DOCTORAL THESIS

The Development and Testing of a Population Based Model of Social Factors as Mediators of the Trauma Psychosis Association

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The Development and Testing of a Population Based Model of Social Factors as Mediators of the Trauma Psychosis Association

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Thesis submitted for the degree of

Doctor of Philosophy

April 2018

I confirm that the word count of this thesis is less than 100,000 excluding the title page, contents acknowledgements, summary or abstract, abbreviations, footnotes, diagrams, maps, illustrations, tables, appendices, and references or bibliography.

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Acknowledgements

I would like to thank Professor Mark Shevlin, my first supervisor. His expertise, support and consistent calm, have made writing this thesis an absolute joy and one of the best experiences of my life. I would also like to thank Professor Jamie Murphy, my second supervisor, who was always available for a chat, a word of encouragement and lots and lots of enthusiasm. Writing this thesis has been a lifelong dream and I could not have asked for better teachers.

I would like to thank my PhD colleagues at Magee, in particular Orla McDevitt-Petrovic and Sarah Butter, for the support, the laughs and the free therapy. I was very lucky to find such lovely friends and these last few years would not have been the same without them.

I would like to thank my family. My husband Andy who has chosen to be by my side and love me in spite of all my little peculiar ways and my fantastic array of moods. Achieving this would have been much more of a struggle without all his help and support. I would like to thank each of our beautiful daughters, Caitlin, Ava, Eimear and Amelia. These are the people for whom my heart beats.

I would like to thank my mum Philomena, who has always supported me and been so proud of my academic achievements. My final thank you is to my dad Cathal. My dad believed in me always and has been my place of love and safety. He always told me I was both smart and beautiful, and that I could do anything. Dementia may mean that he no longer knows who I am, but I will never forget him and all he has done for me. This is for you daddy.

Summary

Evidence has been accumulating that supports the position that it is time for a paradigm shift in how psychosis is conceptualised. The medical model is not sufficient to explain the complexity of the multiple pathways to psychosis. Psychosis, as opposed to being 'abnormal', can be viewed as being a continuum with 'normal' experiences. It can be viewed as a response to an individual's circumstances, history, beliefs, culture and bodily capacities.

One such pathway(s) to psychosis is through the influence of social and environmental factors. The association between childhood trauma and psychosis is well established. This thesis established that association in a large general population sample. It expanded further to also establish the association between social defeat and experiences of psychosis. It established those experiences of psychosis as being on a continuum and used psychotic-like-experiences (PLEs) for the study. PLEs are more prevalent in the general population and are without the confounders associated with clinical diagnosis and treatment.

This thesis developed and tested a latent variable model of social factors as mediators and moderators in these relationships. It established the mediating effects of discrimination and social support and the moderating effects of loneliness. The aetiology of psychosis continues to show itself as being complex and multifactorial with many pathways to a variety of expressions. The clinical implications for these findings are clear. As understanding of the causes of psychosis expands, so too must treatment responses.

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Chapter 1

Introduction

The human brain has the capacity to learn languages. It is however the early environment that programmes this capacity, resulting in us speaking English or Chinese or French, or whatever our native tongue happens to be. This illustrates perfectly how the brain functions by responding to the environment and allowing us to survive in it. The environment programmes the pathways of the brain (van Os, 2014). The brain in the same way has the capacity to learn how to have mental experiences. Mental experiences involve combinations of thought, perception, memory, emotion and imagination as well as all unconscious cognitive processes. As with language, the early environment will programme the brain in the specific type of mental experiences it learns (van Os, 2014). One of those potential pathways is to psychosis as a mental experience.

This introduction aims to outline the context in which this thesis was set. It explores a number of different perspectives of what psychosis is. It looks at the experience of a person who has been diagnosed with schizophrenia. It addresses what the public thinks. It explores the information provided by a variety of internet sources. It establishes that in research and clinical terms at least, the medical model has been the dominant paradigm. Dominant that is, until the last few decades when alternatives have been offered which are growing in validity. This introduction then moves to look at the issues with the medical model. It then addresses issues with the biopsychosocial approach. This leads to conclusions which formed the main foundations of the thesis. The first of which is that psychosis is an experience on a continuum, connected to human functions shared by all people. The second and central theme is that it can originate in and be

driven by, social factors. This introduction concludes by setting out the overall aims and objectives of the thesis as dictated by these focus points.

More Than One Pathway to Psychosis

The last few decades have seen an explosion in research around psychosis. The premise that early experiences contribute to the construction of pathways that lead to psychosis is one area that has been rich in research and is one of the central themes upon which this thesis was built. Of course, neuroplasticity means that the impact of the environment on humans does not stop in early life and this thesis reflects the research in that it develops to addresses the continuing impact of negative events beyond early environment. Research has shown that the simplistic medical model of too much dopamine causing a disease called schizophrenia, is simply inadequate to explain all of these pathways that can lead to the continuum of experiences that represent the phenotype of psychosis. The medical model hypothesizes that the origin of psychosis is biological and genetic malfunction, it is an illness (Craddock & Owen, 2005, Kraepelin, 1919). These malfunctions manifest as differences in brain structures from those who do not have the illness. Psychotic symptoms are believed to be as a result of these differences. They are viewed as chronic and best treated with medication. As well as addressing the aetiological question of 'what causes psychosis?', this thesis also considered the more fundamental question of, 'what is psychosis?', which is addressed in full in chapter 3.

Research shows that psychosis is certainly much more than the medical model is sufficient to explain. The recent expansion in research has been focused on providing as complete and comprehensive a picture as possible to account for all experiences of

psychosis, all the paths that can lead to this outcome. The research of the last few decades will not allow us to ignore that explanations of psychosis are more complex, more multifaceted than the medical model offers. Not all experiences of psychosis require clinical intervention, for example, that voice that we *definitely* heard call our name only to find on turning around, no-one did. That shadow that we were *sure* was someone moving in the empty room. These are of course every day and harmless occurrences of perceptual anomalies. And they may be largely dependent on context. That shadow in the room that you thought was a person, was that seen right after watching a scary movie? Had you been just thinking about someone when you heard their voice call your name?

Van Os (2014) describes how 30% of the general public will have experiences along the continuum of psychosis. These may include examples like those above, as well as mind-reading, having special powers, and thought transmission. Kendler, Gallagher, Abelson, and Kessler (1996) studied psychotic experiences in the general population. The report was based on the US National Comorbidity study. This was a community sample of 5877 participants. Initial screening was done using psychotic symptom probe questions and follow up interviews were done based on these by mental health professionals. The study reported that 28.4% of participants endorsed at least one of the psychosis screening questions. So, what helps to understand why people have these experiences from mild, occasional experiences, to the other end of the scale where clinical intervention becomes necessary?

Psychosis and Context

Although the medical model may have dominated efforts to understand psychosis, it has mostly ignored what is going on in the lives, families and societies of those presenting with symptoms, i.e. the context in which psychosis is being experienced. There are other models outside of the medical model, alternative paradigms, which reflect what those who experience these symptoms tell clinicians and researchers. This is strongly illustrated using beliefs about the nature of hallucinations which are a key and consistent feature of all models of psychosis and perhaps with paranoia, the one with which most people are familiar. In the words of Ron in *Harry Potter and the Chamber of Secrets* (Rowling, 1999), 'Hearing voices no one else can hear isn't a good sign, even in the wizarding world.' (p.145).

Traditionally, applying the medical model, it was believed that the only significance of hallucinations was to indicate a symptom of a brain disease. The only relevance that the content of hallucinations has inside the medical model, is in distinguishing bizarre from non-bizarre content (Thompson et al., 2010). The only context that diagnosis focuses on, is if a person has used drugs while experiencing hallucinations. However research has shown that hallucinations can be full of meaning for the person experiencing them. Famularo, Kinscherff, and Fenton (1992) performed a study with a sample of 96 children, 61 of which had been maltreated and 35 controls. The children were aged between 5 and 10 years old. This study found that, 'the content of auditory visual hallucinations in severely maltreated children was strongly reminiscent of concrete details of traumatic victimisation' (Famularo et al., 1992, p. 866).

Read and Argyle (1999) performed a study of the medical records of 100 acute psychiatric inpatients of a New Zealand general hospital. Of the records, 22 records disclosed reports of either physical or sexual abuse, 12 of these were female and the mean age was 35.5 years (SD=8.6). Of these, 11 reported experience of auditory hallucinations, and a further two of these reported experiences of visual hallucinations. One of the main questions that the study addressed was the extent to which the content of these symptoms was related to reported experiences of abuse. One patient who was abused by her father from the age of 5 reported, 'male voices outside her head and screaming children's voices inside her head' (Read & Argyle, 1999, p. 1467). Another patient who had been sexually abused by his grandfather had visual hallucinations of an old man.

A second study based in New Zealand (Read, Agar, Argyle, & Aderhold, 2003) used a sample of the medical records of 114 females and 86 males who were treated at a community mental health centre. The mean age of the service users was 36.6 with an age range from 18 to 69 years old. Again, there were many examples of content of hallucinations seeming to be related to disclosure of abuse. One person who had been abused between 8-9 years old reported auditory hallucinations in the voice of the abuser. Another who had been violently raped on several occasions, including by strangers, from an early age, reported hallucinations of being tortured by people trying to get into their body. The richest insights into what psychosis is are to be gained from the viewpoints of those who have experienced it.

An Account of Psychosis from The Inside

Imagine leaving home and starting a new life at university. An exciting and also stressful time for anyone. One day as you leave a lecture you clearly and distinctively hear a voice saying, 'She is leaving the room'. When you get home, and are alone you hear the same voice saying, 'She is opening the door'. That same voice, mostly neutral and often calming, continues to comment on your actions in the third person for a few weeks at which point you confide in a friend about the voice. That friend is horrified and strongly suggests you visit your GP. The voice no longer seems so benign in the light of your friend's reaction. Your GP listens without much interest while you admit your fears for the future, your feelings of low self-worth and your intense feelings of anxiety. Your GP becomes very interested however when you mention the voice. Hospital admissions and a diagnosis of schizophrenia soon follow. And looking back, you wish that as you started to speak to your GP your voice had commented, 'She is digging her own grave'. Because with your diagnosis came years of feelings of hopelessness, humiliation and despair.

The above is the account Eleanor Longden gives of her initial experiences with psychosis (Longden, 2013). Today she is amongst other things, a psychology graduate and experienced keynote speaker. She shares her clinical, academic and personal experiences and insights around her experiences with psychosis. She also lives in recovery. She believes that her voices were a meaningful response to traumatic life events, particularly in childhood and that they were in fact a sane response to insane circumstances. This viewpoint of psychosis as a response to context, to life events, is shared by many who have received the same diagnosis. A study conducted in Italy (Magliano et al., 2009) used a sample of 241 people with a diagnosis of schizophrenia.

The sample was 62% male with a mean age of 39.4 (SD=9.6). The study used the Users' Opinion Questionnaire which is a self-report questionnaire developed by service users and mental health professionals. The study found that 150 out of 198 respondents believed that at least one social cause contributed to their illness, with 114 people believing that social causes were the exclusive reason for their illness. The most frequent attribution reported was to family difficulties. Only 10% of respondents mentioned biological causes and these tended to be people who knew they had a diagnosis of schizophrenia as opposed to knowing they had experienced psychosis.

A further two German studies also found that people who lived with psychosis favour psychosocial explanations for their experiences. Angermeyer and Klusmann (1988) found that four percent of respondents in this study believed that acute life events had resulted in their psychotic experiences, while 32% believed that personality issues or parental care issues had caused their illness. Only 10% believed the cause to be biological and 15% believed in hereditary factors. A second German study (Holzinger, Kilian, Lindenbach, Petscheleit, & Angermeyer, 2003) asked 100 patients and 36 of their close relatives about their beliefs around the cause of their illness. The study used a semi-structured problem focused interview. There were ten causal categories created from their feedback with the main reason cited being psychosocial stress which was the reason cited by 33% of those interviewed.

What the Public Think

This viewpoint is also shared by the general public. There exists 'a worldwide popular wisdom that mental illness arises when bad things happen to people', as stated by Read, Hammersley and Rudegeair (2007, p.108). Read, Haslam, Sayce, and Davies, (2006),

conducted a review of what the public in different countries attribute the cause of schizophrenia to, either biogenetic or psychosocial. The study further addressed if the assignment of biogenetic causes, and the subsequent use of diagnostic labels was associated with a reduction in negative attitudes towards people with the 'illness'. The study used searches of PsychINFO, MEDLINE and recent review papers, it included 37 studies over 50 years. What it found from the countries included in the studies was that public opinion asserted that psychosocial causes as opposed to biogenetic causes were the driver for mental illness. This was found to be the case in the USA (Sarbin & Mancuso, 1970), England (Furnham & Rees, 1988), Australia (Jorm et al., 1997), Germany (Angermeyer & Matschinger, 2003), Japan (Tanaka, Inadomi, Kikuchi, & Ohta, 2005), South Africa (Hugo, Boshoff, Traut, Zungu-Dirwayi, & Stein, 2003), Ireland (Barry & Greene, 1992), India (Srinivasan & Thara, 2001), Turkey (Karanci, 1995; Taskin et al., 2003), Malaysia (Razali, Khan, & Hasanah, 1996), China (Furnham & Chan, 2004; Phillips, Li, Stroup, & Xin, 2000), Italy (Magliano, Fiorillo, De Rosa, Malangone, & Maj, 2004), Ethiopia (Shibre et al., 2001), Greece (Alivisatos & Lyketsos, 1964; Molvaer, Hantzi, & Papadatos,1992), Russia (Dietrich et al., 2004), and Mongolia (Dietrich et al., 2004).

Important to note about this study (Read et al., 2007) in the context of this introduction is that it concluded that the use of the medical model did not reduce prejudice towards, or fear of, those with schizophrenia. It has had the opposite effect of increasing them. The study concluded that promoting a model of those with schizophrenia as having a disease of the brain over which they have no control, leads people to fear their lack of control and unpredictability. Coupled with the way in which schizophrenia is reflected in the media and on the internet, this is hardly surprising.

What the Internet Thinks

For many people, like Eleanor Longden, given this diagnosis, there has been no prior reason to research what exactly schizophrenia is. Any knowledge already formed may well be based on the media portrayal of those with schizophrenia. The nature of that knowledge can be seen in the anxious reaction of Eleanor's friend to her disclosure of hearing a voice. Schizophrenia is the psychiatric illness viewed most negatively by the public with people believing those with schizophrenia to be more dangerous and more unpredictable than those with any other diagnosis (Angermeyer & Matschinger, 2003; Wood, Birtel, Alsawy, Pyle, & Morrison, 2014). A person, or their family may well then be feeling apprehensive in the face of such a diagnosis. They may turn to the internet to help understand. What can a person expect to learn? The answer to that mainly depends on where they look. The following is a selection of information given on a variety of websites which will be generated by searching for schizophrenia or psychosis. The National Institute for Mental Health (NIMH) which is described as the largest scientific organisation in the world dedicated to research focused on the understanding, treatment, and prevention of mental disorders and the promotion of mental health, describes schizophrenia as, 'a chronic and severe mental disorder that affects how a person thinks, feels, and behaves' (NIMH, 20016. The website of the Royal College of Psychiatry (Royal College of Psychiatrists, 2017) will provide the following,

> ‘when you have a psychotic episode, it can be the signal of another underlying illness. You can have a psychotic episode after a stressful event like losing a close friend or relative. It can also be the result of a physical illness (like a severe infection), the use of illegal drugs (like cannabis), or a severe mental illness (like schizophrenia or bi-polar disorder’ (para.4).

If the same website is used to then find out what is meant by schizophrenia the following is the result, schizophrenia is described as, ‘a disorder of the mind that affects how you think, feel and behave. Its symptoms are described as either ‘positive’ or ‘negative’.’ (Royal College of Psychiatrists, 2015, para.7).

The website of the British Psychological Society (BPS) (British Psychological Society, 2016) will provide the following information.

> ‘hearing voices or feeling paranoid are common experiences which can often be a reaction to trauma, abuse or deprivation. Calling them symptoms of mental illness, psychosis or schizophrenia is only one way of thinking about them, with advantages or disadvantages’ (para. 6).

The BPS document a response to what they see as ‘flaws’ in current classification (Johnstone & Boyle, 2018). The BPS position is that ‘abnormal’ behaviours and experience exist along a continuum with what we perceive as ‘normal’ behaviours and experiences. They conclude that,

> ‘unless there is strong evidence to the contrary, our behaviour and experience can be seen as intelligible responses to our current circumstances, history, belief systems, culture, and bodily capacities, although the links between these may not be obvious or straightforward’ (p. 8).

Already the information provided, and the definitions given, start to show the differing perspectives available on the topic of psychosis. Terms used vary from ‘illness’ to ‘experiences’. Are psychotic experiences common or are they a symptom of a chronic, severe and disabling brain disease? So far, the model of illness seems to be the main portrayal. As a family member based in the UK, the National Health Service (NHS) might be another trusted source of information. Their website will provide information along the lines of the following, ‘Someone who develops psychosis will have their own unique set of symptoms and experiences according to their particular circumstances’ (NHS, 2016, p. 1). The perspectives of charities who work with those affected can also be a source of information. Mind is a UK based charity that aims to provide support and information for those who experience mental health issues. Their website explains that from the perspective of a person experiencing schizophrenia each person’s experience is unique, but they might find that they, ‘aren’t able to carry on with day to day activities like work or taking care of yourself’ (Mind, 2017, para.3).

From these few sources, at the most fundamental level, a person looking for information will find a range of differing accounts of what schizophrenia is. Ranging from those which might reassure to those which might increase levels of fear and trepidation. The way in which psychosis is conceptualised can have a big impact on those who are

experiencing it. The most common paradigm seems to be the medical model of schizophrenia as a disease. And with that, the sense of hopelessness, humiliation and despair as recounted by Eleanor Longden.

Issues with the Medical Model

Issues with the medical model are discussed by Read, Bentall, and Fosse (2009). Most fundamentally, in spite of 100 years of research centred on a genetic predisposition to schizophrenia, 'the distribution of test statistics suggests nothing outside of what would be expected by chance' (Hamilton, 2008). Findings in genetic research have been disappointing and there has been a failure to prove the existence of a unitary disease process (Joseph, 2006; Read et al., 2009; Ruggeri & Tansell, 2009). As a clinical construct schizophrenia is heterogeneous. Deciding who has schizophrenia is based on a system of expert consensus of what symptoms are, and a clinician then deciding if those symptoms are present. It is possible and common that two people can both have a diagnosis of schizophrenia and not have a single symptom in common. There are overlaps between the core symptoms of schizophrenia and other disorders (Kelleher, 2016) including dissociative identify disorder (Baethge et al., 2005) and both bipolar disorder and depression (Dorahy et al., 2009). This means, as a conjunctive construct, it is possible to experience hallucinations, which are a hallmark of schizophrenia, and not in fact have a diagnosis of schizophrenia (Kelleher, 2016). All of this means that it can be hard to identify people who have schizophrenia, making it an unreliable construct (Read, Dillon, & Mosher, 2013).

This confusion over who has schizophrenia and who does not, based on the diagnostic model, is perfectly illustrated in the work of Rosenhan in his famous study, 'On Being

Sane in Insane Places' (Rosenhan, 1973). Use of the disease construct based on assessment of symptoms resulted in both the diagnosis and hospitalisation of those who were not actually experiencing psychosis as well as identification of 'fake' patients who did not exist. False positives as well as false negatives.

Following on from and closely related to the issue of reliability is the issue of validity, in which again, the construct of schizophrenia is found to be problematic (Read et al., 2013). If the construct of schizophrenia as a brain disease is unreliable, any study of people with the disease could result in studying groups of people with nothing actually in common in terms of the 'disease'. It means that all work done in the four main areas of validity is potentially without much meaning for a unitary disease construct. As this research has however still progressed, it is known that the construct is not a good predictor in terms of symptoms, aetiology, treatment or outcomes (Read et al., 2013).

