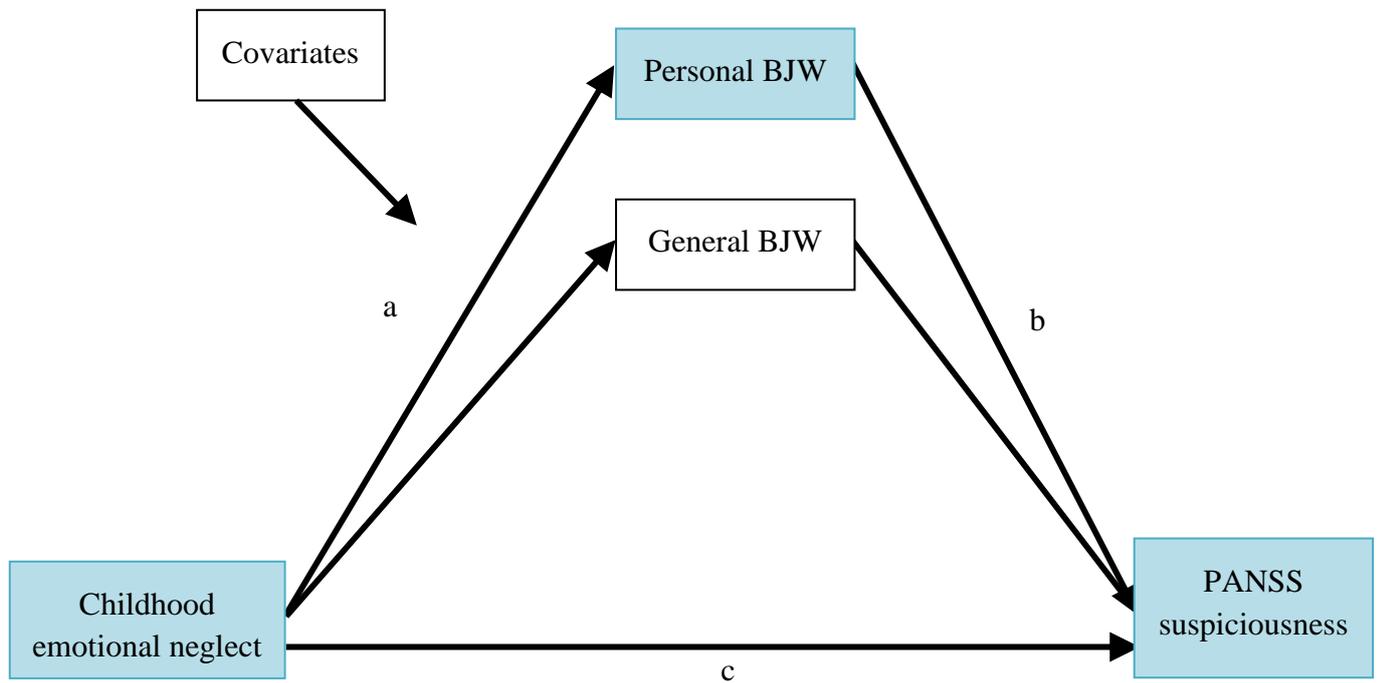


Figure 6.1

Illustration of the model used in the analysis. Covariates included age, sex, sexual abuse and hallucinatory experiences. The mediating variables (personal belief in a just world (personal BJW) and general belief in a just world (general BJW) were regressed onto the IV – emotional neglect variable (path a). The DVs (paranoia) were regressed onto the mediating variables (path b) and the DVs were also regressed onto the IV (path c') simultaneously. The effects of all model variables were linear regression estimates. Please note the colour represents the significant mediator.

6.5 Discussion

The primary aim of the present study was to investigate whether there is specificity between different types of adversity in childhood and symptoms in a sample of individuals currently diagnosed with SSD and a comparison group from the general population. We also tested the mediating role of personal BJW in the case of paranoia. Overall, our study supports those larger epidemiological studies (Bentall et al., 2012; Shevlin, McAnee, Bentall, & Murphy, in submission; Sitko et al., 2014) demonstrating specific associations between different kinds of childhood trauma and different symptoms within the psychotic domain. We found that there were associations specifically between CSA and hallucinations and between CEN and paranoia when the co-occurrence of symptoms is statistically controlled for.

Interestingly, in our sample bivariate correlational analysis produced similar findings in the clinical sample as the linear regressions which controlled for comorbidity. Hallucinations and not paranoia correlated with CSA but was not statistically correlated with the neglect variables (emotional and physical), whereas paranoia was. This finding suggest that we can have some confidence in the more sophisticated regression analyses but did not extend to the comparison sample, where no trauma experiences correlated with paranoia and hallucinations with the exception of physical neglect which modestly correlated with paranoia

Finally, we have provided tentative evidence that high personal perceptions of injustice go some way to explain the association between emotional neglect and paranoia. Perhaps more interesting, and somewhat surprising was the finding that the participants' general BJW was stronger in those who were paranoid. These findings

indicate that paranoia perhaps only develops when personal experiences of CEN are perceived to be unique to the individual.

As predicted, BJW did not mediate the relationship between CSA and hallucinations. There is already strong evidence that dissociative responses, which may be particularly common in victims of sexual abuse, are closely associated with hallucinations and hence may explain the association between childhood trauma and this kind of symptom (Perona-Garcelán et al., 2012; Varese, Barkus, et al., 2012).