The Rosenhan study centrally and importantly highlights the issues of labelling and stigma that are associated with the use of the medical model. This moves the issues with the medical model away from scientific issues and into the real issues faced by those who have to live with a diagnosis. Although it must be pointed out that some people feel reassured to have a medical label for the issues they are experiencing, for that label to be schizophrenia results in a wave of negative outcomes. Those in the Rosenhan study who were diagnosed, acted completely normally from that point on. Yet they found that all actions from the point of diagnosis were interpreted in the light of that diagnosis. Taking copious notes for the research project was seen as a feature of psychosis and in fact, telling people they were actually well was also seen in the same light (Rosenhan, 1973). Naturally, this made being discharged quite a difficult and lengthy task and in

fact, all but one participant in the study was released having been declared ‘in remission’. For them, the experiment resulted in a lifelong label of what is viewed as the most serious of mental illnesses. Given what has already been discussed about how the world sees those with a label of schizophrenia as dangerous and unpredictable (Angermeyer & Matschinger, 2003; Wood et al., 2014), this diagnosis clearly represents a massive and negative impact on a person’s life.

In a real-world example, van Os (2014) talks of his cousin, Elizabeth, who has a diagnosis of schizophrenia but who lives in recovery. In 2009, a great moment happened when Elizabeth applied for and successfully secured a job. However, when her employer found out about her diagnosis, after unsuccessfully trying to terminate her position, she was forced to disclose her diagnosis resulting unsurprisingly, in no-one wanting to work with her. This illustrates not only the stigma produced by this powerful label but also something else at the core of the diagnostic system based on a medical model. Something which has also been described by Eleanor Longden. The hopelessness, the lack of belief in recovery, which is directly linked to this conceptualisation of a genetic cause that is not within the control of the individual. This view is completely devoid of a belief in change which is at the heart of the ability to recover. Some people with a diagnosis of schizophrenia, do have a poor prognosis, but these are the minority of those diagnosis. Some people also experience a full recovery. And in between there are those along the full spectrum between these two outcomes (van Os, 2014).

In summary the issues with the medical model start with the fact that it has to date, not been substantiated. Clinically, there are issues of reliability which are clearly illustrated

by the heterogeneity of the schizophrenia diagnosis. The issues of reliability mean that validity is based on an elusive foundation. Even if that was not the case, there are multiple issues with showing validity in terms of its four cornerstones. For those who experience the diagnosis, issues of labelling and the unrelenting stigma which surrounds the diagnosis of schizophrenia result in a pessimistic view of recovery which is not founded in the spectrum of experiences which those who live with psychosis report. So, what of the biopsychosocial model? A model which does make room for psychosocial factors.

The Main Issue with the Biopsychosocial Model

This issue of genetic attribution is also the core issue with the biopsychosocial model. It must be pointed out that when vulnerability to stress was introduced as a potential foundation on which psychotic experiences were built (Zubin & Spring, 1977), the original paper did state that this vulnerability could be acquired. However, as the stress-diathesis model was taken forward it became common to assert this vulnerability as a genetic predisposition while ignoring potential psychosocial causes (Read et al., 2009). These were assigned the more benign role of triggering the already determined genetic vulnerability. This results in the same issues as already laid out in the above section for the medical model.

At the heart of many of the psychosocial causes which the model purports trigger the vulnerability is poverty (Read et al., 2009). Poverty can be considered as a cause of causes with multiple ways in which it operates to increase exposure to stress and multiple ways in which it works to inhibit self-esteem and secure attachments (Read et al., 2009). Related social factors which are associated with psychosis are listed by Read

et al. (2009, p.301) and ‘include: mother’s health, nutrition and stress during pregnancy; being the product of unwanted pregnancy; early loss of parents via death or abandonment, separation of parents, witnessing inter-parental violence, dysfunctional parenting (often intergenerational) – particularly affectionless over-control; childhood sexual, physical and emotional abuse; childhood emotional or physical neglect; bullying; war trauma, rape or physical assaults as an adult; racist or other forms of discrimination; and heavy marijuana use early in adolescence’. The difference between this model and the model upon which this thesis is based is that these factors are seen as more than the triggering agents which the biopsychosocial model generally tends to reflect them as. In the case of childhood or adolescent trauma, they are seen as having the ability to create the brain changes which are often reported as being the foundation of evidence for the medical model. In the case for social factors, these are causes as opposed to triggers.

The Case for Social Factors

As previously stated, the case for social factors does not exclude the case for a genetic component (van Os & McGuffin, 2003). A common theme throughout this thesis is the role of stress and the sensitivity of both the hypothalamic-pituitary-adrenal (HPA) axis and the mesolimbic dopamine system. This sensitivity may well be inherited. Important to mention also is the potential role of epigenetics in the heritability of sensitivity to stress (Read et al., 2009). DNA fits round the cell nucleus in a tightly wrapped configuration. It is wrapped around histone proteins. These proteins have tails which act as a target for acetyl groups. These groups bind to the tails allowing gene transcription. A complementary process called methylation may occur however which can derail the transcription process. This happens when a methyl group binds to the cytosine part of a

cytosine-guanine base pair on the DNA. The gene is still there but it is now suppressed. These processes are specifically sensitive to the psychosocial experiences of the individual and shaped by the interactions they have with their environment (Champagne & Curley, 2009).

Alternatively, changes like increased sensitivity to stress through distortions in the HPA axis may be caused directly by events in the environment. Chapter 2 of this thesis looks at the types of childhood adversities and traumas that have been implicated as having the ability to create these changes in the brain. Chapter 3 states the case for how these are associated with experiences of psychosis along a continuum. The impact is not of course restricted to changing the brain. Childhood adversity will impact the nature of attachment in relationships, the type of coping mechanisms adopted and a wide range of other psychological factors. Add to this: the process of traumas and negative experiences continuing throughout the life span; experiences such as discrimination and social defeat; the impact of these on social relationships and the potential for a person to become lonely; and the result is a vast expanse of potential research material to provide explanations for how these paths can lead to experiences of psychosis. Chapter 4 of this thesis looks in depth at the case for social factors and in particular at social defeat, experiences of discrimination and the effects of social support. Chapter 5 uses discrimination and social support variables as potential mediators in the relationship between childhood adversity and PLEs and between social defeat and PLEs. Chapter 6 then addresses the moderating role of loneliness.

Studies on migrant and urban populations have been at the centre of work which has been done on the link between the environment and psychosis (Cantor-Graae & Selten,

2005; March et al., 2008; Kelly et al., 2010; Krabbendam & van Os, 2005; McGrath et al., 2004). The reason these populations are so useful in this work is captured by van Os who uses the effects of stress as an example (van Os & McGuffin, 2003). If everyone in the population smoked, it would be difficult to prove that smoking causes lung cancer as there would be no non-smoking populations for comparisons. The solution would be to find populations with mean related differences in the amount that they smoked and make comparisons between these populations. Stress however, actually is ubiquitous. There is no population that can be classed as stress free. The solution therefore has been to use populations which have shown differences in the levels of stress they experience. These have been urban and migrant and other minority populations. Incidence rates of schizophrenia vary widely between urban and rural populations and between majority and minority populations. Important to this work and to this thesis is that these differences in rates are reflected in non-clinical PLEs in the populations, making them a useful area to study without the complications that arise from studying a clinical population. Chapter 4 looks at this work on urban and minority populations in depth.

Overall Aims and Objectives

This introduction has led to a number of key conclusions, upon which the main aims and objectives of the thesis are based. The first is that psychosis is experienced along a continuum and not all points on that continuum are clinically relevant. Some of these experiences are mild and totally benign. As they move towards having an impact on the life of the individual, they can be seen as PLEs and can be of use in studying as they have features in common with psychotic symptoms. This is covered in depth in chapter 3 of this thesis. A second main premise upon which the aims and objectives of this thesis are built is that the medical model is not sufficient to explain all the pathways to

psychosis. Chapter 2 of this thesis addresses the global issue of child abuse. Chapter 3 explains how abuse and trauma as a child has been shown to be linked with outcomes along the continuum of psychosis, the role that childhood trauma plays in both psychosis and PLEs. Chapters 4, 5 and 6 address other issues embedded in the social context in which individuals experience the world. These are mechanisms which can explain the association between childhood adversity and the development of PLEs and psychosis.

The aims of this thesis are firstly, to show that psychosis does occur on a continuum of experiences, as documented in chapter 3. Secondly to show that the social factors of childhood adversity and social defeat are associated with these experiences, as documented in chapters 2, 3 and 4. Thirdly to show that the social factors, social support and experiences of discrimination, can act in a mediating role in this relationship, as documented in chapters 4 and 5. The final objective is to show that the social factor of loneliness has a moderating influence on these relationships, as documented in chapter 6. These aims combine in an overall aim of showing that social factors provide a plausible pathway resulting in psychotic experiences.

The objectives of this thesis are to achieve the aims by constructing a latent variable model using strong and sound statistical techniques. Techniques such as Latent Class Analysis (LCA), Confirmatory Factor Analysis (CFA), mediation and moderation. The foundations for the model are documented in chapters 2, 3 and 4. Chapter 5 describes the model in its entirety. The second objective is to test the model as documented in chapters 5 and 6.

At the heart of the aims of this thesis is furthering our understanding of psychosis. The point of understanding psychosis is not only for the sake of understanding. For those who experience psychosis, the understanding of the scientific community is vital in directing policy and recovery strategies. If causes are social, then it follows that money directed to improving social environments will help with reducing rates of psychosis.

In terms of the outcomes and experiences of those who are diagnosed with schizophrenia, the issues of the stigma that surrounds the label and the hopeless message in terms of recovery are hugely impactful. Read et al., (2007) highlighted that the use of the medical model as an explanation for the experiences of those with psychosis, actually serves to increase stigma, fear and a wish to create distance between those with schizophrenia and 'normal' people. The stigma around schizophrenia is related to this idea that it is a brain disease and that the actions of those with this brain disease are outside of their own control. Other mental illnesses such as depression and anxiety do not create the same extreme reaction. They are viewed as extensions of what all people experience. Depression is considered an extension of sadness and anxiety is seen as an extension of fear. These experiences of sadness and fear have reached a clinical level for a percentage of the population.

So, what if experiences of psychosis were understood as extensions of that voice we are sure we heard, or of that shadow which seemed like someone lurking, represented by a continuum with the most extreme point being those who need clinical intervention? What if psychosis was not viewed as a disease of the brain, but as a result of the trauma and adversity which all humans experience to some degree? What if psychosis is one outcome of what happens to people as a result of bad things that have occurred in their

childhood and in their life? All of this increases people's understanding and ability to relate to this condition and also vastly increases the perception that recovery is attainable. But of course, what is needed beyond this rhetoric, is the use of rigorous scientific process to show that this is the case. And that is what this thesis aimed to provide.

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Chapter 2

Developing Gender-Specific Typologies of Childhood Adversity Based on a Large Community Sample.

Introduction

Child Abuse as a Global Issue

Child abuse is a public health problem that exists globally. It occurs across cultures, in all societies and irrespective of socio-economic-status (SES) (Pereda, Guilera, Forns, & Gomez-Benito, 2009). Krug, Dahlberg, Mercy, Zwi, and Lozano (2002), report that child abuse is a phenomenon recorded in art, literature and science all over the world. The publication of '*The Battered Child Syndrome'* (Kempe, Silverman, Steele, Droegemeuller, & Silver, 1962), is often regarded as the beginning of widespread interest in the topic of child abuse by the medical profession and the general public.

Child maltreatment may occur in a number of different ways. Butchart, Putney, Furniss, and Kahane (2006) define child maltreatment as,

> 'all forms of physical and/emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity, in the context of a relationship of responsibility, trust or power' (p.9).

There are a range of abuses contained within child maltreatment which are outlined in the UK government's Guidance for Professionals – Working Together To Safeguard Children (DCSF, 2010). Physical abuse is defined as acts such as hitting, kicking, biting

or any other acts of aggression which are likely to hurt or cause significant harm to a child. Sexual abuse includes forcing or enticing a child to take part in sexual activities. These activities may or may not include physical contact and they may or may not include penetration. Emotional abuse is considered to be present to some level in all abuses or it may stand alone. It involves persistent emotional maltreatment which results in severe and persistent adverse effects in terms of emotional development. It includes any act which results in a child feeling worthless, unloved, inadequate or only of worth in meeting the needs of another person. Neglect involves failure to meet the basic physical or developmental needs of a child having a detrimental impact on the development or safety of a child. Neglect is expressed developmentally to allow differentiation between the needs of younger and older children.

Studies of child abuse have, in the main, centred on child sexual abuse (CSA). Studies assessing the prevalence of CSA at a global level have consistently revealed variation in rates. Primarily, rates of CSA differ markedly according to gender. Higher prevalence rates for females have been consistency reported (Finkelhor & Dziuba-Leatherman, 1994; Pereda et al., 2009; Perez-Fuentes et al., 2013; MacMillan, Tanaka, Duku, Vaillancourt, & Boyle, 2013; Mohler-Kuo et al., 2014).

Global Studies

Studies have attempted to assess global rates of CSA. Finkelhor and Dziuba-Leatherman (1994) analysed prevalence rates for 21 countries and found global estimates to vary, ranging from between seven percent and 36% for women, and between three percent and 29% for men. The studies that were included ranged from sophisticated national probability surveys and household interview studies to local

convenience sample studies of university students which used self-administered questionnaires. Finkelhor and Dziuba-Leatherman (1994) concluded again that females experience more CSA than males and also point to methodological issues to explain the variations that are found. Several examples are used to highlight this issue. Finkelhor and Dziuba-Leatherman (1994) concluded that high rates for females are most likely as a result of the use of more detailed screening questions and sensitive interviewing, as opposed to the use of cruder, market-survey techniques such as those used by a British study by Baker and Duncan (1985) which used a single, vague screening question leading to lower rates being reported.

Pereda et al. (2009) conducted a meta-analysis on the prevalence of CSA which included 65 articles and covered 22 countries. The meta-analysis had the following inclusion criteria: first that determining the prevalence of CSA was the main or secondary objective, second that the studies all used non-clinical samples and reported the prevalence of CSA separately for males and females, third, that sufficient data must have been collected to conduct satisfactory analysis. This study supported all other findings that reported females having higher prevalence rates. CSA prevalence rates were reported at seven percent of males and 19.7% of females in the Pereda et al. study. The study also examined findings in terms of geography and economic area. In terms of international variation in prevalence rates the highest were reported in Africa with a mean rate of 34.4% (range of 21.1% to 50.7%), while Europe reported the lowest with a mean prevalence rate of 9.2 % (range of 6.8% to 12.3%). Lalor (2004) offered a range of reasons that Africa should have the highest rates. The first is again, that as with gender, these are real differences. A further potential reason for the differences, is that

different societies have differing attitudes in terms of social acceptance of the problem which makes it easier for people to talk about their experiences, or not.

Stoltenborgh, van Ijzendoorn, Euser, and Bakermans-Kranenburg (2011) replicated and extended the Pereda et al. (2009) meta-analysis. The study looked at prevalence estimates from 217 studies which were published between 1980 and 2000. This represented 331 independent samples. Inclusion criteria were: prevalence of CSA was reported at a child rather than a family level, victims were under the age of 18, samples were nonclinical and, sufficient data were provided to allow analysis of great enough power to be performed. An important distinction was also made between self-report and informant-report studies and the meta-analysis focused on addressing methodological issues which contribute to understanding the variation in prevalence rates consistently seen across studies. This meta-analysis revealed a combined prevalence rate of 11.8% when looking at self-report and informant-report studies together. When the difference in type of report was taken into account, the CSA prevalence rates were 0.4% for self-report and 12.7% for informant-report studies. In terms of gender, the prevalence rate was 18.0% for female samples and 7.6% for male samples, reinforcing the common finding that females report more experience of abuse than males. Mixed gender samples reported a CSA prevalence rate of 8.7%. In this study, as with the Pereda et al. (2009) study, CSA was analysed in terms of geographical area. The highest combined prevalence rate for females was seen in Australia (21.5%) and in Africa for males (19.3%). In terms of economic development, areas of high resource showed higher rates in combined female samples than areas of low resource – 18.3% versus 15.9%, while this trend was reversed in combined male samples with 6.8% versus 14.0%. For all sample characteristics, females combined CSA prevalence rates were higher than males.

National Studies

In addressing studies conducted at a national level, there are again, multiple studies which centre on CSA in particular. These studies again highlight the variability to be found in prevalence rates. Samples types used range from opportunistic, representative of the general population or those targeted at specific risk groups.

Perez-Fuentes et al. (2013) conducted a study using a sample from the United States of America. They used data from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) which was conducted in two waves. They cited previous studies which found prevalence rates in the United States to be approximately 16% for males and between 25-27% for females (Molnar, Buka, & Kessler, 2001). They reported a CSA prevalence rates of 10.14%, of which 24.8% were males and 75.2% were females. Shah et al. (2014) in a study conducted in Australia found combined gender prevalence rates to be 30.6%. The sample in this study was a nationally representative sample of people specifically with psychotic illnesses as opposed to a general population or university sample. This study again found that females were more three times more likely to report child abuse than males within this at-risk group. Other national studies done at a general population level include several completed in Australia (Pink, 2009; Reeve & Van Gool, 2013). These reported prevalence rates of CSA and child physical abuse (CPA), which were grouped together, of 15.5%.

A study in Switzerland using a nationally representative sample of 6787 ninth grade students (15.5 +/- .66 years of age) reported CSA prevalence rates at 40.2% of females and 17.2% of males (Mohler-Kuo et al., 2014). Data collection in this case was achieved through self-reported, computer assisted questionnaires. This study expanded areas of

abuse to specifically include abuse by juvenile perpetrators and also abuse via the internet. A study of children conducted on data from the Ontario Child Health Study used a community sample and was based on children aged 4 to 16 years old (MacMillan et al., 2013). The study found that CSA was estimated at 22.1% for females and 8.3% for males. This study also addressed CPA which was reported at 33.7% for males and 28.2% for females. This reflects a common finding of males experiencing more CPA than females but with less disparity than the higher rates of CSA reported by females over males.

A study by Laaksonen et al., (2011) was conducted on a population sample in Finland. The sample used was a subset of a larger sample. The sample comprised 4561 males and 8361 females and the mean age was 27 years for both males and females. The data collection tool was responses to the Childhood Trauma Questionnaire – Short Form (CTQ-SF) as well as questions regarding family structure. The prevalence rates in this sample were reported at 0.7%-4.6% for males and 1.8%-7.5% for females.

A university sample was used for a study by Aboul-Hagag and Hamed (2012) in Egypt. This was a cross-sectional survey using a sample of 450 undergraduate college students with 217 male respondents and 233 females. It used Finkelhor and Dziuba-Leatherman's (1994) questionnaire which presents 12 different acts of sexual abuse and the questionnaire was administered in the university teaching hall. The study reported an overall prevalence rate of 29.8% with 37.8% for females and 21.2% for males.

UK Studies

Studies in the UK have included two recent surveys. May-Chahal and Cawson (2005) published a report based on a sample of 2869 young people aged 18-24 years old in the UK. Random probability sampling was used using the postcode address file and interviews were conducted by trained interviewers using computer assisted personal interviewing. The study addressed the issues of physical abuse, sexual abuse, neglect and emotional maltreatment at levels on a continuum of severity. They reported maltreatment of some form was present in 16% of the sample. At a serious level, seven percent reported experience of physical abuse, six percent reported experience of emotional abuse, six percent reported experience of absence of care, five percent reported experience of absence of supervision and 11% reported experience of sexual abuse involving contact.

Radford, Corral, Bradley and Fisher (2013) reported on a study of prevalence and impact of child maltreatment in the UK which was commissioned by the National Society for the Prevention of Cruelty to Children (NSPCC) (Radford et al., 2011). This study used a sample of 2,160 parents and caregivers, 2,275 children and young people and 1,761 young adults. Age groups assessed for various forms of maltreatment were under 11, between 11-17 years old and 18-24 years old. The range of maltreatments covered physical abuse, sexual abuse, emotional abuse and neglect. The study addressed victimisation in terms of experience in the last year and also over the respondents' lifetime, both in the home and outside of the home. In terms of the lifetime experience of victimisation, the study reported prevalence rates of 8.9% of children under 11, 21.9% of children aged between 11 and 17 years old and 24.5% of young adults aged

between 18 and 24 years old had had experience of one or more forms of abuse in the home.

The report also found that the experiences accumulated with age and that they overlapped, drawing out in particular the issue of poly-victimisation. Poly-victimisation is the co-occurrence of different types of abuse. The report showing this accumulation of overlapping abuses with an increase in age of the respondent's points towards the conclusion that once a victimisation has occurred, the young person is more likely to experience another. The conclusion is that abuses often occur, not in isolation, but together. This exposure to multiple forms of abuse has a greater impact on wellbeing and behaviour than even repeated instances of one type of abuse (Finkelhor, Ormrod, & Turner, 2007; Finkelhor, Ormrod, & Turner, 2009; Turner, Finkelhor, & Ormrod, 2010). Figures from the report illustrate the extent of experiences of victimisation. These are the figures for children who have experienced more than two forms of victimisation:

- Under 2 years old - 9.8%
- Between 3 and 10 years old - 44.8%
- Between 11 and 17 years old - 72.6%
- Between 18 and 24 years old - 77.6%.

The report defines victims of poly-victimisation as children under 2 who have experienced two or more forms of victimisation, children from 3 -10 years who have experienced seven or more forms of victimisation, children from 11 – 17 who have experienced twelve or more forms of victimisation and young people 18 – 24 years old

who have experienced fifteen or more forms of victimisation. These children represent children with the highest 10% of maltreatment and victimisation exposures. The report found a range of factors to be associated with respondents who experienced poly-victimisation. These children were older, they were from lower social classes, they were more likely to have special educational needs or a long-standing disability or illness, they were more likely to have a parent with an enduring physical, learning or psychiatric disability and they had higher rates of exposure to other types of adversity.

Methodological Issues

What is consistent in the studies is the conclusion that the different methodologies used in the studies contributed to variations in rates found both globally and nationally and across sample type (Finkelhor & Dziuba-Leatherman, 1994; May-Chahal & Cawson, 2005; Mohler-Kuo et al., 2014; Pereda et al., 2009; Timmerman & Schreuder, 2014; Wynkoop, Capps, & Priest, 1995). The meta-analysis conducted by Pereda et al. (2009) provided a summary of these issues. Firstly, 68% of articles included only CSA and used a broad definition of CSA. In terms of age limits in 58.5% of the studies the age limit for childhood was set at 15, 16 or 17. Types of samples varied in that 50.8% of the studies used samples drawn from the general population, 61.5% used probabilistic designs and 70.8% recruited samples from local areas. As regards methods of data collection, 67.7% used self-report questionnaires to obtain the data used. Finally, in terms of geographical location, 32.3% of studies were conducted in the United States.

Wissink, van Vugt, Moonen, Stams, and Hendriks (2015) highlighted again this same summary of methodological issues. The study listed as potential methodological issues differences in type of sample, the differences in reporting informant-report versus self-

report data, terms and definitions used, specificity of the age group included in the study, and finally, the country in which the study was conducted in terms of legal and care procedures as this may result in differences in what questions are asked and what information is recorded. May-Chahal and Cawson (2005) again list the issues involved in consistency due to these issues. They list issues as being in relation to sampling, definition, method of administration, age restrictions and questionnaire design.

Sample Type

The types of samples across studies range from clinical samples to school-going samples, to residential samples. Stoltenborgh et al. (2011) addressed this issue of sample type specifically. This study reported that lower prevalence rates were found in convenience samples such as college samples. A possible reason for these lower rates is that these types of groups may be psychologically healthier than at risk groups or clinical samples. A further potential factor with a sample such as a college sample is that they may be more aware of the aims of the study which could introduce response bias as their responses could be designed to influence the outcomes of the study, either intentionally or otherwise (Stoltenborgh et al., 2011).

If samples are predominantly comprised of females, rates will be higher. More females may be found in clinical samples, in university samples recruited from courses which tend to attract more females. More experiences of abuse by females is a real gender difference however there is also an assertion that there may be under-reporting of CSA by males. This has been a subject of discussion in a number of studies (Dhaliwal, Gauzas, Antonowicz, & Ross, 1996; Nooner et al., 2010; Romano & De Luca, 2001;

Violato & Genius, 1993) with the conclusion being that this is likely to be related to methodological issues. The point is made that males may not identify their experiences with sexual abuse because of the socialisation of males and attitudes towards males and sexuality (Coxell, King, Mezey, & Gordon, 1999). Nooner et al. (2010) propose that there may be a number of reasons for 'denial' of abuse in males which may include the timing or age when abuse was reported. If an event was further away, it may not be recalled as well. Other reasons may be the stigma associated with abuse and as proposed by Coxell et al. (1999), there may be differences in interpretation of what constitutes physical and sexual abuse. Variations however are not only between genders, but between studies and within gender.

Higher prevalence rates will also be reported if samples are from at risk groups of individuals. As with females these groups consistently reported higher experiences of abuse. In order to address these issues, samples that are representative of the entire population have the most utility and will also produce the most accurate estimates.

In addition to differences in sample type there were also variations in procedures used for recruitment. This means that even where participants may appear to be homogeneous in terms of the type of sample, the sampling procedures may have contributed to the variations found. Inadequate or biased sampling procedures can lead to an over or under representation of the actual population of children who experience abuse, for example through inclusion or exclusion criteria which are applied (Mash & Wolfe, 1991).

Methods of data collection differ across studies (Stoltenborgh et al., 2011). The type of questionnaire or interview employed can vary widely between studies (Starr, Dubowitz, & Bush, 1990). Studies which involve adults or children reporting on their own experiences may use interviews or questionnaires. If interviewers are used to collect data, factors such as the skill of interviewers or the context in which the data was obtained (Koss, 1993) could also have affected quality of the data. Less skilled interviewers may result in respondents being less open while an interviewer with more experience may be more likely to draw respondents out.

Age limits

The nature of the respondents involved in the studies is also worthy of consideration. Specifically, factors such as the age of the participants will influence responses. In terms of age, recall may be higher in samples of younger people as this is when they are most likely to have experienced forms of abuse. The Ontario Child Health Study (MacMillan et al., 2013) included individuals from age 4 only until age 16. Countering this is the issue that if experiences are contemporary, individuals may be in fact, more reluctant to recall them. It might be easier for those who are older to talk about experience of abuse as a child. Including all age groups in a population will help address this issue around reluctance to recall contemporary events. In addition, inclusion of all age groups means that experiences of poly-victimisation that may occur after childhood will also be captured.

The criterion applied to the definition of what is childhood in terms of the age limits can also vary from study to study (Pereda et al., 2009). This issue of age limits being defined differently had an impact on prevalence rates found. An age limit of 16 will

yield lower prevalence rates than age limits of 17. To address the variability in prevalence rates due to sampling procedures or survey design, it would be preferable to access a large, nationally representative, population-based survey.

Terms and Definitions

This issue of terms and definitions that are used have a critical impact on the variation in prevalence rates. As well as age limits of childhood, there is the issue of how abuse is operationalised. Some examples of terms that can be used would be: sexual abuse, sexual assault, sexual violence, sexual maltreatment. How these terms are both explained and interpreted by respondents may differ. The criteria used to define what actually constitutes sexual abuse can vary (Leventhal, 1998). In a study by Aboul-Hagag and Hamed (2012) of an Egyptian university sample, hugging and kissing were operationalised as CSA and were the most common forms of CSA. This would fall into non-penetrative contact according to categories reported by Negriff, Blankson, and Trickett (2015) when they analysed data collected from 303 adolescents who had been referred to the Department of Child and Family Services for any type of maltreatment. When this referral happened details of the characteristics of sexual abuse experiences were recorded. The three main categories were non-contact (e.g. child exposed to pornography), non-penetrative contact (e.g. kissing, fondling), and penetration (e.g. vaginal/anal intercourse).

Shah et al., (2014) report that they used very strict definitions around classifications of abuse. This study used a clinical sample and offers this use of strict definitions as a reason that the study reported prevalence rates towards the lower end of previously reported prevalence rates in clinical samples. These had been found to range from 28%

to 73% (Bendall, Jackson, Hulbert, & McGorry, 2008). Mash and Wolfe (1991) contend that this use of broad versus narrow definitions of abuse will impact prevalence rates and create variability.

May-Chahal and Cawson (2005) explore the issue of perceptions around what constitutes abuse which is related to questionnaire design. In terms of measuring physical abuse, for example, if there is a belief that what is being experienced is normal discipline this may not be reported in a question which asks if a respondent has experienced physical abuse. However, if the question is framed to ask if the respondent has ever been hit with an object, this would lead to endorsement of the item. Using objective definitions and questions removes the issue of the subjectivity of what is perceived as abuse in some cases.

To further compound this issue of the operationalisation of variables there will be further definitions and terms to cover other variables. The Wissink et al. study (2015) centred on CSA in a sample of respondents with an intellectual disability and with that comes additional significant definitions and terms. The bringing together of multiple areas of study can add to the issue of how terms are interpreted and questions responded to. Perez-Fuentes et al. (2013) highlight another interesting point around the operationalisation of variables. In this case the potential issue arises around the Likert scale used to collect responses in NESARC, which had four possible categories. Two of these were ‘fairly often’ and ‘very often’. These are very similar. The study dealt with this by merging these two categories into one category of ‘often’. In addressing this issue, again, the use of a large nationally representative study would be of benefit. This

ensures consistency in the terms used and in how they are explained, reducing the impact of variation in definitions across many smaller studies.

Types of Abuse

The definition of different types of abuse is a related issue to this. CSA has been widely studied and is the form of abuse that is most easily found as a topic of research in the literature. CPA is also addressed in the literature (MacMillan et al., 2013; Pink, 2009; Reeve & Van Gool, 2013). Other forms of abuse, such as emotional abuse, are not as easily identified and are not documented to the same extent. Shah et al. (2014) in a study of a clinical sample in Australia, observe that the Australian National survey of Mental Health and Wellbeing whilst looking at experiences of CSA and also of CPA, did not address emotional abuse or neglect. In studies that have addressed these forms of abuse, such as Festinger and Baker (2010), the prevalence of emotional abuse has been estimated at roughly just over one third. These are studies that used general community samples. Binggeli, Hart, and Brassard (2001) estimated that 10% to 15% of the sample they used had experienced the more severe and chronic forms of emotional abuse, however a study by Perry, DiDillo, and Peugh (2007) into emotional abuse, found a range of estimates from 12.1% to 45.9%.

Issues around the disparity in prevalence rates of emotional abuse may also have been affected by the fact that this form of abuse has only relatively recently been recognised and so may not be considered a valid form of abuse by respondents or be understood to be something that they have been affected by. Laaksonen et al. (2011) in a study using a sample of the Finnish population investigated physical and psychological maltreatment and found prevalence rates for these types of abuse to be higher in older

cohorts. Younger cohorts reported less CSA and also less of the risk factors that were positively associated with the likelihood of CSA such as physical neglect, physical abuse, parental substance abuse and not growing up with both biological parents. It also found that females reported more psychological abuse while males reported more physical abuse.

Poly-victimisation

A further refinement to looking at different types of abuse is to address the issue of poly-victimisation, which has been drawn out in a number of reports (Finkelhor et al., 2007; Finkelhor et al., 2009; Higgins & McCabe, 2001; Mash & Wolfe, 1991; Radford et al., 2011; Tricket & McBride-Chang, 1995). Tricket and McBride-Chang (1995) reported that CPA often occurs with derogation, scorn or neglect, CSA often occurs with threats of violence and the act of CSA may be painful, creating an act of physical abuse. Perez-Fuentes et al. (2013) stated that CSA often co-occurs with child neglect, emotional and CPA. In a study of methodological issues in research into CPA (Mash & Wolfe, 1991), the authors concluded that CPA rarely occurs in isolation from other forms of maltreatment. In particular, in this study they coupled the experience of CPA with the experience of psychological and emotional abuse.

It can be seen that abuse is not a topic which is clearly delineated, one form of abuse often coexists with another, or indeed, with multiple abuses. A meta-analysis of 29 studies that did endorsements of more than one victimisation type (Higgins & McCabe, 2001) showed that physical abuse was addressed by all of the studies, CSA was addressed in 26, psychological or emotional maltreatment was addressed in 12,

witnessing IPV was addressed in eight and physical neglect in four of the studies. Only one of the studies looked at occurrence of all five of the traumas.

Finkelhor et al. (2007) discuss this issue of poly-victimisation as an often-neglected component of child abuse. In the 2007 study a nationally representative sample of 2,030 children, comprised of children from age 2 to age 17 was used. Results were that 22% of the sample was comprised of children who had experienced four or more kinds of victimisation over one year. A number of studies (Finkelhor et al., 2007; Finkelhor et al., 2009) explore the impact of the experience of poly-victimisation in methodological terms. These studies showed that accounting for poly-victimisation had an effect on the predictive power of individual types of victimisation.

Another factor in the overall context in which child abuse may occur is the issue of parental psychopathology. Finkelhor and Dziuba-Leatherman (1994) state that abuse often occurs within dysfunctional family environments which may contain a variety of these risk factors and co-occurring abuses. There are a wide range of individual, family, social and cultural factors involved (Brown, Cohen, Johnson, & Salzinger, 1998). Finkelhor et al. (2009), in exploring the pathways to victimisation, point to types of family constellations that increase risk for victimisation. Families which are characterised by chaos, multiple or ongoing problems can mean that children are poorly supervised or exposed to risk of victimisation. Once a pattern of victimisation is established, this pattern can continue into adulthood. Shevlin et al. (2013) reported that females who reported CSA are more likely to report intimate partner violence and domestic violence. This accumulation of abuse experiences is reflected in studies which have examined prevalence rates of abuse and have reported on the demographic of age.

Radford et al. (2011) showed that experiences of abuse are reported in greater frequencies and percentage as age increases. In this UK study, both past year and lifetime frequencies and percentages increased steadily from the under 11 years old category, to the 11 to 17 years old category, with the 18 to 24 years old category showing the largest endorsement rates of abuse.

These factors of occurrence, co-occurrence of abuse and relationships to other familial factors make this a particularly difficult area to study with consistency. Vachon, Kruegger, Rogosch, and Cicchetti (2015) address this is a study assessing the effects of a variety of child maltreatment experiences on a sample of 2292 children aged from 5 years old to 13 years old. One of the conclusions reached in the study was that the correlations between occurrences and co-occurrences of abuse and neglect, combined with the myriad of familial factors that can influence the relationships is so complex and intertwined that it may lead to the missed results and often conflicting results that are evident in child abuse and neglect research.

Summary

Examination of the range of methodological issues implicated in the variability of prevalence rates for child abuse helps identify the type of sample that would allow meaningful results. A population-based sample that is nationally representative. A sample that is large enough to address the issues of uniformity within a sample in design and data collection. A sample that addresses multiple forms of abuse as well as the familial issues that provide meaningful context for the occurrence and co-occurrence of abuse. A sample that is large enough and contains all these elements which will allow

the application of the appropriate statistical methods to describe the occurrence and co-occurrence of multiple abuse acts.

LCA has been used to facilitate addressing the complexities involved in the multi-layered, multifactorial question of childhood abuse. It can be paralleled with the way that factor analysis is used to identify clusters of variables. The technique allows the identification of a best fit model involving classes of individuals. Further analysis can then be conducted on the classes to start addressing why the individuals are in the groups or classes. LCA addresses the issue of poly-victimisation by identifying patterns of co-occurring victimisations of a particular type and also identifying risks and problems associated with these patterns.

Studies such as those conducted by Copeland, Shanahan, Costello, and Angold (2009) illustrate the complex nature of the many configurations of psychosocial risk factors which can lead to increased likelihood of experiencing both victimisation and poly-victimisation. The study used LCA to explore the way in which family dysfunctions and parental risk characteristics can lead to young people having an increased risk of experiencing single or multiple forms of abuse. The risk factors included were related to socioeconomic disadvantage, nonnuclear family structure, family dysfunction, stressful life events, being in the foster home care environment, living in a dangerous neighbourhood and harsh parenting. Seventeen putative risk factors were included in total in the study. The study found that there were common patterns of risk co-occurrence.

Karsberg, Armour, and Elklit (2014) used LCA in a study of Greenlandic school students who were aged between 12 and 18 years old. They wished to identify groups in the sample who responded in a similar way to questions across a range of traumatic events. This study identified three distinct classes in the sample allowing further exploration to be conducted on why the classes of students grouped together.

A 2010 study by Shin, Hong, and Hazen used LCA to addresses issues of childhood sexual abuse and adolescent substance use. French, Bi, Latimore, Klemp, and Butler, (2014) applied LCA to investigate sexual victimization patterns using a sample of 657 young people (age range from 14 to 26) recruited from high schools and a university. They were able to identify four classes based on responses given to questions. Houston, Shevlin, Adamson, and Murphy (2010) used LCA to examine a large, nationally representative sample in order to examine the distribution of traumatic experiences. They also identified four latent classes. The classes were based on risk of exposure to a range of ten traumas. The classes ranged from high risk of experiencing all traumas to low of experiencing any of the traumas. The high-risk class again demonstrates the existence of a proportion of people who experience poly-victimisation. The traumas were across the lifetime of the respondents.

Clusters of abusive parenting were modelled using LCA in a study in Portugal (Matos, Moleiro, & Dias, 2014). The study used data collected by professionals in Child Protective Services, using an instrument developed specifically for the study and had a sample of 504 referred cases. Results identified four distinct classes in terms of types of risk and associated variables. LCA allowing progression onto further analysis while accounting for the complex issue of poly-victimisation.

Method

Sample and Procedures

Analysis was conducted on the second wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Dawson, & Hasin, 2004). The NESARC is a longitudinal survey that was designed to be representative of the civilian, noninstitutionalized adult population of the United States, including residents of the District of Columbia, Alaska, and Hawaii. Descriptions of the survey design, and data collection processes are available in greater detail elsewhere (Grant, Dawson, & Hasin, 2004), but will be summarized here. The first wave of the NESARC was conducted between 2001 and 2002, while the second wave took place between 2004 and 2005. Respondents included those living in private households, boarding or rooming houses, non-transient hotels and motels, shelters, facilities for housing workers, college quarters, group homes and military personnel living off base. One adult was randomly selected from each dwelling. Potential respondents were informed in writing of the nature of the study, the confidentiality procedures that were in place, the intended use for the data and the voluntary nature of their participation. Respondents took part in face-to-face, computer assisted personal interviews that were conducted by trained laypersons. In Wave 1, 43,093 adults were interviewed (81% response rate). In Wave 2, 34,653 available respondents (i.e. those who were not deceased, deported, on active military duty, or mentally or physically impaired throughout the follow-up period) were re-interviewed (86.7% response rate). The cumulative response rate for both waves combined was 70.2%. Blacks, Hispanics and young adults aged 18-24 years were oversampled in both waves of the NESARC. As such, data were weighted to adjust for this oversampling. In order to be representative of the U.S population the data was also adjusted for region, age, sex, race, and ethnicity, based on the 2000 Decennial Census.

Measures

The relevant questions for this phase of the study were from Section 13 of the Wave 2 NESARC data. This section was concerned with background information of participants. A range of questions were used as the basis of the creation of six binary variables: neglect, physical abuse, witnessing Inter-Personal Violence (IPV) against mother, step-mother, father's girlfriend, foster mother or adoptive mother, molestation, sexual abuse and having a parent with mental health issues.

All questions were rated using a Likert scale by participants which had the following choices of response: 'never', 'almost never', 'sometimes', 'fairly often', and 'very often'. For the response to create a binary value of 1, the respondent must have answered with 'sometimes', 'fairly often', or 'very often'. If any of the questions included in each category created a binary 1, the higher-level variable was given a value of binary 1, indicating the presence of the trauma in this case. Table 2.1 shows the questions underlying each of the binary variables.

Table 2.1 Binary Variables and Underlying Individual Items.

Binary variable	Screening Item
Neglect	How often did you go without things you needed like clothes, shoes or school supplies because a parent or other adult living in your home spent the money on themselves? How often did a parent or other adult living in your home make you go hungry or not prepare regular meals? How often did a parent or other adult living in your home ignore or fail to get you medical treatment when you were sick or hurt?
Physical Abuse	How often did a parent or other adult living in your home push, grab, shove, slap or hit you? How often did a parent or other adult living in your home hit you so hard you had marks or bruises or were injured?
Witnessing IPV	How often did your father, step-father, foster or adoptive father do ANY of the following to your mother, step-mother, foster or adoptive mother? • Push, grab, slap or throw something at her? • Kick, bite, hit her with a fist, or hit her with something hard? • Repeatedly hit her for at least a few minutes? • Threaten her with a knife or gun or use a knife or gun to hurt her?
Molestation	How often did an adult or other person touch or fondle you in a sexual way when you didn't want them to or you were too young to know what was happening?