Several methodological limitations need to be acknowledged. Firstly, we measured childhood trauma using the CTQ, which is a retrospective self-report measure. Although this measure has demonstrated good sensitivity and satisfactory specificity and good convergent and discriminant validity (Bernstein et al., 2003), the use of self-rated measures in individuals with a diagnosis of SSD has been criticised because of potential reporting biases attributable to illness (Sideli et al., 2012). However, studies with nonpsychotic patients have shown that there are many barriers to disclosing abuse (e.g. disbelief, for a recent review see Tener & Murphy, 2014) and that it can therefore take many years to disclose (Jonzon & Lindblad, 2004), in which case it is possible that our findings may underestimate the levels of childhood trauma experienced by our patient sample; this effect would tend to reduce the possibility of detecting specific associations. Furthermore several studies have indicated that reports of child abuse by patients are often accurate, and have good concurrent validity against other sources of information (Fisher et al., 2011). Moreover, a small number of prospective studies of the association between childhood trauma and psychosis in general have yielded similar results to those obtained from retrospective reports (Varese et al., 2012), although, to our knowledge, no prospective study has yet tested for associations with specific symptoms.

The present sample was also relatively modest in size, and based on a convenience sample allowing the possibility of a bias in referral to the study and limiting the generalizability and statistical power of the findings. Nonetheless, our results reflect those found in large-scale epidemiological studies. Our mediation model, which included 72 participants, was reduced to 50 as PROCESS uses listwise deletion to handle missing data. We employed bootstrapped bias-corrected percentile based confidence intervals of 10,000 bootstrap draws to ensure that our findings were robust. Nonetheless, the finding that personal BJW partially mediated the relationship between emotional neglect and paranoia must be taken cautiously.

Most importantly, the study was cross-sectional, with childhood trauma, BJW and patients' symptoms all being measured at the same time point. It is important to note that causation requires the demonstration that the cause precedes the effect (Hill, 1965). Whereas we have inferred that this was the case from patients' retrospective reports, we have no proof that this was so. Mediation analysis does not protect from other possible interpretations of the data, and is also subject to confounding from unmeasured variables. Hence, the best that can be safely concluded is that the *findings are consistent with the hypothesis* that specific childhood traumas contribute causally to specific psychotic symptoms, and that BJW is one of the mediating mechanisms.

The findings from this study indicate that paranoia and hallucinations may reflect different kinds of early experiences. Clinicians may wish to consider this during clinical practice by making sure to assess for childhood adversity and by considering such adversities in their clinical formulations. There is already evidence that trauma-focused interventions may have some utility in the treatment of psychotic patients (Mueser et al., 2008; van den Berg & van der Gaag, 2012) and further

research is required to develop these approaches. The implications of our findings around personal and general BJW may also extend to therapeutic settings. There is currently no systematic intervention targeting these psychological processes during therapy, although cognitive behaviour therapy has the potential to do so.

Interventions need to be designed to target perceptions of injustice to test the hypothesis that this will reduce paranoid thoughts. It is important to note here that this may not mean attempting to reduce individual feelings of personal injustice, but may potentially validate and normalise those feelings. It is possible that the discrepancy between personal and general BJW is a cause of considerable psychological distress to patients and this discrepancy needs further exploration.

6.6 References

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Chapter 7
Discussion

7.1 General Discussion

The five investigations included in this thesis address a number of empirical questions relevant to the theoretical and clinical understanding of the psychological mechanisms involved in depression, paranoia and hallucinations, with a particular emphasis on paranoid ideations. Each of the sections included in the present chapter provide specific and integrative summaries of the findings, discuss the strengths and limitations of the designs employed, discuss future directions in research and finally address the clinical and practical implications of the findings.

The primary aim of my thesis was to investigate the association between specific social risk factors and specific symptoms within psychosis (specifically paranoia and hallucinations) and also depression. There is limited research looking at symptoms of psychosis in this way (for review see Bentall et al., 2014). The series of studies presented here broadly support the hypothesis of links between specific types of adversities and specific symptoms. The secondary aim was to assess the underlying mechanisms involved in the specific pathways between adversities and symptoms. I measured experiences of discrimination, injustice, stress, lack of trust, support, social rank as well as negative self-esteem as potential mechanisms that go some way to explain the link between particular adversities and the mental health outcomes identified.

7.2 Specific findings

Chapter 2 describes the development and validation of a measure of perceived relative deprivation (PRD) that can be employed in small and large scale studies to introduce the individual's perspective on their childhood experiences of relative deprivation and inequality. This has the advantage of generating individual level data

using personal evaluations which is important as we consider how inequality and deprivation affect some individuals but not all. Arguably, it may not be the actual experience of living in deprivation and inequality, but the perception that is important. The measure correlated with objective measures of deprivation and inequality, demonstrating construct validity.