Binary variable	Screening Item
Sexual abuse	How often did an adult or other person have you touch their body in a sexual way when you didn't want them to or you were too young to know what was happening?
	How often did an adult or other person attempt to have sexual intercourse with you when you didn't want them to or you were too young to know what was happening?
	How often did an adult or other person actually have sexual intercourse with you when you didn't want them to or you were too young to know what was happening?
Parent with mental health issues	Before you were 18 years old, was a parent or other adult living in your home treated or hospitalised for mental illness?

Statistical Analysis

Mplus Version 6 was used to perform LCA. LCA was done using the 6 binary variables representing trauma that were created using SPSS Version 21 Release 21.0.0.0. Other variables that were used were gender and weighting variables to balance the sampling strategies (W2WEIGHT, W2STRAT, W2PSU). LCA is a statistical method that is used to identify homogeneous groups, or classes, from categorical, multivariate data (Shevlin, Murphy, Dorahy, & Adamson, 2007). In this study LCA was used to identify the number and nature of subtypes of traumas experienced, based on the answers to the selected questions on trauma from Section 13 of NESARC. The fit of five models (2-class through to a 6-class model) was assessed. Selection of the optimal number of latent classes was based on several statistical fit indices. The log-likelihood is a function of the observed responses for each person and the model parameters. The information statistics Akaike Information Criterion (AIC) (Akaike, 1987), Bayesian Information Criterion (BIC) (Schwartz, 1978) and Sample Size Adjusted Bayesian Information Criterium (ssa-BIC) (Schwartz 1978), are goodness-of-fit measures used to compare competing models; lower observed values indicate better fit. The Lo-Mendall-Rubin's adjusted likelihood ratio test (LMRA-LRT) (Lo, Mendell, & Rubin, 2001) result was used to compare models with differing numbers of latent classes; a non-significant value ($p<0.05$) suggests that the model with one less fit should be accepted.

Results

Table 2.2 shows the endorsement rates for each of the trauma questions (N = 34653). This reports the frequencies, percentages and chi-square results at the level of the individual questions. To examine the variations in prevalence rates, Table 2.2 shows that the items relating to both questions about physical abuse were endorsed by the

largest proportions of the total sample: ‘how often did a parent or other adult living in your home push, grab, shove, slap or hit you’ (16.5%), ‘how often did a parent or other adult living in your home hit you so hard you had marks or bruises or were injured’ (7.1%). One question relating to witnessing interpersonal violence against the mother ‘how often did your father, step-father, foster or adoptive father push, grab, slap or throw something at your mother, step-mother, foster or adoptive mother’ (14.7%) was also highly endorsed.

Gender differences can also be seen in prevalence rates. For males the questions endorsed in larger amounts were: ‘how often did a parent or other adult in your home push, grab, shove, slap or hit you’ (17.3%), ‘how often did a parent or other adult in your home hit you so hard you had marks or bruises or were injured’ (6.7%) and ‘how often did your father, step-father, foster or adoptive father push, grab, slap or throw something at your mother, step-mother, foster or adoptive mother’ (6.5%). For females the questions endorsed by larger proportions of the sample were: ‘how often did a parent or other adult in your home push, grab, shove, slap or hit you’ (15.8%), ‘how often did your father, step-father, foster or adoptive father push, grab, slap or throw something at your mother, step-mother, foster or adoptive mother’ (9.4%) and ‘how often did a parent or other adult in your home hit you so hard you had marks or bruises or were injured’ (7.5%).

To explore prevalence rates in terms of those questions least endorsed, the smallest percentage endorsements overall where for the items ‘how often did your father, step-father, foster or adoptive father threaten your mother, step-mother, foster or adoptive mother with a knife or gun or use a knife or gun to hurt her’ (1.6%), ‘how often did an

Table 2.2 Frequencies, Percentages and Chi-Squares for Endorsement of Trauma Screening Items - Individual Level.

Binary variable/screening item	**Male** Yes (%)	**Female** Yes (%)	**Total** Yes (%)	**Chi-Square**
Neglect				
How often did you go without things you needed like clothes, shoes or school supplies because a parent or other adult living in your home spent the money on themselves?	770 (4.9)	1356 (5.9)	2126 (5.5)	$\chi^2(5, N = 34653) = 63.115, p < .01$
How often did a parent or other adult living in your home make you go hungry or not prepare regular meals?	375 (2.6)	707 (3.2)	1082 (2.8)	$\chi^2(5, N = 34653) = 56.691, p < .01$
How often did a parent or other adult living in your home ignore or fail to get you medical treatment when you were sick or hurt?	312 (0.7)	735 (3.4)	1047 (2.7)	$\chi^2(5, N = 34653) = 70.992, p < .01$
Physical Abuse				
How often did a parent or other adult living in your home push, grab, shove, slap or hit you?	2655 (17.3)	3112 (15.8)	6037 (16.5)	$\chi^2(5, N = 34653) = 238.032, p < .01$
How often did a parent or other adult living in your home hit you so hard you had marks or bruises or were injured?	1066 (6.7)	1642 (7.5)	2708 (7.1)	$\chi^2(5, N = 34653) = 120.014, p < .01$

Binary variable/screening item	Male Yes (%)	Female Yes (%)	Total Yes (%)	Chi-Square
Witnessing IPV				
How often did your father, step-father, foster or adoptive father do ANY of the following to your mother, step-mother, foster or adoptive mother?				
• Push, grab, slap or throw something at her?	1012 (6.5)	2045 (9.4)	3057 (14.7)	$\chi^2(5, N = 34653) = 187.064, p < .01$
• Kick, bite, hit her with a fist, or hit her with something hard?	698 (4.3)	1510 (6.8)	2280 (5.7)	$\chi^2(5, N = 34653) = 169.345, p < .01$
• Repeatedly hit her for at least a few minutes?	465 (2.7)	1160 (5.1)	1625 (4.0)	$\chi^2(5, N = 34653) = 160.838, p < .01$
• Threaten her with a knife or gun or use a knife or gun to hurt her?	168 (1.1)	474 (2.0)	642 (1.6)	$\chi^2(5, N = 34653) = 94.151, p < .01$
Molestation				
How often did an adult or other person touch or fondle you in a sexual way when you didn't want them to or you were too young to know what was happening?	208 (1.3)	1341 (6.5)	1549 (4.0)	$\chi^2(5, N = 34653) = 809.455, p < .01$

Binary variable/screening item	**Male** Yes (%)	**Female** Yes (%)	**Total** Yes (%)	**Chi-Square**
How often did an adult or other person have you touch their body in a sexual way when you didn't want them to or you were too young to know what was happening?	162 (1.0)	826 (3.9)	988 (2.5)	$\chi^2(5, N = 34653) = 369.955, p < .01$
Sexual abuse				
How often did an adult or other person attempt to have sexual intercourse with you when you didn't want them to or you were too young to know what was happening?	141 (0.9)	820 (3.7)	961 (2.4)	$\chi^2(5, N = 34653) = 465.445, p < .01$
How often did an adult or other person actually have sexual intercourse with you when you didn't want them to or you were too young to know what was happening?	117 (0.7)	570 (2.4)	687 (1.6)	$\chi^2(5, N = 34653) = 335.603, p < .01$
Parent with mental health issues				
Before you were 18 years old, was a parent or other adult living in your home treated or hospitalised for mental illness?	719 (4.9)	1140 (5.8)	1859 (5.4)	$\chi^2(2, N = 34653) = 9.824, p < .01$

adult or other person actually have sexual intercourse with you when you didn't want them to or you were too young to know what was happening' (1.6%) and 'how often did an adult or other person attempt to have sexual intercourse with you when you didn't want them to or you were too young to know what was happening' (2.4%). In terms of gender differences in endorsement, the smallest percentage endorsements for males were for 'how often did a parent or other adult living in your home ignore or fail to get you medical treatment when you were sick or hurt' (0.7%), 'how often did an adult or other person actually have sexual intercourse with you when you didn't want them to or you were too young to know what was happening' (0.7%) and 'how often did an adult or other person attempt to have sexual intercourse with you when you didn't want them to or you were too young to know what was happening' (0.9%). The smallest percentage endorsements for females were 'how often did your father, step-father, foster or adoptive father threaten your mother, step-mother, foster or adoptive mother with a knife or gun or use a knife or gun to hurt her' (2.0%), 'how often did an adult or other person actually have sexual intercourse with you when you didn't want them to or you were too young to know what was happening' (2.4%) and 'how often did a parent or other adult living in your home make you go hungry or not prepare regular meals' (3.2%).

Comparing male and female endorsement of questions, in all except for the question, 'how often did a parent or other adult in your home push, grab, shove, slap or hit you', females endorsed in higher percentages than males. For this item 15.8% of females endorsed the question compared to 17.3% of males. The largest percentage difference in endorsement was for the item 'how often did an adult or other person touch or fondle you in a sexual way when you didn't want them to or you were too young to know what

was happening', 6.5% of females endorsed this question compared to 1.4% of males. The smallest percentage difference in endorsement was for the item 'how often did a parent or other adult living in your home make you go hungry or not prepare regular meals', 3.2% of females endorsed this question compared to 2.6% of males.

Table 2.3 shows the endorsement rates, in terms of frequencies and percentages for each of the trauma items at the level of the overall binary variable. In terms of the overall binary variables, which were switched on when any individual item was endorsed, the highest rates of endorsement for the total data was for physical abuse. This was

Table 2.3 Frequencies and Percentages of Endorsement Of Trauma Screening Items - Binary Variable Level.

Binary variable	**Male** Yes (%)	**Female** Yes (%)	**Total** Yes (%)	**Chi-Square**
Neglect	994 (6.4)	1723 (7.5)	2717 (7.6)	$\chi^2(2, N = 34653) = 35.861, p < .01$
Physical Abuse	2766 (18.0)	3528 (16.5)	6294 (17.2)	$\chi^2(2, N = 34653) = 11.707, p < .01$
Witnessing IPV	1069 (6.9)	2120 (9.7)	3189 (8.3)	$\chi^2(2, N = 34653) = 106.525, p < .01$
Molestation	233 (1.5)	1390 (6.7)	1623 (4.2)	$\chi^2(2, N = 34653) = 540.719, p < .01$
Sexual abuse	166 (1.0)	863 (3.9)	1029 (2.5)	$\chi^2(2, N = 34653) = 303.322, p < .01$
Parent with mental health issues	719 (4.9)	1140 (5.8)	1859 (5.4)	$\chi^2(2, N = 34653) = 9.824, p < .01$

endorsed by 17.2% of respondents, by 18.0% of males and by 16.5% of females. The next largest endorsement at this binary variable level was for witnessing IPV against the maternal parenting figure, 8.3% of all respondents endorsed this category, 9.7% of males and 6.9% of females. Molestation and sexual abuse had the lowest rates of endorsement. For molestation at the binary variable level, endorsement was 4.2% of the

overall data, 1.5% of males and 6.7% of females. For sexual abuse, endorsement was 2.5% of all respondents with 1.0% of males and 3.9% of females endorsing this trauma category. In all cases except for physical abuse, females endorsed in higher rates. The biggest gender difference at this overall level was for molestation which females endorsed 5.2% more than males, followed by sexual abuse which females endorsed 2.9% more than males. In terms of physical abuse, makes endorsed this overall category 1.5% more than females.

Latent Class Analysis

The fit indices for males from the LCA are reported in Table 2.4. For males the 3-class solution is considered to be the best model. The AIC, BIC and ssa-BIC information statistics were lower for the 3-class solution compared to the 2-class solution, and the Lo-Mendell-Rubin's LRT indicates that the 4-class solution is not significantly better than the 3-class solution therefore on the basis of parsimony, the 3-class solution is preferred.

The latent class profile plot for males is shown in Figure 2.1. Class 2 was the largest class for males (N=13299: 89.9%). This class was characterised by low likelihood of having experienced any of the trauma variables. This class was considered to be the baseline or normative group. Class 1 was the smallest class (N=117: 0.7%) and was characterised by a relatively high probability of endorsing the items related to sexual abuse. This class was labelled 'sexual abuse'. Class 3 was an intermediate group (N=1061: 9.4%) and was characterised by a high probability of having experienced physical abuse. This class was labelled 'physical abuse'.

Table 2. 4 Fit Indices for the Latent Class Analysis of the Trauma Variables for Males.

Number of Classes	Loglikelihood	AIC	BIC	ssa-BIC	LMRA-LRT	P-Value
1	-18724.080	37460.159	37505.641	37486.574		
2	-17294.062	34614.124	34712.668	34671.356	2818.014	.000
3	-17056.375	34152.749	34304.356	34240.797	468.391	.000
4	-17026.236	34106.471	34311.140	34225.336	59.392	.151
5	-17017.777	34103.554	34361.285	34253.236	16.669	.311
6	-17011.692	34105.385	34416.178	34285.883	11.991	.477

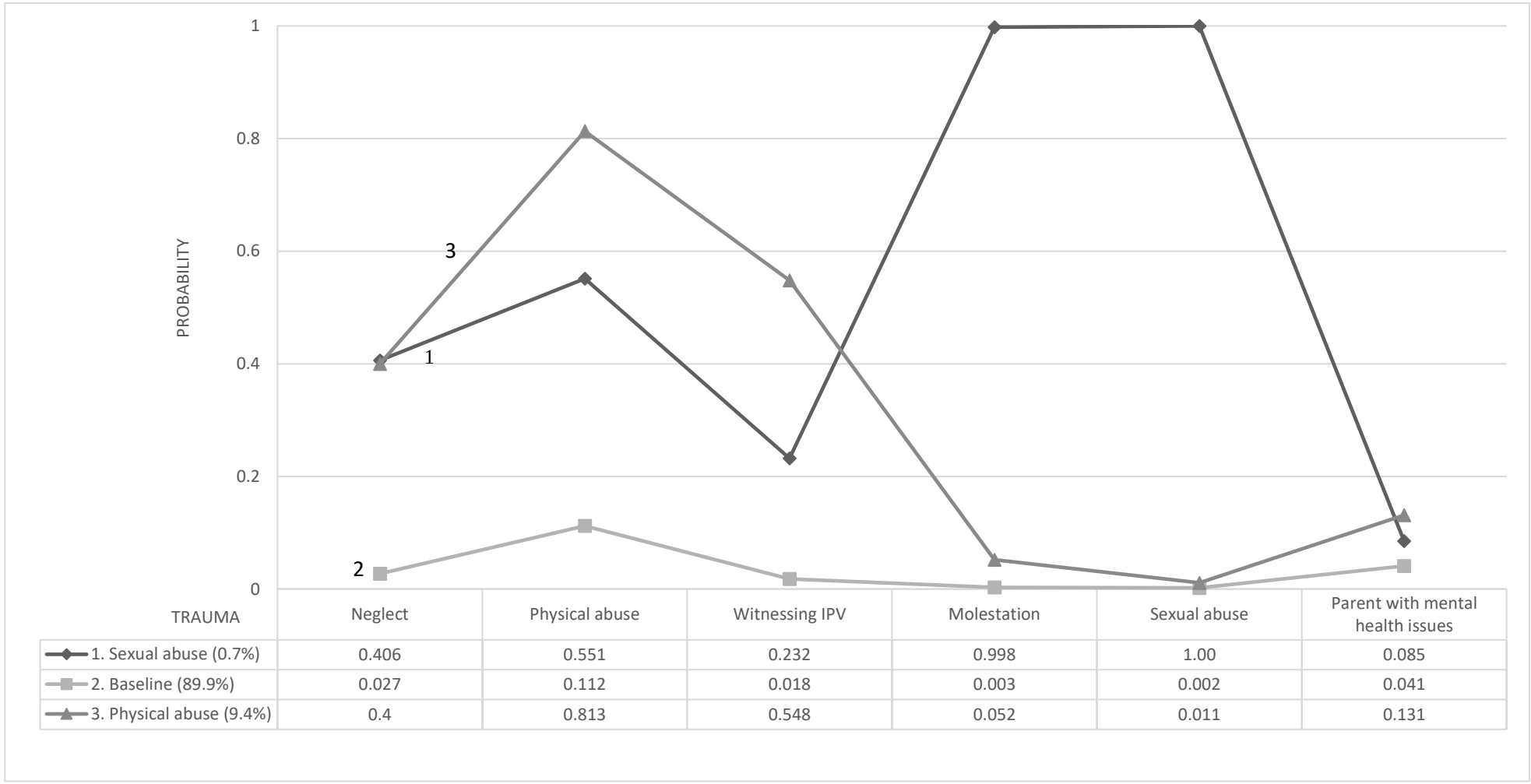
AIC = Akaike information criterion, BIC = Bayesian information criterion, ssa-BIC = sample size adjusted BIC, LMRA-LRT = Lo-Mendell-Rubin's adjusted likelihood ratio test.

The fit indices for females from the LCA are reported in Table 2.5. For females the 4-class solution is considered to be the best model. The AIC, BIC and ssa-BIC information statistics were lower for the 4-class solution compared to the 3-class and 2-class solutions, and the Lo-Mendell-Rubin's LRT indicates that the 5-class solution is not significantly better than the 4-class solution. Therefore on the basis of parsimony, the 4-class solution is preferred.

The latent class profile plot for females is shown in Figure 2.2. Class 2 was the largest class for females (N=17090: 84.2%). This class was characterised by low likelihood of having experienced any of the trauma variables. This class was considered to be the baseline or normative group. Class 3 was the smallest class (N=405: 2.0%) and was characterised by a relatively high probability of endorsing the items related to both physical and sexual abuse. This class was labelled 'physical and sexual abuse'. Classes 1 (N=1576, 10.0%) and 4 (N=903, 3.8%) represent two intermediate groups. Class 1 was characterised by a high probability of endorsing the items related to physical abuse only and was labelled 'physical abuse'. Class 4 was characterised by a high probability of endorsing the items related to sexual abuse only and was labelled 'sexual abuse'.

The fit indices for the total data from the LCA are reported in Table 2.6. For the total data, the 4-class solution is considered to be the best model. The AIC, BIC and ssa-BIC information statistics were lower for the 4-class solution compared to the 3-class and 2-class solutions, and the Lo-Mendell-Rubin's LRT indicates that the 5-class solution is not significantly better than the 4-class solution. Therefore on the basis of parsimony, the 4-class solution is preferred.

Figure 2.1 Profile Plot- Latent Class Analysis for Males.



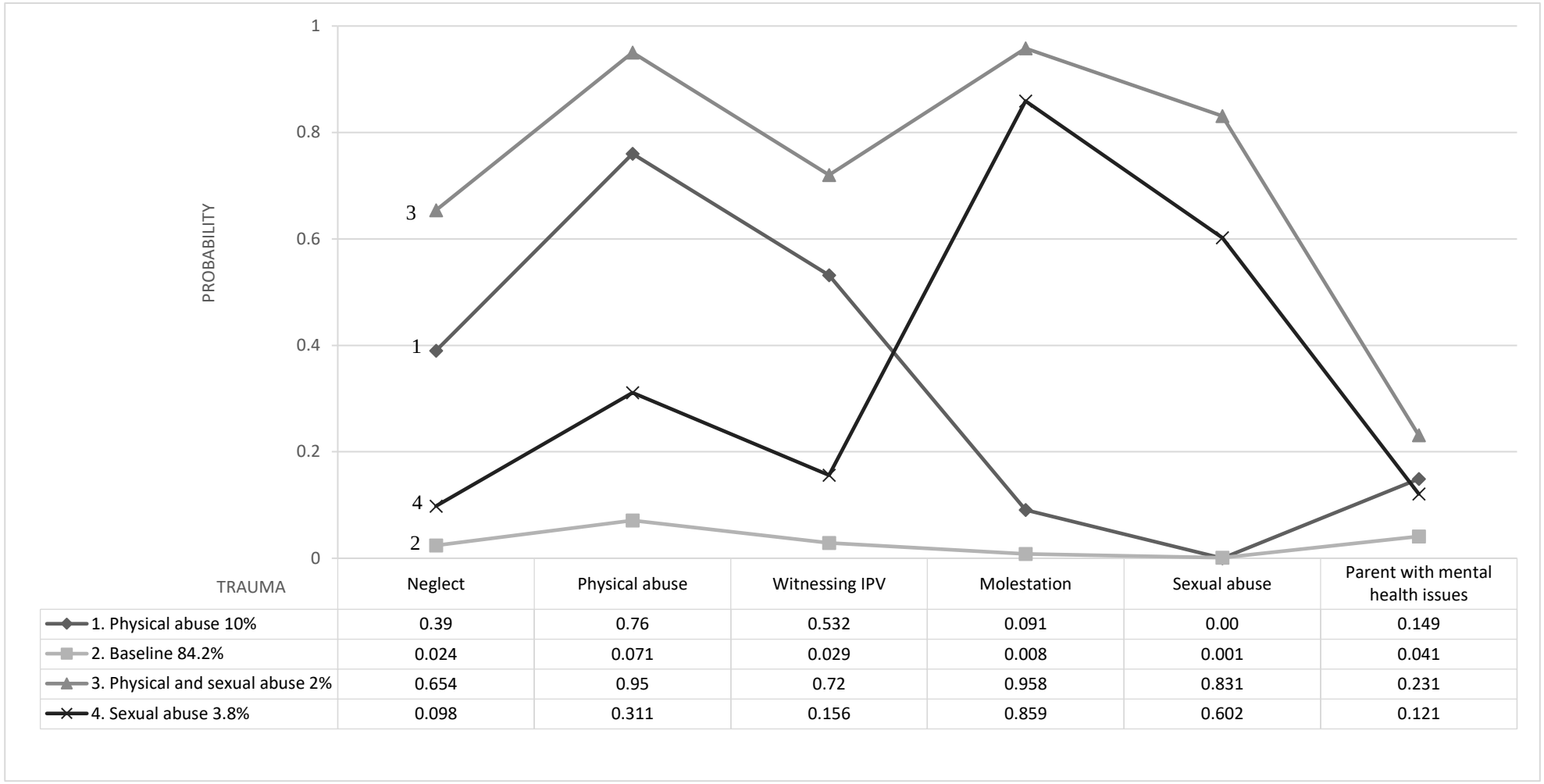
TRAUMA	Neglect	Physical abuse	Witnessing IPV	Molestation	Sexual abuse	Parent with mental health issues
1. Sexual abuse (0.7%)	0.406	0.551	0.232	0.998	1.00	0.085
2. Baseline (89.9%)	0.027	0.112	0.018	0.003	0.002	0.041
3. Physical abuse (9.4%)	0.4	0.813	0.548	0.052	0.011	0.131

Table 2.5 Fit Indices for The Latent Class Analysis of The Trauma Variables for Females.

Number of classes	Loglikelihood	AIC	BIC	ssa-BIC	LMRA-LRT	P-Value
1	-33375.265	66762.530	66809.944	66790.876		
2	-29470.919	58967.838	59070.567	59029.254	7697.640	.000
3	-28763.140	57566.280	57724.325	57660.766	1395.427	.000
4	-28631.139	57316.278	57529.638	57443.833	260.248	.000
5	-28614.388	57317.499	57586.175	57478.125	12.597	.480
6	-28614.388	57310.776	57634.768	57504.472	17.308	.641

AIC = Akaike information criterion, BIC = Bayesian information criterion, ssa-BIC = sample size adjusted BIC, LMRA-LRT = Lo-Mendell-Rubin's adjusted likelihood ratio test.

Figure 2 2 Profile Plot - Latent Class Analysis for Females.



TRAUMA	Neglect	Physical abuse	Witnessing IPV	Molestation	Sexual abuse	Parent with mental health issues
1. Physical abuse 10%	0.39	0.76	0.532	0.091	0.00	0.149
2. Baseline 84.2%	0.024	0.071	0.029	0.008	0.001	0.041
3. Physical and sexual abuse 2%	0.654	0.95	0.72	0.958	0.831	0.231
4. Sexual abuse 3.8%	0.098	0.311	0.156	0.859	0.602	0.121

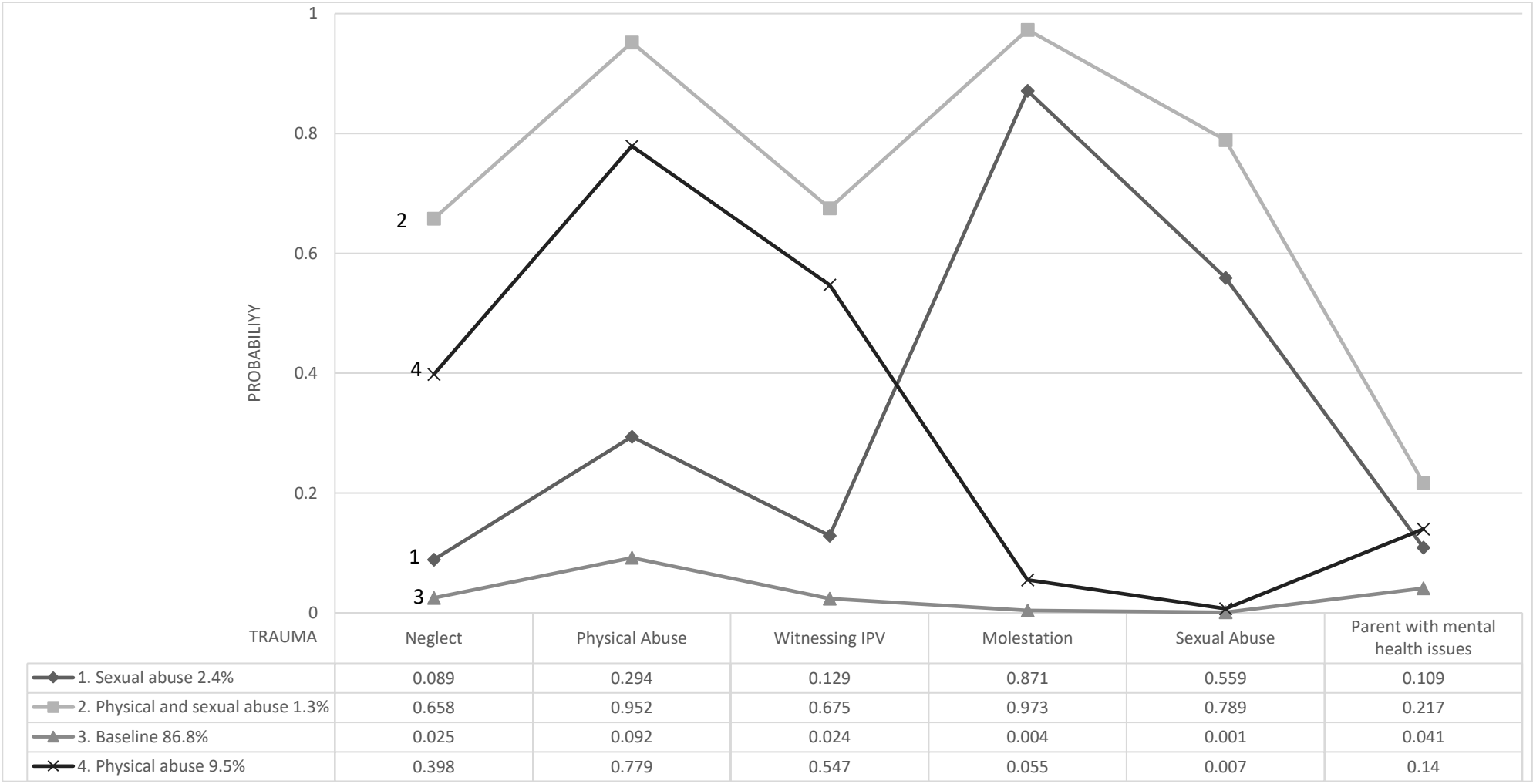
Table 2.6 Fit Indices for the Latent Class Analysis of the Trauma Variables for Total Data.

Number of classes	Loglikelihood	AIC	BIC	ssa-BIC	LMRA-LRT	P-Value
1	-51879.217	103770.435	103821.118	103802.050		
2	-46722.552	93471.105	93580.920	93539.606	10174.207	.000
3	-45709.229	91458.459	91627.405	91563.845	1999.308	.000
4	-45560.882	91175.764	91403.842	91318.036	292.62	.000
5	-45553.742	91175.484	91462.693	91354.641	14.088	.488
6	-45545.881	91173.762	91520.103	91389.805	14.411	.551

AIC = Akaike information criterion, BIC = Bayesian information criterion, ssa-BIC = sample size adjusted BIC, LMRA-LRT = Lo-Mendell-Rubin's adjusted likelihood ratio test.

The latent class profile plot for the total data is shown in Figure 2.3. Class 3 was the largest class for the total data (N=29885: 86.8%). This class was characterised by low likelihood of having experienced any of the trauma variables. This class was considered to be the baseline or normative group. Class 2 was the smallest class (N=454: 1.3%) and was characterised by a relatively high probability of endorsing the items related to both physical and sexual abuse. This class was labelled the 'physical and sexual abuse' class. Classes 1 (N=835, 2.4%) and 4 (N=3278, 9.5%) represent two intermediate groups. Class 1 was characterised by a high probability of endorsing the items related to sexual abuse and was labelled the 'sexual abuse' class. Class 4 was characterised by a high probability of endorsing the items related to physical abuse only and was labelled the 'physical abuse' class.

Figure 2.3 Profile Plot - Latent Class Analysis for The Total Data.



TRAUMA	Neglect	Physical Abuse	Witnessing IPV	Molestation	Sexual Abuse	Parent with mental health issues
1. Sexual abuse 2.4%	0.089	0.294	0.129	0.871	0.559	0.109
2. Physical and sexual abuse 1.3%	0.658	0.952	0.675	0.973	0.789	0.217
3. Baseline 86.8%	0.025	0.092	0.024	0.004	0.001	0.041
4. Physical abuse 9.5%	0.398	0.779	0.547	0.055	0.007	0.14

Discussion

The aim of this chapter was to analyse the NESARC dataset and identify, using LCA, if there were distinct groups or classes of people within the dataset in terms of the experiences respondents have had with childhood trauma. If so, to begin examining what characteristics these classes have in the context of the probabilities of the traumas occurring. It was expected that there would be homogenous groups within the dataset and also that there would be a gender difference. Results showed that there were three distinct classes in the male only data, shown in Figure 2.1. For the female only dataset, four distinct classes emerged, shown in Figure 2.2. These classes were mirrored in the total dataset with four classes also emerging as the best fit model, shown in Figure 2.3.

Tables 2.2 and 2.3 show endorsement rates and percentages for the traumas included in the study – neglect, physical abuse, witnessing IPV against the maternal parenting figure, molestation, sexual abuse and having a parent hospitalised or diagnosed with mental health issues. Neglect was the third highest trauma experienced in all categories – males, females and overall. Physical abuse was the highest for both males and females and overall and was endorsed by more males than females. Macmillan et al. (2013), Pink (2009), Reeve and Van Gool (2013) also found CPA to be reported at higher levels than other studied traumas as well as being reported in higher rates by males. Witnessing IPV was included to add depth and meaning around family context. This study wanted to add additional perspective around the features of family life for the respondents. This trauma was the second highest endorsed category in terms of males, females and in the total dataset. Molestation and sexual abuse were reported separately in the study. Molestation was the fifth highest category at an overall level and also for males only. It was the fourth highest for females. This is where we can start to see the

gender difference emerging which is reflected in the LCA findings. Sexual abuse was the lowest endorsed category at all levels. This category however again reflected the gender differences around abuse with over three times as many females endorsing this trauma as males. This reflects previous research (Laaksonen et al., 2011; MacMillan et al., 2013; Mohler-Kuo et al., 2014; Perez-Fuentes et al., 2013; Shah et al., 2014). Having a parent with mental health issues was an intermediate category for overall, male and female endorsement. Like witnessing IPV this category was important to allow additional family context to be included in the study.

In summary, the overall order of trauma endorsement was similar in males, females and in the total data. The only differences were in the order that molestation and witnessing IPV of the maternal parenting figure, were endorsed by males and females. More variation was seen in the percentages endorsing the trauma categories within the different gender categories with the most extreme differences being in the molestation, sexual abuse and witnessing IPV against the maternal parenting figure. Females endorsed these in much higher frequencies than males.

Exploration of the endorsement rates again highlighted the methodological issues which continue to make this a difficult area to study in terms of making comparisons between results (Finkelhor & Dziuba-Leatherman, 1994; Mohler-Kuo et al., 2014; Pereda et al., 2009; Timmerman & Schreuder, 2014; Wynkoop et al., 1995). The wide range of sample types, sampling procedures, terms and definitions used around abuse and traumas, types of abuse included, data collection methods and the way in which the data analysed result in an equally wide range of results. These issues were addressed by using a large, national, general population based dataset. The data was collected using

trained interviewees. Questions were included around a number of abuses to allow examination of both the occurrence and the co-occurrence of trauma. Items which allowed issues of family context to be addressed were used. The operationalisation of abuse variables was designed to establish a more conservative estimate, to eliminate any areas of ambiguity or difference in interpretation of the abuses.

In order to further explore this complicated issue a LCA was used. Use of LCA addresses the issues of poly-victimisation which are so important to understanding experience of maltreatment and victimisation (Finkelhor et al., 2007; Finkelhor et al., 2009). Results of the LCA are shown in Table 2.4 for males, Table 2.5 for females, and Table 2.6 for the total data. Results support the theory that the experience of traumatic symptoms – neglect, physical abuse, witnessing IPV of the maternal parenting figure, sexual abuse, parent with mental health issues, occur on a continuum. The inclusion of questions such as having a parent with mental health issues before the age of 18 and having witnessed IPV against the maternal parenting figure allowed added insight to be gained from examining other issues around family context. The study extended the abuses to include questions on neglect as well as physical and sexual abuse allowing poly-victimisation to be addressed even further.

The male only model, shown in Figure 2.1 showed that a 3-class solution was the best fit. The three classes that emerged in the 3-class male solution were sexual abuse, baseline and physical abuse. A closer examination of the three classes shows the probability of them experiencing the traumas examined. Those in the second largest sized class, the physical abuse class, were most likely to experience physical abuse, followed by witnessing IPV of the female parenting figure with the trauma they were

least likely to experience being sexual abuse, followed by molestation. For the smallest male class, male sexual abuse, the traumas of neglect and having a parent with mental with mental health issues were of intermediary probability compared to the other traumas. Those in the smallest class, the sexual abuse class, were most likely to experience sexual abuse while having a parent with mental health issues was the trauma with the lowest probability rate for them. The largest class, the baseline group, had low probabilities of experiencing any of the traumas, the highest probability was for physical abuse. Although physical abuse would appear at higher levels to be the most frequent abuse to be experienced and especially for males, an examination at this level shows that for males who are in the smallest class, the sexual abuse class, it is the trauma with the third highest likelihood of occurring with both sexual abuse and molestation being higher in probability. This class is least likely to experience parental mental health issues, followed by witnessing IPV against the maternal parenting figure.

A 4-class solution, shown in Figure 2.2, was the best fit for the female only data. The categories were labelled – physical abuse, baseline, physical and sexual abuse and sexual abuse. This again supports the theory that exposure to traumas and other familial issues occur on a continuum for females. This pattern of classes is similar to those found by Nooner et al. (2010) who looked at self-report data on sexual and physical abuse only using a sample (N=795) of respondents aged 11-13 years old from five sites across the United States. A closer look at the probabilities within each class shows that within the second largest group, the physical abuse class, the trauma with the highest probability of occurring is physical abuse followed by witnessing IPV of the female parenting figure, while the two lowest likely to occur traumas are molestation and sexual abuse. For the largest class, the baseline category, there is a consistently low

probability of any of the traumas occurring. The smallest class, the class which was labelled physical and sexual abuse, had almost identical probability of both physical abuse and molestation occurring, with the next highest probability being for sexual abuse. The second smallest class, the sexual abuse class had the highest probability of sexual abuse, followed by molestation, then followed by physical abuse.

The total data solution, shown in Figure 2.3, reflected the solution for the female only data. This data also showed a 4-class solution as the model of best fit. Classes were labelled physical and sexual abuse, physical abuse, sexual abuse and baseline. The physical and sexual abuse class which was the smallest group, showed a high probability of endorsing both physical and sexual abuse items, the baseline class which was the largest group, showed a low probability of endorsing any of the items. The two intermediate classes showed a high probability of endorsing physical abuse only and sexual abuse only respectively. A closer look at the probabilities within each class shows that this solution largely follows the patterns within the female only solution. Within the second largest class, the physical abuse class, the trauma with the highest probability of occurring is physical abuse followed by witnessing IPV of the female parenting figure, while the two lowest likely to occur traumas are molestation and sexual abuse. For the largest class, the baseline category, there is a consistently low probability of any of the traumas occurring. The smallest class, the class which was labelled physical and sexual abuse, had almost identical probability of both physical abuse and molestation occurring with the next highest probability being for sexual abuse. The second smallest class, the sexual abuse class, differed from the sexual abuse class within the female only model in the it had the highest probability of molestation,

followed by sexual abuse, which was reversed in the female only solution, then followed by physical abuse.

The value of using LCA is that it provides a way of addressing these complex issues around abuse in a person-centred approach, particularly these elements around multiple forms of abuse. The inclusion of data that addresses familial context as well as neglect means that additional depth is provided, allowing a richer picture to emerge surrounding issues of abuse and multiple abuse. The emergence of three distinct classes for the male only data, four for the female only data and four for the total data provides an interesting way to address the differences within these classes, and at this level, differences in experiences which are meaningful only within this class structure, start to emerge. Differences which may help understanding of what is happening within this group of people.

Strengths of this study are in the nature of the sample type, the sampling strategy, the size of the sample, the range of traumas included, the operationalisation of the traumas and the type of analysis conducted. The power of LCA to expose differences at a low level within the classes that emerge, that allow gender differences to be highlighted and then within these parsimonious solutions, that allow subtle differences to be seen and provide the basis for further examination. Inherent in the use of this data are also its limitations. The use of a Likert Scale can lead to subjective interpretation of words such as ‘sometimes’. The exclusion of the response ‘almost never’ was designed to help reduce any issues around subjective evaluations of responses. Of course, this can lead to both under and over reporting as a respondent makes this judgement. The presence of a trained interviewer is one way that this may have been mitigated. To limit the burden on

respondents, NESARC assessed CSA with only four questions compared to some of the more in depth questioning of other surveys. In addition, the survey did not include some sections of the population such as those under 18 or those in jail or hospitalised at the time of the interview (Perez-Fuentes et al., 2013). Lastly, the survey responses were subject to the possibility of recall bias as respondents were asked to report on lifetime traumatic events. Research has however suggested that such reports are surprisingly reliable (Read, van Os, Morrison, & Ross, 2005).

The global and persisting nature of abuse and its effect at an individual and societal level dictates that even with the many difficulties in its study it is equally necessary to persist in reaching an understanding of how and why it occurs. Vital in this, is understanding who experiences trauma. In gaining an understanding of the groups that experience trauma may lie the answers to identification, prevention and early intervention.

The next steps in this research were to look at how these classes, particularly addressing the both the gender differences and the differences that emerged from within the classes in each gender, relate to further variables. The next stage is to look at PLEs in this large, general population sample and to explore how the classes that have been identified relate to each other in terms of both PLEs and the risk factors for PLEs. Further, what are the mechanisms that link them.

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Chapter 3

Associations between Gender-Specific Typologies of Childhood Adversity and Psychotic-Like-Experiences in a Large Community Sample.

Introduction

Models of Psychosis

The traditional approach to the conceptualisation of psychosis came from psychiatry and offered the medical model. Kraepelin, considered to be the founder of modern psychiatry, believed that the primary origin of psychotic illness was biological and genetic malfunction (Craddock & Owen, 2005, Kraepelin, 1919). Kraepelin developed a classification system which has become the basis of both the World Health Organisations (WHO) International Classification of Disease (ICD) and the American Psychiatric Associations (APA) Diagnostic and Statistical Manual of mental disorders (DSM), which are the most widely used present day classifications of mental illness.

In terms of psychosis, this distinction between classes of disorder was first documented by Kraepelin when he distinguished between the occurrence of 'dementia praecox' which is now known as schizophrenia, and manic depression which is now known as bipolar disorder. Kraepelin's assertion was that these two manifestations were separate having different underlying disease processes and requiring different treatment (Kraepelin, 1919). Using this approach, which interprets psychotic experiences as expressions of serious disease, results in a focus on illness (Cochrane, Petch, & Pickering, 2010; Meehl, 1966; Read, Perry, Moskowitz, & Connolly, 2001). It assumes

that differences between psychotic symptoms and normal experiences and behaviours are qualitative (Johns & van Os, 2001).

Moving on from the medical model, the diathesis-stress model of schizophrenia (Zubin & Spring, 1977) offered a biopsychosocial model. This has been adopted as being based on a genetic predisposition creating a vulnerability which manifests as an oversensitivity to stress from the environment that results in an individual moving from healthy to ill in the presence of such stress (Cochrane et al., 2010; Read et al., 2001). Genetic and biological factors combine to create this vulnerability which is then triggered by developmental and environmental influences (Mason & Beavan-Pearson, 2005). It is important to note though that the 1977 paper did also state that the vulnerability could be 'acquired' as opposed to being genetic. This has not generally been incorporated in the biopsychosocial model as it has been taken forward however.