I then used this measure to assess psychological wellbeing, paranoid ideation and hallucinatory experiences with a student sample as described in Chapter 3. PRD was associated with poor scores on all the mental health measures. I also investigated personal beliefs in a just world (BJW), general BJW, trust and social rank to see if these factors acted as mediators between PRD and the mental health outcomes. Personal beliefs about injustice and social rank were identified as mediators between PRD, paranoid ideation and poor psychological wellbeing. None of the mediators included in our model accounted for the association between PRD and hallucination proneness, suggesting that other mechanisms must account for this association. The observation that personalized beliefs about injustice but not general BJW were associated with paranoid ideation is consistent with the findings of Valiente et al. (2010), possibly suggesting that PRD during childhood causes the individual to feel uniquely singled out and victimized. The mediating role of social rank for paranoia and poor well-being was consistent with previous findings that negative beliefs about the self are important in both phenomena (e.g. Beck, Rush, Shaw, & Emery, 1979; Bentall & Fernyhough, 2008; Freeman et al., 2005).

Interested to see if these mechanisms held true when assessing deprivation and inequality using objective measures in adulthood, I used a large epidemiological dataset to carry out an analysis of the relationship between symptoms and neighbourhood variables, as reported in Chapter 4. This study included, as measures,

the index of multiple deprivation (IMD), measures of psychosis and depression, and also specific symptom dimensions extracted from the Psychosis Screening Questionnaire (PSQ): paranoia, AVH, and mania/hypomania. Although this was a cross sectional design we found that the IMD significantly predicted psychosis and depression. When focussing on specific symptoms, as we had hypothesised, IMD was associated with both paranoia and depression, but not hallucinations or mania. In our multivariate mediation model, when controlling for comorbidity between the symptoms and other background variables (age, sex and ethnicity), IMD was associated with discrimination, lack of trust, social support and stress.. Examination of the final model (model 3) indicated that the ORs for the direct effects between deprivation and symptoms reduced once the mediators were entered into the model. In the case of depression the OR became statistically non-significant indicating full mediation between IMD and depression through all the mediators: discrimination, trust, lack of support and stress (Baron & Kenny, 1986). In the case of paranoia, the OR reduced in magnitude but remained statistically significant, therefore indicating partial mediation through discrimination, trust, and stress.

In Chapter 5, which reported a study of a clinical sample and healthy controls, my regression analyses, which controlled for the co-occurrence of paranoia and hallucinations, confirmed that the insecure attachment dimensions were significant predictors of paranoia and not hallucinations in both the clinical (N = 176) and non-clinical samples (N = 113). A secondary aim of this study was to investigate the possible mediating role of negative self-esteem and belief in powerful others. In fact, the latter variable, although correlated with paranoia, did not prove to play a mediating role between insecure attachment and paranoia in the clinical participants. However, in line with previous research (Pickering, Simpson, & Bentall, 2008), we

found that negative self-esteem mediated the relationship between the insecure attachment dimensions and paranoid symptoms, partially for attachment anxiety and fully for attachment avoidance.

Chapter 6 considered the relationship between childhood experiences of trauma and subsequent schizophrenia spectrum diagnoses ($n = 72$) as reported in epidemiological studies. I was curious to assess if these findings were translatable at an individual level. In general, the study findings support those larger studies demonstrating that childhood trauma predicts SSD. I found, as others have (e.g. Shevlin, Dorahy & Adamson, 2007), that traumas tended to co-occur. My linear regression model found that childhood sexual abuse (CSA) and childhood emotional neglect (CEN) were the only significant predictors of hallucinations and paranoia respectively. When personal and general BJW were introduced into the model, consistent with the findings from chapter 3, I found that personal beliefs about injustice were the only significant mediator for paranoid ideation; in this case it partially mediated the relationship.

7.3 Integrative summary

A large amount of research demonstrates associations between inequality, deprivation and psychosis (e.g. Burns, Tomita, & Kapadia, 2014; Kirkbride et al., 2012; Kirkbride, Jones, Ullrich, & Coid, 2014), with some evidence pointing towards specific associations with non-affective psychoses and not affective psychoses (Kirkbride et al., 2014). However only 1 study (Oher et al., 2014) investigated concepts related to inequality and deprivation and specific symptom dimensions (reality distortion, depressive symptoms and disorganisation). The authors found higher rates of reality distortion and depressive symptoms in the most densely

populated neighbourhoods. Within the reality distortion dimension there was no clear association with paranoia, but there was evidence to suggest that higher levels of hallucinations were observed in the most populated areas. In my investigation using a student sample I found that experiences of PRD in childhood predicted paranoid ideation, hallucinatory experiences and poor psychological wellbeing. However, when investigating inequality at adulthood I found somewhat different results, with the IMD significantly predicting the broadly defined psychosis but, when individual symptoms were tested, it significantly predicted paranoia and depressive symptoms and not hallucination proneness.

It seems clear from our findings from these two studies that experiencing deprivation and inequality are associated with paranoia. However, the relationship with auditory verbal hallucinations is less certain, with my study on PRD in childhood in students showing an association which was not replicated in the epidemiological dataset when using adulthood objective deprivation measures and higher severity measures of hallucinations. It is possible that these differences reflect measurement issues, as different assessment tools for both symptoms and life experiences were used in the different samples. It is possible that specificity becomes more evident at higher levels of severity, as measured by the PSQ in the epidemiological study and by Positive and Negative Symptom Scale (PANSS) in the clinical studies. Alternatively, the discrepant findings may reflect the different mechanisms involved in the development of specific psychotic experiences operating at different points in development. Hence, it is possible that childhood experiences are more relevant for hallucinatory experiences and current living circumstances are less significant, whereas it seems plausible that both childhood and current experiences feed and prolong paranoid thoughts.