The DSM has typically classified symptoms in terms of positive, negative and disorganised. Those symptoms described as positive are symptoms which are not normally present in individuals without psychosis and are mainly grouped under hallucinations and delusions, which introduce a further level to the hierarchy (Johns & van Os, 2001; van Os & Kapur, 2009). Negative symptoms are those characteristics which are absent in individuals who have psychosis and are normally present in individuals without psychosis. These include, avolition which is the removal of drive and motivation and may manifest for example, in a reluctance to socialise or in an individual sitting still for long periods of time. Also included is anhedonia. This is an inability to experience pleasure. Alogia, which is an inability to speak. Finally, affective flattening which is the diminishment of emotional expression (van Os & Kapur, 2009).

Disorganised symptoms of psychosis are related to thought disorder, bizarre behaviour and inappropriate affect (van Os & Kapur, 2009).

The DSM further categorises psychosis as,

- due to a general medical condition,
- substance induced,
- affective or
- non-affective.

Affective psychoses are associated with a diagnosis of depression or bi-polar disorder while non-affective includes schizophrenia, schizoaffective disorder, schizophreniform disorder, brief psychotic disorder and psychotic disorder not otherwise specified (van Os, 2009). The most recent version of the DSM: DSM V (APA, 2013) has not shifted in terms of its underlying paradigm but it has reorganised to capture this underlying multidimensional structure of psychosis (Heckers et al., 2013). Most notably it puts schizophrenia in a less prominent position than previous versions of the manual.

As research has progressed, models of psychosis have increased in complexity. The conceptualisation of psychosis can be viewed as being both multidimensional and hierarchical. In terms of the hierarchical organisation of the construct, psychosis is at the top level. Below that lie a range of symptoms which vary in number across the models. Using the simplest structure, symptoms are divided into positive and negative. Disorganised is often incorporated at this level also as a symptom type (Cochrane et al., 2010; Misiak, Moustafe, Kiejna, & Frydecka, 2016).

The multidimensional nature of the classification model is well illustrated using the hallucinations category. The top level of the hierarchy has psychosis, the next level in this case is positive symptoms with hallucinations being a sub-level. Hallucinations become multidimensional existing as auditory, visual, tactile, olfactory and taste. A further level exists when the different types of auditory hallucinations are addressed.

At the core of studies of specificity is this issue of dimensions of hallucinations. Shevlin et al. (2011) used a general population-based study from the US, the National Comorbidity Study Replication (NCS-R) (Kessler & Merikangus, 2004), to look at the relationship between childhood sexual assault, childhood physical assault and types of hallucinations; specifically, auditory and visual. The study found that being raped or physically assaulted under the age of 16 predicted both visual and auditory hallucinations. Being raped under 16 years old made an individual 3.3 times more likely to experience visual hallucinations and 3.5 times more likely to experience auditory hallucinations.

In terms of further analysis of the factors of psychosis, Wigman et al. (2011) focussed on the positive symptoms only and used exploratory and confirmatory factor analysis within this one high level factor. Data used were two large adolescent general population samples, n=5422 and n=2230. Both datasets identified a five-factor model of positive symptoms as the optimal solution. The five factors were hallucinations, paranoia, grandiosity, delusions and paranormal beliefs. Other studies have identified a three-factor model (Ahmed et al., 2013; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003; Raine et al., 1994). These three-factors are comprised of groupings of symptoms which are labelled as cognitive/perceptual, social/interpersonal and disorganised.

Factor analyses have most frequently reported three-factor models as a result (Ahmed, et al., 2013; Battaglia, Cavallini, Macciardi, & Bellodi, 1997; Bergman et al., 1996; Fossati et al. 2003; Gruzelier, 1996; Raine et al., 1994). All studies consistently found the cognitive/perceptual and social/interpersonal factors with some differences over the third of the three factors. Battaglia et al. (1997) identified oddness features as the final factor, while Bergman et al. (1996) identified paranoid features as the final factor. More recent studies such as those by Fossati et al. (2003) and Ahmed et al. (2013) have supported the disorganised features as the third factor.

In addition to factor models, recent developments have offered alternative approaches to how psychosis is conceptualised. The mathematical concept of network modelling removes the idea of a hierarchy altogether (Borsboom & Cramer, 2013; Looijestijn, Dirk Blom, Aleman, Hoek, & Goekoop, 2015; McNally et al., 2015). The theory is applied at microscale, mesoscale and macroscale levels which cover biological, psychological and social factors. All entities in a network are sets of interconnected agents that can be identified separately and can also pass their properties to each other. It starts with activity at the neuron level, moves to configurations of neural networks in the brain, networks of the body and networks formed in society. Agents could be genes, proteins, neurons or people. Agents are referred to as nodes and all nodes are mutually connected through links which may differ in strength or weight. Those which are highly connected are referred to as hubs.

To apply this theory in terms of mental illness, using the psychosis construct, components of the system may be positive symptoms, negative symptoms and disorganised symptoms. These are three components of psychosis that are expressed to

some degree by most people with a diagnosis of schizophrenia. In network model theory, they will go hand in hand with other symptom clusters such as affective symptoms which may be

- depression, anxiety or anger,
- neurotic symptoms (such as obsessive compulsive, phobias),
- cognitive symptoms (such as memory loss, mental retardation),
- motivational symptoms (such as mania).

In network model theory, individual symptoms are seen as causal agents which facilitate the occurrence of other symptoms and therefore have a tendency to create causal loops. So, increased anxiety may lead to fatigue which may lead to concentration difficulties which may lead to error proneness which may lead to actual errors which may lead to increased anxiety. In the case of the positive symptoms of psychosis a causal loop may start with hallucinations which trigger delusions to explain them, which in turn strengthens the hallucination proneness. On a larger scale of mental illness, mental disorders may be considered vicious circles between elementary syndromes.

Psychosis on a Continuum

This section addresses the theory of psychosis on a continuum. It initially explores the basis of the theory. It addresses attempts to define terms and definitions used to describe subclinical experiences of psychosis and the difficulties with these definitions. It then reviews findings of studies which address this theory of a continuum. It looks at meta-analytical studies and also explores general population studies which have been done to specifically look at rates of PLEs in the community.

Studies will be described in terms of the type of sample used, measurements used, which level of subclinical experience they identify and pertinent results. The findings of studies in terms of the type of subclinical experience that are being described is determined by the measure that was used in the study. Those which measure psychotic symptoms, those which measure PLEs and those which measure schizotypal experiences are contained in this section. The main difficulty lies in differentiating between PLEs and schizotypal experiences.

Manifestations of psychosis in terms of clinical observations can be seen as ranging from non-pathological, moving into schizotypal traits, schizotypal personality disorder and then schizophrenia (Ahmed et al., 2013; Strauss, 1969). This would mean that psychosis exists on a continuum as opposed to being a dichotomous state of either being present or being absent. The premise of sub-clinical psychotic experiences is that psychotic experiences are present not only at the level where clinical intervention is required but that they also exist at a range of levels, not requiring clinical intervention in the general population (Cochrane et al., 2010; Johns & van Os, 2001; Lataster et al., 2006; Shevlin, Murphy, Dorahy, & Adamson, 2007; Sommer et al., 2010; van Os, 2009; van Os, Hanssen, Bijl, & Ravelli, 2000).

The definition of terms at this subclinical level can be difficult as lines between different types of subclinical experience are not firmly drawn. Subclinical manifestations represent those who either experience one or more psychotic symptoms but do not meet the criteria for a diagnosis, or who experience PLEs that are similar to symptoms but may or may not be distressing (Shevlin, Boyda, Houston, & Murphy, 2015a). The differences between psychotic symptoms and normal experiences and

behaviours are considered to be quantitative as opposed to qualitative (Johns & van Os, 2001). They are continuous with normal experiences (Allerdyce, Gaebel, Zielasek, & van Os, 2007; Krabbendam, Myin-Germeys, & van Os, 2004; van Os et al., 2000). Traditionally, in accordance with the DSM, symptoms have been addressed in terms of level, number and duration (Heckers et al., 2013).

Recently studies have addressed the level of distress which is associated with experiences, as well as number and duration of symptoms or experiences. Experiences which do not create distress may be referred to as schizotypal experiences while those which are moving towards causing some degree of distress are referred to as PLEs. PLEs are progressing towards being clinically relevant. Schizotypy is described as a trait reflecting a disposition towards behaviours and cognitions that are found in their most extreme form in individuals with a diagnosis of schizophrenia (Ahmed et al., 2013; Cochrane et al., 2010). Schizotypal experiences may include those around magical thinking and strong superstitious beliefs. Fossati et al. (2003) point to the importance of studying schizotypy in the context of psychosis as it allows study without the confounder of severe psychotic symptoms and with that, the confounding effects associated with psychiatric service utilisation (Newbury et al., 2016).

Shevlin et al. (2015a) studied the degree of distress experienced in subclinical experiences. The study used a sample of 462 university students from two UK universities. The sample was comprised of 117 males and 345 females with an average age of 21.2 years (SD=5.4) and an age range from 18 to 34 years old. Measurement was done using the positive items from the Community Assessment for Psychic Experiences (CAPE) CAPE-42 which is a self-report measure of psychotic experiences derived from

the Peters et al. Delusions Inventory (PDI-21) (Peters, Joseph, & Garety, 1999). A variable was then created on the basis of frequency of experiences and distress resulting from these experiences. The variable had three levels reflecting

- no endorsement,
- endorsement with no distress
- endorsement with distress.

Results were tested within the framework of seven different factor analytic models. The five-factor model by Wigman (Wigman et al., 2011) was the best fit. This model as described previously, supports the theory of psychosis on a continuum with the five factors of hallucinations, paranoia, grandiosity, delusions and paranormal beliefs. The study supports that an understanding of this aspect of distress can help in modelling psychosis and related experiences.

One aspect of these subclinical experiences, which is relevant particularly when levels of distress are used, is that they may act as indicators for the development of clinical manifestations of psychosis as opposed to those experiences which are transitory in nature (Cougnard et al., 2007; Dominguez, Wichers, Lieb, Wittchen, & van Os, 2011; Hanssen, Bak, Bijl, Vollebergh, & van Os, 2005; van Os, 2009). Understanding what causes these transitory experiences to disappear for some individuals and to become clinically relevant for others has clear implications in terms of types of interventions and timing of interventions. If experiences of schizotypal traits start to develop these aspects of distress, that may be a way in which they indicate that they are progressing towards becoming PLEs and potentially becoming of clinical relevance.

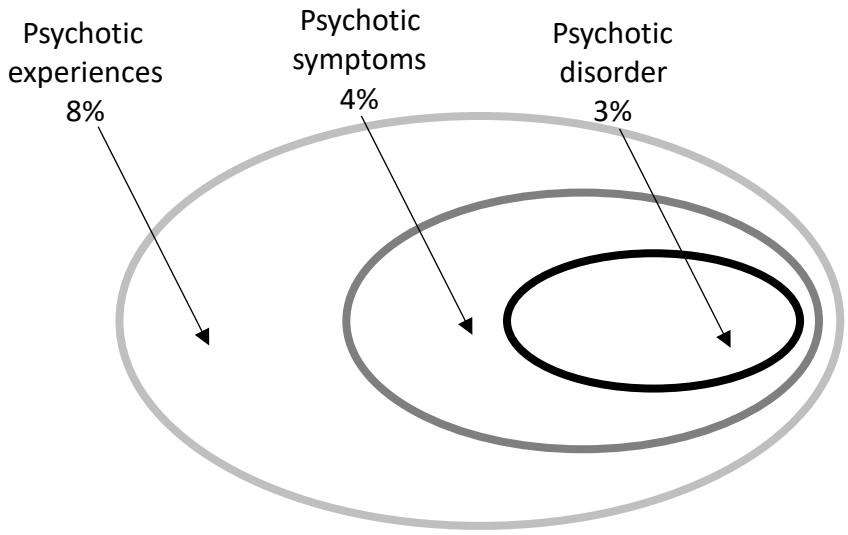
Krabbendam et al. (2004) discuss that one possible driver for pushing experiences towards clinical relevance is how the individual responds both cognitively and emotionally to the experience itself. An emphasis in research in this area has been that it is not the abnormal experience in itself that creates disorder, it is this response. The response is mediated by the beliefs that an individual holds and the appraisal they make (Bentall, Kinderman, & Kaney, 1994; Garety, Kuipers, Fowler, Freeman, & Bebbington, 2001; Morrison, 2001). Beliefs can come from a number of sources, including from a cultural perspective. Some degree of fear or mistrust of others can be incorporated in the society in which an individual is raised (Rossler et al., 2007).

A 2009 review by van Os and Kapur considers beliefs and cognitions and how they work in view of the links with dopamine regulation. The paper asks the question of why a change in dopamine regulation may lead a person to become convinced that colleagues or neighbours are conspiring against them. The paper looks at this change in dopamine concentration in the context of an individual experiencing something novel in the environment. The two occurring together may result in salience being given to certain objects, people or actions accompanied by the construction of new cognitive schemas in an attempt to understand this salience. The outcome of this process is the development of negative, positive or disorganised psychotic symptoms. Medication used for treatment may address the dopamine imbalance without addressing the environmental change or the neurobiological vulnerability which created the imbalance.

The rates of PLEs and schizotypal experiences in the general population are greater than the rates of diagnosed psychosis (Perala et al., 2007) with those who proceed to clinically defined psychosis representing the extreme end of the distribution

(Dominguez et al., 2011; Mason & Beavan-Pearson, 2005). Johns and van Os (2001) compare subclinical experiences versus clinical symptoms in psychosis to other continuously distributed characteristics such as blood pressure and glucose tolerance which only require treatment when they become clinically significant as hypertension and diabetes. In the same way the clinical manifestation of psychosis will only represent a minority of the total. This model which incorporates frequency of experiences and the distress associated with them supports experiences of non-pathology, schizotypal experiences, PLEs, moving into clinically relevant symptoms lying along a positively skewed distribution with most people reflecting non-pathology moving along to a small number who experience clinical levels of symptoms. Figure 3.1 shows variation along the continuum in terms of cumulative percentages (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009).

Figure 3.1 Psychosis Variation Along a Continuum



Reviews of the continuum include a systematic review by van Os et al. (2009) which examined studies of PLEs and performed a meta-analysis. The review included all reported incidence and prevalence studies and the subsequent meta-analysis had a range

of inclusion and exclusion criteria applied which resulted in the inclusion of 47 papers. The mean rate for PLEs was found to be around five percent and the mean incidence rate three percent. The report approximated that 75-90% of developmental psychotic experiences were transitory and that they disappeared over time. The study concluded that the evidence found pointed towards the proneness-persistence-impairment model of psychosis. This model considers that there is an interaction between genetic factors and this expression of a degree of psychosis, which in the presence of environmental risks and if not addressed, may become a clinically relevant expression of psychosis. The meta-analysis concluded that those risk factors are the same for PLEs and clinical expressions. An updated review of PLEs was conducted by Linscott and van Os in 2013. The study was again interested in testing the psychosis-proneness-persistence-impairment model using the increase in data available and it consciously adopted a more conservative approach which it achieved by using narrower focused inclusion criteria. Results from 61 cohorts showed a rate of 7.2% and a median annual incidence rate of 2.5%.

General population or community studies which show the differing rates of those experiencing psychotic manifestations versus those who are diagnosed, include a paper by Kendler, Gallagher, Abelson, and Kessler (1996). The report was based on the US National Comorbidity study. This was a community sample of 5877 participants. Initial screening was done using psychotic symptom probe questions and follow up interviews were done based on these by mental health professionals. The study found that clinical rates of psychosis in the sample were 0.7%. It also found that 28.4% of participants endorsed at least one of the psychosis screening questions. Although the study did not

address a measure of distress, these experiences are described for the purposes of this chapter as PLEs.

Poulton et al. (2000) used data from the Dunedin birth cohort (N=761). Participants were interviewed using structured diagnostic interviews at age 11 and at age 26. The study found prevalence rates at the clinical level to be at 3.7% for the participants at age 26. At the same age in terms of PLEs, 25% reported at least one delusional or hallucinatory experience. Using the Dutch NEMISIS study data (Bijl, van Zessen, Ravelli, de Rijk, & Langendoen, 1998), van Os et al. (2000) found clinical levels of endorsement of the 17 positive psychosis items of the Composite International Diagnostic Interview (CIDI) (World Health Organisation, 1997) to be 2.1%, while 17.5% of participants reported experiencing at least one of the items. The study was based on a representative, general population sample of 7176 males and females. Johns et al. (2004) addressed rates of self-reported psychotic experiences in a study which used a large scale, population based sample, the British Psychiatric Morbidity Survey. The survey comprised of 8580 participants, aged 16 – 74 years with a mean age of 45.36 (SD=15.61). The sample included 3852 males and 4728 females. Analysis was performed on responses to the five probe items of the Psychosis Screening Questionnaire (PSQ) (Bebbington & Nayani, 1995). These five items are associated with experiences of hypomania, thought insertion, paranoia, strange experiences and hallucinations and the survey was conducted by interviewing participants. Johns et al. (2004) found rates for endorsement of one or more of the screening items of 5.5%.

Rossler et al. (2007) used The Zurich Study for analysis of psychotic experiences in the general population. This was a study which began in 1979 with a sample of 591

participants aged 20/21 years. Follow-up interviews were conducted at age 23, 28, 30, 35 and 41. Over 20 years, 62% of the original sample continued to participate in the study. Semi-structured interviews were conducted using the SPIKE (Structured Psychopathological Interview and Rating of the Social Consequences of Psychological Disturbances for Epidemiology) for all waves. Questions were based on symptoms and rated according to the extent that they were experienced by the participant. Results showed two distinct dimensions. One represented psychotic symptoms while the other represented schizotypal signs depending on the point along the scale at which the participant reported the experience.

Murphy, Shevlin, and Adamson (2007) used LCA to focus on the positive symptoms of psychosis reported in a study using the British Psychiatric Morbidity Survey (described above). Analysis revealed four distinct classes which were labelled as ‘positive psychosis’ (1.0%), ‘paranoid’ (16.0%), ‘intermediate’ (7.1%) and ‘normative’ (75.9%). The ‘positive psychosis’ class had high probabilities of endorsing four out of the five screening items and was considered to be the most likely to indicate a clinical level of psychotic experience. The remaining were seen as PLEs with the ‘paranoid’ class endorsing the paranoia screening item in higher probabilities and the ‘intermediate’ class actively not endorsing the paranoia item at the same rate and showing similar endorsement of the remaining items to the paranoia class. The ‘normative’ class had low probabilities of endorsing four of the five items with a higher probability of endorsing hypomania only.

The Role of Childhood Trauma

An important element has emerged through the ever-growing body of research which disagrees that the diathesis element of the stress-diathesis model is necessarily a genetic predisposition (Braehler et al., 2013; Gallagher & Jones, 2013; Lataster et al., 2006; Read et al., 2001; Varese et al., 2012;). This section describes the theory of childhood trauma and its role in the development of psychosis. It initially explores the basis of the theory. It then reviews findings of a number of types of studies. The relationship between childhood trauma and PLEs has been addressed in a number of ways through research: general population studies which look at this link between PLEs and trauma; studies of traumatised groups which look at how the experience of trauma relates to the experience of PLEs within the group, and studies of clinical populations which look at how experiences of PLEs are related to trauma. Studies included in this section are systematic and meta-analytical reviews, then specifically, general population studies and studies of traumatised groups. Studies will be described in terms of the type of sample used, measurements used and pertinent results.

In 2001 Read et al. documented the theory of a Traumagenic Neurodevelopmental (TN) Model of schizophrenia which offered early traumatic events as a trigger for structural changes to the brain and pathways to psychotic experiences or symptoms. The theory offers that the experience of these traumas creates changes in neurological and biochemical development that centre in particular on over-reactivity of the hypothalamic-pituitary-adrenal (HPA) axis, changes in neurotransmitter systems and structural brain changes (Issa, Wilson, Terry, & Pillai, 2010; Jindal et al., 2010; Misiak et al., 2016; Velakoulis et al., 2006; Walker, Mittal, & Tessner, 2008). Galletly, Van Hooff, and McFarlane (2011) describe the impact that these traumas have on the

developing brain. The main impact is through the pathological effect that stress has on the hippocampus. Effects are posited to be created by the impact of elevation of cortisol and excitatory amino acids accompanied by a reduction in brain-derived neurotrophic factor (BDNF).

Read et al. (2001) offer a comprehensive review of studies providing evidence of this link between childhood abuse and brain changes. The TN Model purports that these neurological and biochemical changes are caused by the long lasting neurological effects of abuse in childhood. That these in particular create over reactivity of the HPA axis which results in changes in the neurotransmitter systems controlled by it. These lead to structural changes in the brain in terms of damage to the hippocampus, cerebral atrophy, ventricular enlargement and reversed structural cerebral asymmetry. The TN model asserts that by understanding these implications of childhood abuse, a better understanding can be reached of certain aspects of psychosis. These are

- the oversensitivity to stress that manifests in those with psychosis,
- cognitive impairments,
- pathways to both positive and negative symptoms,
- the relationship between psychotic and dissociative symptomology.

The evidence reviewed in the Read et al. (2001) paper is compelling as it involves participants who have been abused as children, participants who have been diagnosed with schizophrenia as children, adults who have been diagnosed with schizophrenia and adults who have survived childhood abuse. Evidence will be addressed in terms of

implications for the HPA axis, followed by neurotransmitter changes and concluding with structural changes.

Child abuse researchers believe that the trauma that is caused by abuse in children creates this sensitisation of the stress response which is controlled by the HPA axis and by peripheral release of hormones including epinephrine and cortisol (Perry & Pate, 1994). An additional pathway is suggested by Yehuda (1986) which proposes that low cortical response to trauma is followed by a decreased level of cortisol, which in turn leads to an increase in numbers of and responsibility of glutocorticoid receptors, which then leads to an increased negative feedback regulation loop and finally to a sensitised HPA axis.

Neurotransmitter involvement includes serotonin but is centred around dopamine in particular which features in the TN model as a lead on effect of the sensitisation of the HPA axis. As a result of the effect on the HPA axis, dopamine levels are increased which has been demonstrated in studies of stress paradigms using animals (Perry, 1998). This effect further increases in the presence of a constant stimulus, for example, greater synthesis of dopamine, norepinephrine and epinephrine has been found in sexually abused girls than in controls.

Evidence of the link between child abuse and structural changes of the brain in the TN Model is divided into

- evidence of hippocampal damage,
- cerebral atrophy,

- ventricle enlargement,
- reversed cerebral asymmetry.

The hippocampus is central for learning and memory functions and is very sensitive to stress activation. The effects of stress on the hippocampus include affecting its ability to store certain types of information such as verbal information (Perry, 1998). It is sufficiently sensitive that under certain stress conditions its capacity to control the reactivity of the HPA axis can be permanently reduced. Hippocampal damage has been found to be common in adults with a diagnosis of schizophrenia (Chua & Murray, 1996) and compellingly, Suddath, Christison, Torrey, Casanova, and Weinberger (1990) found reduced hippocampal volume in 14 out of 15 monozygotic (MZ) twins discordant for schizophrenia. Further, it has been shown that this reduction is predominantly in the anterior region which has been shown in animal studies to have a greater role in regulating cortisol levels (Regestein, Jackson, & Peterson, 1986).

The most consistently reported changes in adults diagnosed with schizophrenia are cerebral atrophy and ventricular enlargement (Harrison, 1995). In addition, these changes have been found in the same regions in children with early-onset schizophrenia (Frazier et al., 1996; Jacobsen et al., 1997; Jacobsen et al., 1998). It has been found that the condition progresses into adolescence but not into adulthood as ventricular size in adults diagnosed with schizophrenia is found to be static.

In most people the left side of the brain is larger than the right, referred to as cerebral asymmetry. In adults with schizophrenia however, this has become reversed (Chua & Murray, 1996) with strong evidence that the left side is also dysfunctional (Gur & Chin,

1999; Petty, 1999). This same condition has been found consistently in studies of children who have been abused (Green, Voeller, & Gaines, 1981; Ito, Glod, Ackerman, & Teicher, 1998; Teicher et al., 1997). It has also been found in studies of adults who were abused as children; in the case of Bremner, Randall, Vermetten, and Laurence (1997). This was after controlling for age, sex, race, handedness, education, body size and alcohol use. The cause of this asymmetry has been linked to production of norepinephrine, serotonin and dopamine which are activated by stress and distributed during development of the brain in childhood (Ito et al., 1998; Teicher et al., 1997).

As well as the evidence offered in the TN model paper (Read et al., 2001), other animal studies have addressed the effects of social stress in animals with evidence that shows reactivity in terms of dopamine levels. Morgan et al. (2002) conducted research on monkeys while Tidey and Mickzek (1996) focused on rodents. Both pieces of work were centred round the social defeat hypothesis (Selten & Cantor-Graae, 2005; Selten, van der Ven, Rutten, & Cantor-Graae 2013). This hypothesis purports that chronic experience of social defeat may lead to sensitisation of the mesolimbic dopamine system and that this in turn increases the risk of psychosis. The hypothesis looks to social defeat as the common denominator in findings which show the following as increasing risk of psychosis: urbanicity; being a migrant; being of low intelligence; the use of cannabis; having a hearing impairment or being deaf; a history of physical or sexual abuse.

There are a number of mechanisms by which these risk factors may cause long term experience of social defeat: the high levels of competition presented by living in a more urban area; fewer career opportunities for people of lower intelligence; the social

exclusion experienced by being a migrant or a member of the deaf community; the humiliation of abuse. The hypothesis does not believe that social defeat is necessary or sufficient for the development of psychosis but it does state that defeated populations will produce more cases of psychosis than non-defeated populations. Taking a wider perspective, the role of social defeat in those who experience mental health issues is not surprising given the role of social competition on evolution.

Two animal studies in particular look at this relationship between social dominance and dopamine activity in the brains of monkey and rodent samples using stress paradigms and neuroreceptor imaging studies. Morgan et al. (2002) examined dopaminergic reactivity in monkeys who were housed individually compared to being in social housing. The study found that when social housing was used, for dominant monkeys, levels of dopamine remained the same. For monkeys housed individually or subordinate monkeys placed in social housing, levels of dopamine increased. Tidey and Miczek (1996) used the resident-intruder paradigm to examine dopamine reactivity in rodents. An intruder rat was placed into the cage of a resident rat which then attacked the intruder and forced it to behave submissively. What was reflected in the brain of the submissive rodent was once again increased dopamine levels in the mesocorticolimbic system. Further, it was found that if the intruder was kept isolated for a long time after the forced submission, this change was amplified, whereas a return to the group mitigated the effects. In addition, it was also found that repeated experiences lead to lasting behavioural sensitisation, an effect which has been confirmed by a number of studies (Covington & Miczek, 2001; McLaughlin, Li, Valdez, Chavkin, & Chavkin, 2006).

The documentation of the TN Model marked the start of an intense period of study of the relationship between psychosis and childhood trauma (Ashcroft, Kingdon, & Chadwick, 2012; Bendall, Jackson, Hulbert, & McGorry, 2008; Braehler et al., 2013; Gallagher & Jones, 2013; Johnstone, 2009; Misiak et al., 2016). Bendall et al. (2008) performed a systematic review of the evidence linking childhood trauma and psychotic disorders. This review included 46 studies. Of the 46 studies, 38 were studies of the prevalence of childhood trauma in groups with psychotic disorder and 8 of the studies measured the prevalence of psychosis in groups who had experienced childhood trauma. The report did conclude that it was difficult to perform a comprehensive review as only six studies were considered robust enough to allow conclusions to be drawn. This was mainly due to a lack of adequate control groups. The report concluded that although there could be no quantification of an association between childhood trauma and psychosis by meta-analysis, there was preliminary evidence of such an association which warranted further investigation.

By 2012, investigation by meta-analysis did provide some conclusions (Varese et al., 2012). One of the most important of these was that after stratifying all analyses included to assess the issue of design effect, the differences caused by using different designs were found to be non-significant. This allows confidence in the meta-analysis results in both this case and in the case of the previous review by Bendall et al. (2008). Varese et al. (2012) looked at the link between childhood adversity and the development of psychosis. The study used 10 cohort studies, 8 large scale cross-sectional studies and 18 case control studies which were conducted between January 1980 and November 2011. Results were that the experience of childhood trauma increased the risk by over two times with an odds ratio of 2.8 (Varese et al., 2012). A further 2013 meta-analysis

(Bonoldi et al., 2013) showed that rates of childhood adversity are highly prevalent among patients diagnosed on the psychotic spectrum. This review used 23 studies conducted between 1988 and 2011 which included 2017 psychotic participants. Sexual abuse was estimated at a prevalence rate of 26%, physical abuse at a prevalence rate of 39% and emotional abuse at a prevalence rate of 34%.

Reviews and studies have also addressed this link between childhood adversity and the development of psychosis at a subclinical level. General population studies include a study by Sommer et al. (2010) that analysed healthy individuals who experienced auditory hallucinations. This was a sample of 103 participants who experienced hallucinations frequently, matched with 60 controls who had never experienced hallucinations. Matching was done on the basis of sex, age and education. Face to face interviews were conducted with psychiatrists as part of the study and none of the participants matched the criteria for a clinical diagnosis. Experiences were rated using the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991) and the Peters Delusion Inventory (PDI) (Peters, Joseph, Day, & Garety, 2004). The study found that compared with the matched controls, those who experienced frequent hallucinations were more likely to have experienced childhood trauma and also to have a family history of an Axis I disorder on the DSM. Childhood trauma was statistically associated with the presence of hallucinations in the 103 participants. The study concluded that there were two possible mechanisms behind the findings. The first was that experience of childhood trauma leads to an altered perception of the world, captured in the elevated SPQ and PDI scores, the second was that childhood trauma is more likely to occur in families with a predisposition to schizotypal disorder as reflected in the association with a family history of psychiatric diagnosis.

Other studies have also chosen experiences of auditory and visual hallucinations to address prevalence in nonclinical individuals. Tien (1991) estimated rates to be 10% for males and 15% for females in a study which used two samples. The first sample was The Sidgwick Study (Sidgwick, Johnson, Myers, Podmore, & Sidgwick, 1894) which addressed surveyed 17,000 adults in England, Russia and Brazil between 1889 and 1892. The second sample was from the Epidemiologic Catchment Area (ECA) program (Eaton & Kellser, 1985). This was comprised of a sample of 18,572 participants in the first wave and 15,258 followed-up in the second wave. The survey was conducted in America between 1980 and 1984.

Studies of traumatised groups include the Lataster et al. (2006) study which used two experiences of adversity in childhood to examine the link specifically between childhood traumas and non-clinical psychotic experiences. The experiences that were used were unwanted sexual experiences and being bullied. The study found that in a sample of 1290 young people with a mean age of 14 (SD=1), there was a strong dose-response relationship between these experiences and the development of non-clinical psychotic experiences. Bullying had an odds ratio of 2.9, while sexual trauma had an odds ratio of 4.8. A 2011 study by Galletly et al. looked at the link between subclinical experiences and childhood adversity. The specific focus of the study was to assess if exposure to Australian bush fires would increase endorsement of psychotic experiences. The study included a sample and a control group. The sample was 865 children who had been exposed to the bushfires and 725 who had not. The mean age was 7.93 years (SD = 2.26). A follow up study was conducted 20 years later which was comprised of 529 of the group who had been exposed to the bushfire and 464 from the control group. At this stage the mean age of the sample was 28.17 years (SD = 2.30). Although the bushfires

were the main focus, the study used the standard list of ten Criterion-A events from CIDI (World Health Organisation, 1997) which included a systematically recoded list of the 'other' category to create an additional seven traumas. Also used was the Adverse Childhood Experiences scale (ACE) (Dube et al., 2003) to create a comprehensive list of traumas in childhood, adolescence and young adulthood. These included rape, sexual molestation, serious physical attack, domestic violence, witnessing domestic violence, childhood physical abuse and childhood emotional abuse. The presence of subclinical psychotic experiences was explored using the psychosis screen from the Australian National Survey of Health and Well-Being (Degenhardt & Hall, 2001). The screen contained four initial questions, three of which had further probe questions if an endorsement occurred at the higher level. Whilst the study found that there was no significant association between the bushfire and endorsement of screening questions, it did find other associations. Of the total sample, 5.6% endorsed at least one psychosis screening item. A further 2.6% endorsed at the probe question level. Endorsement was associated significantly with a range of variables including childhood adversity. Other significant associations were with emotional and behavioural disturbance, dysfunctional parenting, alcohol use and cannabis use. The study also found that endorsement was more common in those who had been exposed to multiple traumas.

Gender Differences

Shevlin et al. (2011) discuss the fact that most studies which investigate the link between child abuse and the experience of levels of psychosis either only study these in the context of one gender or fail to analyse findings by gender in spite of the fact that gender differences do exist. While findings have been contradictory, it has been consistently found that females tend to report experiencing positive symptoms more

frequently, while males tend to report experiencing more negative symptoms (Fossati et al., 2003; Maric, Krabbendam, Vollebergh, de Graaf, & van Os, 2003; van Os et al., 2000). In terms of incidence rates, van Os and Kapur (2009) discuss them in the context of the medical models' diagnostic categories. Those categories which are biased towards negative symptoms and long duration of illness reflect higher incidence rates for men. Those biased towards affective symptoms and brief duration do not show a gender bias. Fossati et al. (2003) looked at this gender issue in the context of schizotypal personality and also found that females scored higher than males on scales which measure positive symptoms while males scored higher on scales of social and physical anhedonia and negative symptom groupings. Maric et al. (2003) addressed gender differences in psychotic experiences in a general population sample at the subclinical level. They found the finding to be consistent in this sample type also.

Other gender differences are also reported (Seeman, 2013). Incidence of psychosis at a clinical level is 1.4 times higher for males than females. Females have a later age of onset which may also be related to the lower prevalence rates, females social functioning is less affected by the illness after diagnosis and females show a better response to treatment.

Seeman (2013) addresses in particular the relationship between gender, trauma and psychosis. More females report abuse, and in particular sexual abuse, which has been shown to predict more strongly an experience of hallucinations, which are shown to be reported by more females than males. Although Fisher et al. (2009) reported that while being female moderated the relationship between trauma and psychosis while being male did not, the literature overwhelming supports that the relationship between abuse

and psychosis is not moderated by gender. Shevlin, Murphy, and Read (2015b) found that sexual trauma predicted probably psychosis in both males and females. After controlling for potential confounding variables, odds ratios did not differ significantly according to gender. This study suggests that methodological limitation such as low prevalence rates of psychosis and sexual trauma for males leads to low statistical power making complex hypotheses such as this hard to test.

Summary

Not all psychotic experiences manifest at a clinical level in the population. Schizotypal experiences, PLEs and PEs are reported in population samples along a continuum. The pattern of distribution which underlies these experiences is skewed, with the majority of the population not having any experiences, moving along to a lesser number experiencing subclinical manifestations. These may range in intensity and in the need for intervention from schizotypal experiences to PLEs. At this point distress does start to manifest and become an issue. The right-hand side of the distribution shows a small amount of individuals who pass into the clinically relevant section of the distribution when subclinical becomes clinical and distress is maximum.

Developing an understanding of how and when these experiences occur and how some become relevant at a clinical level has implications for research and for designing interventions that are used at the appropriate time and given to the appropriate people. Research strongly supports the link between childhood adversity and the development of this range of psychotic experiences as one potential pathway to psychosis. To develop an understanding of the link between childhood adversity and the PLEs which people experience at a sub-clinical level, the next step in the present study was to

address the associations between the gender specific trauma classes identified in chapter 2 and the schizotypal and PLEs as divided into the symptom clusters of cognitive/perceptual, social/interpersonal and disorganised, in line with the three-factor model.

Rates of endorsement of the three levels contained in the data were,

- those who did not endorse,
- those who endorsed having some experience
- those who endorsed having the experience accompanied by a level of disruption.

Performing this review in the context of the childhood trauma class memberships would allow an examination of this distribution in the context of these childhood traumas. An important element of this study is to address these separately for males and for females.

The aims of this chapter were firstly, to explore endorsement rates of schizotypal experiences and PLEs in the sample within the context of trauma profiles developed in chapter 2. The second aim was to examine if responses to the questions asked reflected a skewed distribution in line with the continuum i.e. are responses decreasing in line with responses of ‘no’, ‘yes’ and ‘yes with distress’. The third aim of this chapter was to add to expand the existing literature concerning gender differences around schizotypal experiences and PLEs by addressing males and females separately in line with the separation of the trauma classes by gender. Finally, this chapter addressed if there is an ordered relationship between the experiences of abuse represented by the trauma profiles, and endorsement rates of schizotypal experiences and PLEs.

Method

Sample and Procedures

Analysis was conducted on the second wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Dawson, & Hasin, 2004). The NESARC is a longitudinal survey that was designed to be representative of the civilian, noninstitutionalized adult population of the United States, including residents of the District of Columbia, Alaska, and Hawaii. The dataset is described in chapter 2.

Measures

Chapter 2 used questions from section 13 of the NESARC wave 2 dataset to conduct a LCA to identify groups of people who had shared experiences in relation to trauma and abuse. This current chapter used questions from section 10 of the dataset which relate to personality disorders including schizotypal personality disorder. The questions in this section were designed to be similar in concept to well established measures such as the Structured Clinical Interview for DSM disorders, version II (SCID-II) (First, Gibbon, Spitzer, Williams, & Benjamin, 1997) and the International Personality Disorders Examination (IPDE) (Loranger et al., 1994). This section of the NESARC which relates specifically to schizotypal personality disorder has been tested and reliability is reported as .67 in smaller samples (Ruan et al., 2008). Internal consistency of the section has been reported as .83. For this current study the questions were grouped according to symptom cluster as reflected in the three-factor model (Raine et al., 1994). The symptom clusters used were cognitive/perceptual, social/interpersonal and disorganised as outlined in Table 3.1.

Statistical Analysis

SPSS Version 21 Release 21.0.0.0 was used to conduct analysis using the class membership variables which represented membership according to gender and shared experiences of the traumas identified – neglect, physical abuse, IPV against the mother, molestation, sexual abuse and having a parent with mental health issues. Cross tabulations were conducted against responses to the items from section 10 of NESARC representing usual experiences.

Table 3.1 Symptom Clusters and Underlying Screening Items

Symptom Cluster	Screening Item
Cognitive / perceptual	Have you had personal experiences with the supernatural?
	Have you had the sense that some force is around you, even though you cannot see anyone?
	Have you believed that you have a 'sixth sense' that allows you to know and predict things that other people can't?
	Have you often seen auras or energy fields around people?
	Have you ever thought that you can make things happen just by making a wish or thinking about them?
	Have you often thought that shadows or objects are really people or animals, or that noises are actually people's voices?
	Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?
Social / Interpersonal	Have you had trouble expressing your emotions and feelings?
	Have you rarely shown emotion?
	Have you often felt nervous when you were with other people, even if you have known them for a while?
	Have you felt suspicious of people, even if you have known them for a while?
	When you are around people, have you often had the feeling that you are being watched or stared at?
	Have there been very few people that you're really close to outside of your immediate family?

Symptom Cluster	Screening Item
Disorganised	Have people thought you act strangely?
	Have people thought you have strange ideas?
	Have people thought you were odd, eccentric or strange?

Results

Introduction

The tables in this section show frequencies of endorsement of PLEs for the symptom clusters. Tables 3.2 to 3.7 show unweighted count and weighted percentage endorsement again, by symptom cluster for each individual item within the cluster. Frequencies are shown for each PLE, across class membership. Tables 3.2 and 3.3 show frequencies by class membership for the cognitive/perceptual symptom cluster. Tables 3.4 and 3.5 show frequencies by class membership for the social/interpersonal symptom cluster. Tables 3.6 and 3.7 show frequencies by class membership for the disorganised symptom cluster. Tables 3.2, 3.4 and 3.6 show frequencies for symptom clusters for males. Tables 3.3, 3.5, and 3.7 show frequencies for symptom clusters for females. Tables 3.8 and 3.9 summarise the ranges of endorsement of items within the PLE symptom clusters – cognitive/perceptual, social/interpersonal and disorganised, by class for each gender.