Overall, the evidence for specific mechanisms relating to specific symptoms seem stronger than common mechanisms. The evidence for pathways to paranoia from neglect via insecure attachment and low self-esteem, on the one hand, and from social disadvantage and feelings of injustice on the other, appears to be strong. It is not clear from the available evidence whether, in some sense, these are different manifestations of the same pathway or, alternatively, the two pathways converge synergistically on increased threat anticipation which, it is widely agreed, is the final step leading to paranoia (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002). It is important to note, that although I studied deprivation, inequality, insecure attachment and trauma independently in a series of studies, these risk factors can occur simultaneously and it is possible that they interact in complex ways. For example, it is quite plausible that insecure attachment will impact on (moderate) childhood perceptions of deprivation or that, alternatively, neighbourhood deprivation will have a much greater paranoia-inducing effect in someone who has a background of childhood neglect, insecure attachment and low self-esteem. Testing these kinds of hypotheses will require considerable statistical power and large samples in which all of these variables have been assessed together.

An important qualification is that there is no claim here that these mechanisms exhaustively account for the development of paranoid ideation. In particular, no attempt has been made to identify resilience factors which may be required to explain why some socially disadvantaged and neglected individuals *do not* become paranoid.

7.4 Limitations

A detailed discussion of the limitations of each of the current studies is included in each of the chapters. However, I will briefly discuss some of the principle shortcomings that the studies presented in this thesis share. Firstly, all of the studies employed cross-sectional designs. This type of design has been criticised for several reasons. Perhaps most importantly, cross-sectional quantitative data cannot identify with certainty causal relationships between the relevant psychological processes and outcomes. Although my inferences about directions of causality and the temporal flow of events were justified by theoretical arguments and evidence from the literature, other directions of causality cannot be ruled out. To reinforce my findings, the psychological accounts developed here could be explored using experimental designs which are able to manipulate events to examine relevant associations. It may also be possible to assess how individuals respond to known and unknown environments through, for example, real time “walking” studies (e.g. Nettle, Pepper, Jobling, & Schroeder, 2014) and using qualitative interviews to gauge individuals’ responses to particular environments and their anticipation of threat based on where individuals grew up. Examples of possible future studies are mentioned below (7.7).

I used a mixture of small and large scale student and patient population designs as well as utilising epidemiological datasets to investigate specific associations between social adversities and symptoms within the psychosis spectrum, using quantitative methods. Future designs must consider the importance of qualitative designs and, where possible, longitudinal data should be used. Longitudinal studies are recognised as the gold standard when assessing these types of associations, particularly in psychological research where cause and effect are

always disputed (Little, Bovaird, & Card, 2007). It must, however, be acknowledged that all designs are susceptible to unobservable variables, which is certainly a problem when employing structural equation modelling and examining mediating variables (Bullock, Green, & Ha, 2010).

Secondly, all the studies used in this thesis employed self-report measures to assess both current experiences (Chapters 4 and 5) and childhood experiences (Chapters 2, 3 and 6). The use of retrospective accounts of childhood experiences is limited by the recall of participants. It is arguable that perceptions of past events are influenced by current thoughts and experiences as well as understanding of those events, particularly when remembering highly emotional experiences (DePrince et al., 2012; Howe, 2013).

In Chapters 2 and 3 I asked individuals to report their experiences of relative deprivation compared to their peers at school and in the neighbourhood as well as “in general” up until the age of 16. It could be argued that individuals’ perceptions of their experiences change as they age. However, these studies used student samples, whom, by and large, had only recently left their family homes, and so recall of events here are arguably likely to be minimally distorted. Chapter 6 used a validated measure of childhood experiences of trauma (Bernstein et al., 1994) however this measure is largely indicative of trauma experienced as a result of actions by caregivers. Research has shown that this type of trauma imposes a need to misremember and forget the trauma as a means to survive (e.g. betrayal trauma theory; DePrince et al., 2012; Freyd, DePrince, & Zurbriggen, 2001). This effect may help to explain the observed association between trauma and dissociation (Sar et al., 2010; Varese, Barkus, & Bentall, 2012). In addition to these theoretical possibilities, there are many obstacles to disclosing abuse (e.g. disbelief, for a recent review see

Tener & Murphy, 2014) and it can take many years to disclose, with one study finding an average of 21 years delay in disclosing CSA in women (Jonzon & Lindblad, 2004). Therefore it is possible that my findings from patients in Chapter 6 may represent an attenuation of the true associations.

In addition, I consistently controlled for sex in my analyses. For practical reasons, this research did not consider the differences between sexes in types of trauma experienced (Cotton et al., 2009) or the role sex plays in the expression of symptoms. It has been noted that male patients experience more negative and cognitive symptoms of psychosis whilst females experience more persecutory delusions and auditory hallucinations (see Leung & Chue, 2000), potentially as a result of the types of trauma exposure.

Cumulative experiences of trauma have also been well documented (Shevlin, Houston, Dorahy, & Adamson, 2008; Varese, Smeets, et al., 2012) and although this dose-response effect was replicated in Chapter 6, I was unable to assess experiences of adversity in adulthood, which may also be of paramount importance in the development of psychopathology (e.g. Elklit & Shevlin, 2011). I investigated several traumas independently of each other. However, as already noted, all these factors tend to inter-correlate.

I am not aware of researcher bias in any of my studies, as individuals volunteered themselves into the study. However, this in itself incurs a self-selected sample bias. Chapters 2 and 3 involved student samples who depart from population norms in various ways (e.g. by having relatively high IQ) and the findings may not be generalisable to other groups of people (Henrich, Heine, & Norenzayan, 2010). Chapter 4 utilised an epidemiological dataset and I am unaware of any biases of the

recruitment method used to obtain this information. However, Chapters 5 and 6 may be subjected to referral bias, particularly in Chapter 6 where sensitive topics were discussed.

7.5 Clinical implications

Considering the principal findings and despite the general limitations of the methodologies employed in this thesis, there are interesting and important implications for clinicians to consider. Firstly, the findings from each of the studies show that there is great value in taking an individual history in understanding current psychological distress. This extends not only to experiences of trauma as defined by abuse and neglect but also the psychological impact of growing up in deprivation and an understanding of what individuals may have been exposed to in such areas. It has been argued that trauma should not be defined by any particular event but by the overwhelming emotional response to events (Bolton et al., 2013). It seems important to take an individualised approach to intervention, recognising an individual's place in society and utilising their current protective and resilient factors during therapies.

On an individual level, it may be possible to address the social stressors that inequality produces through psychological treatments (e.g. cognitive-behaviour therapy (CBT) and interpersonal psychotherapy) which already aim to address self-esteem and are thought to be effective in depression (Cuijpers, van Straten, Andersson, & van Oppen, 2008), and in the case of CBT, psychosis (CBTp; Wykes, Steel, Everitt, & Tarrier, 2008). It is also possible that these approaches might be enhanced by specifically targeting the mediating mechanisms outlined in this thesis, namely support, trust, perceptions on justice and stress. Therapeutically, it may not be important to attempt to reduce these factors but to acknowledge and validate the

individual's experiences of them (for example stress and perceptions of injustice). Considering the findings from Chapter 5, it may also be beneficial to adapt CBT to address attachment-related cognitions specifically, especially when working with paranoid patients. By assessing attachment styles in individuals with paranoia it may be possible to enhance the therapeutic alliance between practitioner and client and enable clinicians to target psychological interventions based on their clients' internal working models of themselves and of others.

There seems to be a systemic problem in disclosing and responding to reports of trauma. The findings from this thesis show that traumas seem to co-occur, and currently this is not dealt with appropriately within psychological services. Read, Hammersley and Rudegeair (2007) discuss some of the barriers involved in the process, which include having a diagnosis of psychosis, fear of vicarious traumatisation, fear of inducing false memories, and being the opposite sex to client. Furthermore they highlight a lack of training in how to ask and how to respond to individuals when they do report childhood adversity. A particular problem to those disclosing trauma is fear of not being believed and shame. One therapy that can be trauma informed in this way is cognitive-behaviour therapy for psychosis (CBTp) but there needs to be a system-wide recognition of the psychological consequences of trauma and how to respond to those that report it.

7.6 Policy implications

In addition to the potential for clinical implications there are some important practical implications, particularly if these studies are supported by other methodologies (for exempling, qualitative and longitudinal research). Inequality and deprivation are societal level problems and the findings of Chapters 2 to 4 have

important implications that are supported by previous research and need to be addressed by policy makers. It seems likely that the reduction of social inequality may have substantial benefits for the psychological health and wellbeing of populations.

Unfortunately, devising policies to reduce inequalities and gaining popular support for their implementation may prove to be a very considerable challenge. Attempts have been made in Switzerland to reduce social inequality, which last year proposed a cap on executive pay, and the results illustrate the political barriers faced when attempting to bring about a more economically just society. The proposal, aimed at reducing the difference between the highest earner and lowest earner in any organisation to a ratio of 1:12, with the aim at stopping executives from earning in one month what lowest paid individuals would get in a year. The proposal was rejected by 65.3% of voters (Hooper, 2013). More recently, attempts to flatten the effects of inequality have again been proposed, this time by increasing the minimum wage to match a living wage. Adjusted for the country's high prices, the proposal would have increased lowest wages equivalent to £8.33 an hour based on a 42-hour week, according to the Organisation for Economic Cooperation and Development (OECD). The aim of this plan was to make living in expensive cities such as Zurich and Geneva possible for those on low income. However this proposal was rejected with concerns that this increase would put small companies out of business and drive high production costs even higher (see Kollwe, 2014).

Some policy makers in the UK have advocated other strategies to blunt the effects of inequality, for example by debt relief, better education in personal financial management (Foresight Mental Capital and Well-being Project, 2008), targeting

interventions at poorer groups (Marmot et al., 2010) as well as identifying and promoting resilience factors (Friedli, 2009).

The OECD (2012) reported that it is possible to flatten the impact of inequality and drive economic growth using a range of taxation policies. For example they highlight that increasing total tax revenues may reduce income inequalities but have a negative impact for GDP per capita. Changing the tax type (personal income and consumption tax) while keeping total tax revenues constant has the potential to negatively impact on income equality, as these tend to favour the wealthy, thus increasing income inequality, but may have a positive impact on GDP per capital. However, cutting tax expenditures and marginal rates in most cases had a positive influence for both the economy and reducing income inequalities. Finally they argue that progressive taxation in general may improve both equality and economic growth, but they note that the long-term effects may be uncertain with the potential for high top rates reducing working hours and productivity, and undermining incentives to work.

Taxation plans need support from the general public for them to work, and it seems, from the evidence of attempts made in Switzerland, that there is an underlying fear of the consequences of reducing inequality in this way as 75% of those who voted rejected the idea of increasing minimum wages (Kollewe, 2014). Furthermore, it has been found that the youth of Britain can hold more right wing, racist and disengaging attitudes as a result of persistent unemployment and a poor job market (McDowell, Rootham, & Hardgrove, 2014); hence social disadvantage can undermine the very psychological resources needed to address it. Hence, individuals tend to accept and justify the status quo of society in more unequal societies (Dorling, 2010; Kay et al., 2009). Individuals in these circumstances may become

more materialistic and individualistic. Research suggests there is a strong association between materialism and loneliness, where possessions take the place of human connectedness. Although it may be possible to reverse this effect by re-socialising with others (Pieters, 2013).

The policy implications for health services are clear. The association between specific traumas and specific symptoms of psychosis provide further evidence for the need of both trauma informed services as well as trauma specific services (Elliott, Bjelajac, Falot, Markoff, & Reed, 2005; Harris & Falot, 2001). The National Institute for Health and Care Excellence (NICE) guidelines state for schizophrenia and psychosis individualised CBT should be offered, but need to be more explicit in recommending trauma informed approach (see Haarmans, 2012). The same is true for the section of the guidance discussing “assessment”. The NICE guidelines state “assess for PTSD and other reactions to trauma” (NICE, 2014), as they recognise that many of those who experience psychosis may have had traumatic experiences in their lives. It is unclear here what is meant by “trauma” and also “other reactions”. There is a need for this approach to be extended beyond the assessment point (as I have noted earlier, it can take many years for individuals to disclose trauma). Furthermore, there is no mention of trauma informed /specific services in the intervention guidelines of NICE. Arguably, modifications to the guidelines are therefore needed in order to ensure that National Health Trusts take notice of the growing research evidence.

Finally, in order to improve public mental health, which will go some ways to reduce experiences of paranoia, there is utility in increase individual power over their life circumstances. This requires policy changes at many levels, for example in the workplace. For example a British Chambers of Commerce survey, found 70 per cent

of businesses reported an improvement in employee relations when they used flexible working hours. In fact, in Britain policy has changed to suggest that all employees have the legal right to request flexible working hours (Advisory Conciliation and Arbitration Service (ACAS), 2014). This may go some way to reduce stress in the work place, thus positively impacting on psychological wellbeing.

7.7 Future research designs

Research focusing on a symptom specific approach is needed if we are to better understand the processes involved in psychological distress, particularly when considering complex disorders such as schizophrenia which has been recognised as an unreliable and heterogeneous diagnosis (Bentall & Varese, 2012; Kinderman, Read, Moncrieff, & Bentall, 2013). Intervention research designed specifically to target the mediating mechanisms identified in this thesis seems an important direction for future research. This may also help in understanding the temporal relationship between psychological mechanisms discussed. In addition, identifying how the mediating mechanisms may be influenced by each other seems paramount as a next step, for example, examining how reducing stress levels influences perceptions of trust, support and social rank. This may be important when considering intervention techniques to identify what works best.

I highlighted in Chapter 1 that paranoia can be subdivided into two distinct topographies: “poor me” paranoia and “bad me” paranoia (Trower & Chadwick, 1995). However in this thesis I did not differentiate between these two forms. This may be of particular interest to my findings in Chapter 3 which found specific mediating pathways from childhood relative deprivation to paranoia through personal

experiences of injustice. It would be beneficial for future research to replicate these findings using the two distinct categories of paranoia as an outcome measure to identify if the findings hold true to “bad me” paranoia as there may be some conceptual overlap between perceptions of injustice and “poor me” paranoia. On considering the immediate consequences and stress levels surrounding unequal and deprived areas experimentally, it is possible to imagine a study using individuals who currently report paranoid thoughts and ask them to watch a video of someone walking through different areas whilst using eye tracking designs. In addition it would be possible to measure individual’s heart rate and cortisol levels throughout the “virtual” walk. This would establish the over-anticipation of threat identified in those individuals, and potentially what kinds of environmental cues individuals found calming.

There are some longitudinal datasets which have not yet been used to investigate the association between deprivation and psychosis. For example it may be possible to obtain Hospital Episode Statistics (HES) data for England through the Health and Social Care Information Centre (see <http://www.hscic.gov.uk/hes>). This includes detailed information of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England for every individual over a 7 year period. It may be possible using this dataset to map inequality and deprivation throughout England against admissions for psychosis. The dataset can be linked with Office of National Statistics data which contains other survey information for each LSOA, for example, self-report quality of life, social capital and stress. This is a type of longitudinal dataset that can be used to investigate these specific associations. Unfortunately, at present it does not contain specific information on specific symptoms within the psychosis domain.

However, these sorts of datasets may provide useful information to characterise the similarities, differences, risk factors as well as protective factors of urban and rural living. The study of the “urbanicity effect” has dominated interest amongst researchers and the impact of rural living has been somewhat overshadowed. Future studies might wish to use geographical data to identify mental health characteristics in the most and least densely populated areas. Alongside this, it may be beneficial to obtain survey data to build a picture of the living standards and social aspects of the areas of interest. This should include aspects of living that are important to those communities (e.g. distance from and access to shops and services), distance from and access to socialising. Focus should lie in both the protective and risk factors for mental health experiences.

In general, the present findings highlight the need to develop a science of public mental health, which at present barely exists as a discipline. In the future, more complex and imaginative designs examining specific environments, specific outcomes, and specific mediating mechanisms will be required if this is to be achieved.

7.8 References

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Appendix A: Chapter 1: Perceived Inequality in Childhood Scale

Participant ID: _____ Age: _____ Sex: M / F

Ethnicity: _____

Perceived inequality in childhood Scale

1. How many times did you move house in the first 16 years of your life?

2. What was the address or approximate location of the house you lived in when you were 5 years old?
.....
 - (i) How many people lived in this house?
 - (ii) How many bedrooms did this house have?
 - (iii) Who owned this house?
 - (iv) Was it in an urban, suburban or rural area?
 - (v) What was your father's occupation when you lived here?
 - (vi) What was your mother's occupation when you lived here?* Please state if either parent was unemployed.

3. What was the address or approximate location of the house you lived in when you were 10 years old?
.....
 - (i) How many people lived in this house?
 - (ii) How many bedrooms did this house have?
 - (iii) Who owned this house?
 - (iv) Was it in an urban, suburban or rural area?
 - (v) What was your father's occupation when you lived here?
 - (vi) What was your mother's occupation when you lived here?* Please state if either parent was unemployed.

4. What was the address or approximate location of the house you lived in when you were 15 years old?
.....
 - (i) How many people lived in this house?
 - (ii) How many bedrooms did this house have?
 - (iii) Who owned this house?
 - (iv) Was it in an urban, suburban or rural area?
 - (v) What was your father's occupation when you lived here?
 - (vi) What was your mother's occupation when you lived here?* Please state if either parent was unemployed.

5. Did your family receive welfare benefits when you were young? Y/N

The following statements are aimed to identify your experiences during the first 16 years of your life in general. Please answer as honestly and accurately as possible by circling the appropriate response.

6. In comparison to other children in your school and neighbourhood how stable was your home environment (social and economic security):
 - i. Unstable
 - ii. Less stables
 - iii. The same
 - iv. Slightly more stable
 - v. The most stable

7. In comparison to other children in your school and neighbourhood, the opportunities presented to you by your parents were (e.g. musical and cultural activities, activities and sports):
 - i. Very poor
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best

8. In comparison to other children in your school and neighbourhood, the amount of time you spent with your parents was:
 - i. Far less
 - ii. Less
 - iii. The same
 - iv. More
 - v. Significantly more

9. In comparison to other children in your school and neighbourhood, your parents involvement in your education was:
 - i. Far less
 - ii. Less
 - iii. The same
 - iv. More
 - v. Significantly more

10. In comparison to other children in your school and neighbourhood, the amount of time you spent with your extended family and with family friends was:
 - i. Far less
 - ii. Less
 - iii. The same
 - iv. More
 - v. Significantly more

11. In comparison to other children in your school and neighbourhood how would you rate your holidays?
 - i. I very rarely or never went on holidays as a child

- ii. My holidays seemed not as good as those of other children in my neighbourhood
 - iii. My holidays seemed as good as those of other children in my neighbourhood
 - iv. My holidays seemed slightly better than those of other children in my neighbourhood
 - v. My holidays seemed the best in comparison to other children in my neighbourhood.
12. Compared to others in your school and neighbourhood, as a whole, did you feel that your family was:
- i. Well below average in wealth
 - ii. Below average in wealth
 - iii. Of average wealth
 - iv. Above average in wealth
 - v. Well above average in wealth
13. In comparison to other children in your school and neighbourhood, the birthday and Christmas presents you received were:
- i. I got very few birthday and Christmas presents
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best
14. In comparison to other families in your school and neighbourhood, the cars owned by your family were:
- i. We never owned cars
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best
15. In comparison to other children in your school and neighbourhood, the houses you lived in were:
- i. Very poor
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best
16. In comparison to other children in your school and neighbourhood, the clothes you wore to school were:
- i. Second hand
 - ii. Hand me downs
 - iii. The same
 - iv. Slightly better
 - v. The latest fashion

The next questions are similar to those which you have just answered, but concern how you saw yourself, as a child, in comparison with wider society.

17. In comparison with other families in the country how would you rate your holidays?
 - i. I very rarely or never went on holidays as a child
 - ii. My holidays seemed not as good as those of other children
 - iii. My holidays seemed as good as those of other children
 - iv. My holidays seemed slightly better than those of other children
 - v. My holidays seemed the best in comparison to other children

18. In comparison with other families in the country, as a whole, did you feel that your family was:
 - i. Well below average in wealth
 - ii. Below average in wealth
 - iii. Of average wealth
 - iv. Above average in wealth
 - v. Well above average in wealth

19. In comparison with other families in the country, the birthday and Christmas presents you received were:
 - i. I got very few birthday and Christmas presents
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best

20. In comparison with other families in the country, the cars owned by your family were:
 - i. We never owned cars
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best

21. In comparison with other families in the country, the houses you lived in were:
 - i. Very poor
 - ii. Not as good
 - iii. As good
 - iv. Slightly better
 - v. The best

22. In comparison with other families in the country, the clothes you wore to school were:
 - i. Second hand
 - ii. Hand me downs
 - iii. The same
 - iv. Slightly better
 - v. The latest fashion

Appendix B: Chapter 3 extra Table 1

CFA overall model fit results for each measure used in mediation model. All scales loaded onto a single factor structure.

Questionnaire	PICS	GBJW	PBJW	Trust	SCS	LSHS	PaDS	Wellbeing
RMSEA	.05**	.08	.08	.05**	.16	.09	.06*	.07*
TLI	.95	.93	.94	.90	.67	.82	.95	.86
CFI	.96	.96	.90	.91	.74	.86	.96	.88
SRMR	.05	.04	.04	.05	.08	.06	.04	.06

*Note: ** acceptable to < .06; * acceptable to < .08. Note: The perceived inequality in childhood scale (PICS); GBJW (general belief in a just world); PBJW (personal belief in a just world); Trust (Trustworthiness subscale of the philosophies of human nature scale); Social rank (social comparison scale); Paranoia (persecution and deservedness scale); Hallucinations (Launay -Slade Hallucination Scale); Wellbeing (subjective happiness scale); Index of multiple deprivation* (IMD score, based on spearman's correlation).*

Appendix C: Chapter 3 extra Table 2

Unstandardised (B) and standardised estimates (β), and 99% confidence intervals for the direct and indirect effects between perceived relative deprivation and mental wellbeing.

<i>Effect</i>	<i>99%CI</i>				
	<i>B</i>	<i>SE</i>	<i>Lower</i>	<i>Upper</i>	<i>β</i>
Direct effects (path a)					
PRD→ GBJW	0.29	0.07	0.11	0.47	0.17***
PRD→ PBJW	0.46	0.09	0.24	0.68	0.23***
PRD→ Trust	0.20	0.11	-0.08	0.48	0.08
PRD→ Social rank	1.23	0.19	0.74	1.72	0.27***
Direct effects (path b)					
GBJW→ Paranoid ideation	0.09	0.07	-0.08	0.26	0.05
PBJW→ Paranoid ideation	-0.31	0.06	-0.46	-0.16	-0.23***
Trust → Paranoid ideation	-0.32	0.04	-0.43	-0.21	-0.29***
Social rank → Paranoid ideation	-0.16	0.02	-0.22	-0.11	-0.27***
GBJW→ Hallucinations	-0.02	0.08	-0.21	0.18	-0.06
PBJW→ Hallucinations	-0.14	0.07	-0.31	0.03	-0.10*
Trust → Hallucinations	-0.1	0.05	-0.27	-0.03	-0.14**
Social rank → Hallucinations	-0.03	0.03	-0.10	0.03	-0.06
GBJW→ Wellbeing	0.01	0.01	-0.02	0.03	0.02
PBJW→ Wellbeing	-0.05	0.01	-0.06	-0.03	-0.24***
Trust → Wellbeing	-0.01	0.01	-0.02	0.01	-0.04
Social rank → Wellbeing	-0.04	0.00	-0.04	-0.03	-0.44***
Direct effects (Path c')					
PRD→ Hallucinations	-0.36	0.12	-0.68	-0.03	-0.13*
PRD→ Paranoid ideation	-0.12	0.11	-0.40	0.17	-0.04
PRD→ Wellbeing	-0.03	0.01	-0.06	0.01	-0.07
Total indirect effects of RD					
PRD→ Paranoid ideation	-0.38	0.07	-0.56	-0.21	-0.38***

PRD→ Wellbeing	-0.07	0.01	-0.09	-0.04	-0.17***
PRD→ Hallucination	-0.14	0.05	-0.25	-0.03	-0.14**

Specific indirect effects of RD

PRD → GBJW → Hallucinations	-0.00	0.02	-0.06	0.05	-0.00
PRD → PBJW → Hallucinations	-0.06	0.04	-0.15	0.02	-0.02
PRD → Trust → Hallucinations	-0.03	0.02	-0.08	0.02	-0.01
PRD → Social rank → Hallucinations	-0.04	0.03	-0.13	0.04	-0.02
PRD → GBJW → Paranoid ideation	0.03	0.02	-0.03	0.08	0.01
PRD → PBJW → Paranoid ideation	-0.14	0.04	-0.24	-0.05	-0.05***
PRD → Trust → Paranoid ideation	-0.06	0.04	-0.15	0.03	-0.02
PRD → Social rank → Paranoid ideation	-0.20	0.04	-0.31	-0.09	-0.07***
PRD → GBJW → Wellbeing	0.00	0.00	-0.01	0.01	0.00
PRD → PBJW → Wellbeing	-0.02	0.01	-0.03	-0.01	-0.05***
PRD → Trust → Wellbeing	-0.00	0.00	-0.00	0.00	-0.00
PRD → Social rank → Wellbeing	-0.04	0.01	-0.06	-0.03	-0.12***

*Note: *** $p < .001$, ** $p < .01$, * $p < .05$. PRD = Perceived relative deprivation; GBJW = General belief in a just world; PBJW = Personal belief in a just world*