Frequencies of endorsement are described for each gender, across and within each symptom cluster, at the level of each individual PLE in terms of both the PLE and in terms of class membership. Frequencies of endorsement are shown at three levels. The first level is those who said no to the item, that they had not experienced it. The second level is those who said yes, that they had experienced it. The third level is those who said yes, they had experienced it and that they had experienced it at such a level that it had disrupted their life. Results will concentrate on describing those who replied ‘yes’ and ‘yes with disruption’. The results section will conclude by describing and comparing formal tests of association between each class and PLE across each symptom cluster.

For males, there were three classes identified. The largest male class was the ‘baseline’ class (N=13,299). This class represented 38.7% of the total sample (N=34,653) and was characterised by low frequencies endorsing any of the trauma variables. The smallest males class was the ‘sexual abuse’ class (N=117). This class represented 0.3% of the total sample and was characterised by increased experience of sexual abuse. An intermediate class, the ‘physical abuse’ class (N=1061) represented 3.1% of the total sample. This class was characterised by increased experience of physical abuse. For females there were four classes identified. The largest female class was the ‘baseline’ class (N=17,090). This class represented 49.6% of the total sample (N=34,653) and was characterised by low frequencies endorsing any of the trauma variables. The smallest female class was the ‘physical and sexual abuse’ class (N=405). This class represented 1.2% of the total sample and was characterised by increased experience of both sexual and physical abuse. For females there were two intermediate classes. The ‘physical abuse’ class (N=1576) represented 4.6% of the total sample. This class was characterised by increased experience of physical abuse. The ‘sexual abuse’ class (N=903) represented 2.6% of the total sample. This class was characterised by increased experience of sexual abuse.

Cognitive/Perceptual Symptom Cluster

Males – Endorsement

For males, Table 3.2 shows frequencies in terms of unweighted counts and weighted percentages for each of the cognitive/perceptual PLEs, across the three male classes. The range of frequencies for those males who said ‘yes’ across all PLE items in the cognitive/perceptual grouping was from 1.1% to 41.1%. The lowest endorsement

came from the ‘baseline’ class, the highest came from the ‘sexual abuse’ class. In terms of the individual PLEs, the item, ‘Have you had the sense that some force is around you, even though you cannot see it?’, is endorsed in the highest frequencies. For this item, endorsement ranges from 16.0% to 41.1% at the level of male participants who replied yes. The lowest frequency came from the ‘baseline class’, the highest came from the ‘sexual abuse’ class. The item ‘Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?’, was endorsed in frequencies from 6.7% to 23.4%. The lowest frequency for this item came from the ‘baseline class’, the highest came from the ‘sexual abuse’ class. The item, ‘Have you had personal experiences with the supernatural?’, was endorsed in frequencies from 6.8% to 23.3%. The lowest frequency came from the ‘baseline class’, the highest came from the ‘sexual abuse’ class.

Those items which were at the lowest end in terms of frequencies were firstly the item, ‘Have you often thought that shadows or objects were really people or animals, or that noises are actually people voices?’, which was endorsed by 1.1% to 6.3% of male participants. Secondly, ‘Have you often seen auras or energy fields around people?’, which was endorsed by 1.7% to 13.8% of male participants. In both cases the lowest frequency came from the ‘baseline class’, the highest came from the ‘sexual abuse’ class.

In terms of class membership for this level of endorsement of the cognitive/perceptual PLEs (those who said ‘yes’), those in the smallest class for males, the ‘sexual abuse’ class, showed the highest rates of endorsement. The

'sexual abuse' class frequencies ranged from 6.3% to 41.1%. The 'physical abuse' class endorsed the cognitive/perceptual PLEs at this level in frequencies from 2.3% to 25.6%. The 'baseline' class showed the lowest levels of endorsement with frequencies ranging from 1.1% to 16.0%. In terms of class membership endorsement, all of the lower end frequencies were for the item, 'Have you often thought that shadows or objects were really people or animals, or that noises are actually people voices?' while all of the highest frequencies, in each class were for the item, 'Have you had the sense that some force is around you, even though you cannot see it?'.

Males – Endorsement with Disruption

This section will address endorsement of the cognitive/perceptual items, for males, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies.

In terms of the PLEs, two PLEs were endorsed at an upper level of 2.9% which was the highest frequency. The first item was, 'Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?' which was endorsed at this level from 0.8% to 2.9%. The lowest endorsement came from the 'baseline' class, the highest came from the 'physical abuse' class. The second item was, 'Have you believed that you have a 'sixth sense' that allows you to know and predict things that other people can't?'. This item was endorsed, at this level, from 0.5% to 2.9%. The lowest endorsement came from the

‘baseline class’, the highest came from the ‘sexual abuse’ class. The lowest endorsed item was, ‘Have you often seen auras or energy fields around people?’, which was endorsed in frequencies from 0.1% to 0.6%. The lowest endorsement came from the ‘baseline class’, the highest came from the ‘sexual abuse’ class.

In terms of class membership, the ‘physical abuse’ and ‘sexual abuse’ classes endorsed in similar frequency ranges. For the ‘physical abuse’ class, frequencies ranged from 0.3% to 2.9%. For the ‘sexual abuse’ class, the range was 0.1% to 2.9%. The ‘baseline’ class endorsed in the lowest frequencies, 0.1% to 0.8%. This grouping, the cognitive/perceptual symptom cluster was endorsed in the lowest frequencies at this ‘disrupted’ level by males. Looking specifically at the items endorsed at this level, across the classes, both the ‘physical abuse’ and the ‘baseline’ classes endorsed, ‘Have you often seen auras or energy fields around people?’ in the lowest frequencies (0.1% and 0.3% respectively) and, ‘Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?’, in the highest frequencies (0.8% and 2.9% respectively). The ‘sexual abuse’ class endorsed, ‘Have you had personal experiences with the supernatural?’, in the lowest frequencies at 0.1% and ‘Have you believed that you have a ‘sixth sense’ that allows you to know and predict things that other people can’t?’, in the highest frequencies at 2.9%.

Table 3.2 Counts, Percentage of PLE Grouping and Percentage of Class Membership Grouping Against Responses to PLE Cognitive/Perceptual Questions for Males.

	PLE Response	Physical Abuse (N=1061:3.1%) N	PLE %	Class %	Sexual Abuse (N=117:0.3%) N	PLE %	Class %	Baseline (N=13299:38.7%) N	PLE %	Class %
Have you had personal experiences with the supernatural?	14424									
No	13244	893	6.3	85.3	85	0.6	76.5	12266	93.1	92.8
Yes	1107	147	12.2	13.0	31	2.4	23.3	929	85.5	6.8
Yes and has disrupted my life	73	16	24.6	1.7	1	0.2	0.1	56	75.1	0.4
$X^2(4,14424)=150.180,P<0.01$										
Have you had the sense that some force is around you, even though you cannot see anyone?	14435									
No	11832	752	6.0	72.0	63	0.5	57.2	11017	93.5	83.5
Yes	2500	279	10.4	25.6	49	1.8	41.1	2172	87.8	16.0
Yes and has disrupted my life	103	24	25.1	2.3	4	2.0	1.7	75	72.9	0.5
$X^2(4,14435)=178.899,P<0.01$										
Have you believed that you have a 'sixth sense' that allows you to know and predict things that other can't?	14447									
No	13292	897	6.3	85.6	84	0.6	75.5	12321	93.1	93.7
Yes	1066	154	14.0	13.1	26	2.5	21.6	886	83.5	5.8
Yes and has disrupted my life	89	15	15.5	1.3	6	3.9	2.9	68	80.6	0.5
$X^2(4,14447)=184.403,P<0.01$										

	PLE Response	Physical Abuse (N=1061:3.1%) N	PLE %	Class %	Sexual Abuse (N=117:0.3%) N	PLE %	Class %	Baseline (N=13299:38.7%) N	PLE %	Class %
Have you often seen auras or energy fields around people?	14451									
No	14090	1009	6.7	95.8	101	0.6	85.5	12980	92.7	98.1
Yes	333	44	13.6	3.9	14	5.2	13.8	275	81.3	1.7
Yes and has disrupted my life	28	5	14.5	0.3	1	3.3	0.6	22	82.2	0.1
$X^2(4,14451)=76.258,P<0.01$										
Have you ever thought you can make things happen just by making a wish or thinking about them?	14456									
No	13388	919	6.4	87.6	93	0.6	81.0	12376	93.0	93.8
Yes	990	120	12.3	11.3	19	2.0	16.5	851	85.7	5.8
Yes and has disrupted my life	78	17	15.5	1.1	5	4.1	2.6	56	80.5	0.4
$X^2(4,14456)=112.548,P<0.01$										
Have you often thought that shadows or objects are really people or animals, or that noises are actually people's voices?	14446									
No	14205	1024	6.7	96.6	108	0.7	93.1	13073	92.6	98.7
Yes	192	25	13.0	2.3	7	3.9	6.3	160	83.2	1.1
Yes and has disrupted my life	49	11	28.1	1.2	1	1.6	0.6	37	70.3	0.2
$X^2(4,14446)=47.594,P<0.01$										

	PLE Response	Physical Abuse (N=1061:3.1%) N	PLE %	Class %	Sexual Abuse (N=117:0.3%) N	PLE %	Class %	Baseline (N=13299:38.7%) N	PLE %	Class %
Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?	14375									
No	13016	855	6.1	82.6	84	0.6	75.9	12077	93.3	92.5
Yes	1199	153	13.4	14.6	28	2.3	23.4	1018	84.3	6.7
Yes and has disrupted my life	160	38	21.5	2.9	2	0.6	0.8	120	77.9	0.8
$X^2(4,14375)=170.612,P<0.01$										

Females - Endorsement

For females, Table 3.3 shows frequencies in terms of unweighted counts and weighted percentages for each of the cognitive/perceptual PLEs, across the four female classes. In terms of the PLEs, the item, 'Have you had the sense that some force is around you, even though you cannot see it?', was endorsed in the highest frequencies. For this item, endorsement ranged from 16.4% to 34.9% at the level of female participants who replied yes. The item 'Have you had personal experience with the supernatural', was endorsed in frequencies from 7.6% to 20.3%. The item, 'Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message', was endorsed in frequencies from 6.7% to 17.9%.

Those items which were at the lowest end in terms of frequencies of endorsement were the items, 'Have you often thought that shadows or objects were really people or animals, or that noises are actually people voices?', which was endorsed by 1.1% to 2.7% of female participants and 'Have you often seen auras or energy fields around people?', which was endorsed by 1.9% to 6.9% of female participants. The range of frequencies for those females who said 'yes' across all PLE items in the cognitive/perceptual grouping was from 1.1% to 34.9%.

In terms of class membership for this level of endorsement of the cognitive/perceptual PLEs (those who said 'yes'), those in the 'sexual abuse' class which is the second smallest class for females representing 2.6% of the total sample, showed the highest rates of endorsement. In addition, they also had the widest range of endorsement. The 'sexual abuse' class frequencies ranged from 1.8% to 34.9%.

Table 3.3 Counts, Percentage of PLE Grouping and Percentage of Class Membership Grouping Against Responses to PLE Cognitive/Perceptual Questions for Females.

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have you had personal experiences with the supernatural?	19907												
No	17992	305	1.5	76.7	1324	7.0	84.8	709	3.9	77.7	15654	87.6	92.0
Yes	1778	80	3.7	18.8	216	11.4	13.5	172	10.5	20.3	1310	74.4	7.6
Yes and has disrupted my life	137	19	12.7	4.5	29	18.9	1.6	20	14.2	2.0	69	54.7	0.4
$X^2(6,19907)=437.963,P<0.01$													
Have you had the sense that some force is around you, even though you cannot see anyone?	19898												
No	16055	248	1.4	64.8	1116	6.6	71.3	574	3.5	62.4	14117	88.5	83.1
Yes	3680	135	2.9	30.1	418	10.8	26.5	304	8.8	34.9	2823	77.5	16.4
Yes and has disrupted my life	163	22	11.9	5.1	37	21.3	2.1	23	16.1	2.6	81	50.7	0.4
$X^2(6,19898)=538.911,P<0.01$													
Have you believed that you have a 'sixth sense' that allows you to know and predict things that other can't?	19914												
No	17877	315	1.6	83.2	1327	7.1	86.4	728	4.2	83.5	15507	87.1	92.0
Yes	1904	75	3.0	14.4	214	10.5	11.9	154	7.9	14.5	1461	78.7	7.7
Yes and has disrupted my life	133	15	8.0	2.4	30	24.3	1.7	19	17.8	2.0	69	49.9	0.3

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
$X^2(6,19914)=292.081,P<0.01$													
Have you often seen auras or energy fields around people?	19921												
No	19321	365	1.7	93.5	1474	7.2	94.1	831	4.3	92.4	16651	86.8	98.0
Yes	560	29	3.8	5.3	87	16.7	5.5	66	12.9	6.9	378	66.6	1.9
Yes and has disrupted my life	40	9	11.2	1.2	8	17.7	0.4	6	17.2	0.7	17	53.8	0.1
$X^2(6,19921)=270.692,P<0.01$													
Have you ever thought you can make things happen just by making a wish or thinking about them?	19921												
No	18531	349	1.7	88.7	1411	7.2	90.9	797	4.3	89.0	15974	86.8	94.3
Yes	1302	48	3.0	10.3	142	10.5	8.3	93	7.8	10.1	1019	78.6	5.4
Yes and has disrupted my life	88	7	4.9	1.0	19	16.5	0.8	10	12.0	1.0	52	67.0	0.3
$X^2(6,19921)=119.660,P<0.01$													
Have you often thought that shadows or objects are really people or animals, or that noises are actually people's voices?	19927												
No	19562	379	1.7	95.6	1510	7.3	96.5	871	4.5	96.6	16802	86.5	98.7
Yes	290	14	3.6	2.7	47	15.1	2.6	20	6.4	1.8	209	74.9	1.1
Yes and has disrupted my life	75	9	8.3	1.7	16	19.1	0.9	12	20.3	1.6	38	52.4	0.2

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
$X^2(6,19927)=135.037,P<0.01$													
Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?	19786												
No	17802	307	1.5	77.3	1302	7.0	85.7	722	4.2	82.9	15471	87.3	92.6
Yes	1749	71	4.1	17.9	216	12.1	12.4	144	8.2	13.7	1318	75.6	6.7
Yes and has disrupted my life	235	25	8.4	4.7	45	13.9	1.8	34	15.9	3.4	131	61.9	0.7
$X^2(6,19786)=380.279,P<0.01$													

The smallest class for females, the ‘physical and sexual abuse’ class which represented 1.2% of the entire sample had the next highest frequency of endorsement over all the cognitive/perceptual items. Endorsement ranged from 2.7% to 30.1%. The ‘physical abuse’ class which represented 4.6% of the entire sample endorsed the cognitive/perceptual PLEs at this level in frequencies from 2.6% to 26.5%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 1.1% to 16.4%. In terms of class membership endorsement, all of the lower end frequencies were for the item, ‘Have you often thought that shadows or objects were really people or animals, or that noises are actually people voices?’ while all of the highest frequencies, in each class were for the item, ‘Have you had the sense that some force is around you, even though you cannot see it?’. This reflected the pattern of endorsement for males in terms of the item which was highest across all classes and that which was lowest.

Females – Endorsement with Disruption

This section will address endorsement of the cognitive/perceptual items, for females, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies. Endorsement was at higher percentages than for males in the same symptom cluster.

In terms of the individual PLEs, the item which was endorsed at the highest frequency was, ‘Have you had the sense that some force is around you, even though you cannot see it?’. This was endorsed in the range 0.4% to 5.1%. This reflected the

item highest endorsed at the level of the respondent replied ‘yes’. The next highest item that was endorsed was, ‘Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?’ which was endorsed at this level from 0.7% to 4.7%. This item was closely followed by, ‘Have you had personal experiences with the supernatural?’ which was endorsed at this level from 0.4% to 4.5%. The lowest endorsed item was, ‘Have you ever thought that you can make things happen just by making a wish or thinking about them?’, which was endorsed in frequencies from 0.3% to 1.0%.

In terms of class membership for this level of endorsement of the cognitive/perceptual PLEs a different pattern emerged than at the level of those who said ‘yes’ but who did not indicate that the item had disrupted their lives. Those in the ‘physical and sexual’ abuse class, the smallest female class, endorsed in both larger and in a wider range of frequencies, from 1.0% to 5.1%. Those in the ‘sexual abuse’ class which is the second smallest class for females representing 2.6% of the total sample, endorsed at this level, with disruption, in frequencies that ranged from 0.7% to 3.4%. The ‘physical abuse’ class which represented 4.6% of the entire sample endorsed the cognitive/perceptual PLEs at this level in frequencies from 0.4% to 2.1%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 0.1% to 0.7%. In terms of class membership endorsement, most of the lower end frequencies were for the item, ‘Have you often seen auras or energy fields around people?’ with the exception of the lowest item endorsed at this level by the ‘physical and sexual abuse’ class which was ‘Have you ever thought that you can make things happen just by making a wish or thinking about them?’. The highest frequencies, in each class were for one of two items, ‘Have you had the sense

that some force is around you, even though you cannot see it?' which was endorsed at the higher level by the 'physical and sexual abuse' class at 5.1% and by the 'physical abuse' class at 2.1% or, 'Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?' which was endorsed at the higher level by the 'sexual abuse' class at 3.4% and by the 'baseline' class at 0.7%.

Social/Interpersonal Symptom Cluster

Male Endorsement

For males, Table 3.4 shows frequencies in terms of unweighted counts and weighted percentages for each of the social/interpersonal PLEs, across the three male classes. The range of frequencies for those males who said 'yes' across all PLE items in the social/interpersonal grouping was from 3.9% to 41.1%. In terms of the individual PLEs, the item, 'Have there been few people that you're really close to outside of your immediate family?', is endorsed in the highest frequencies. For this item, endorsement ranges from 29.7% to 41.1% at the level of male participants who replied yes. The item 'Have you felt suspicious of people, even if you have known them for a while?', was endorsed in frequencies from 8.6% to 26.8%. The item, 'Have you rarely shown emotion?', was endorsed in frequencies from 19.4% to 23.0%. This symptom group for males was notable in that it had several items for which the lower range was high in comparison to all other PLE symptom groups lower range percentage for males. Of particular interest were the lower percentages for the items, 'Have there been few people that you're really close to outside of your immediate family?' (29.7%), and the item, 'Have you rarely shown emotion?' (19.4%).

Those items which were at the lowest end in terms of frequencies were the items, ‘Have you often felt nervous when you are with other people, even if you have known them for a while?’, which was endorsed by 3.9% to 13.6% of male participants, and ‘Have you had trouble expressing your emotions and feelings?’, which was endorsed by 9.7% to 17.4% of male participants.

In terms of class membership for this level of endorsement of the social/interpersonal PLEs (those who said ‘yes’), those in the smallest class for males, the ‘sexual abuse’ class, showed the highest rates of endorsement. The ‘sexual abuse’ class frequencies ranged from 13.6% to 41.1%. The ‘physical abuse’ class endorsed the social/interpersonal PLEs at this level in frequencies from 9.3% to 40.1%. The upper level was similar between the ‘sexual abuse’ and the ‘physical abuse’ class for this symptom cluster. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 3.9% to 29.7%. These ranges and percentages were higher than for males endorsing at this level in the cognitive/perceptual symptom cluster, particularly for the baseline class.

In terms of class membership endorsement at the level of individual PLEs in this symptom cluster, all of the lower end frequencies were for the item, ‘Have you often felt nervous when you are with other people, even if you have known them for a while?’ while all of the highest frequencies, in each class were for the item, ‘Have there been few people that you’re really close to outside of your immediate family?’.

Male Endorsement with Disruption

This section will address endorsement of the social/interpersonal items, for males, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies than for those who said 'yes' but who did not indicate disruption. The item endorsed at the highest frequency, 5.4% to 13.2%, was 'Have you had trouble expressing your emotions and feelings?'. The lowest endorsed item was, 'Have you often felt nervous when you are with other people, even if you have known them for a while?', which was endorsed in frequencies from 1.0% to 5.8%. The item 'Have there been few people that you're really close to outside of your immediate family?', went from being the highest endorsed item at the level of replying 'yes' (29.7% to 41.1%) to being the lowest endorsed item at this level which indicated disruption to the respondent's life, with endorsement levels from 1.1% to 3.2% in comparison to the highest endorsed item at this level, 'Have you had trouble expressing your emotions and feelings?' which was the second lowest endorsed at the initial level.

In terms of class membership, the 'physical abuse' class endorsed in the highest frequencies from 2.9% to 13.2%. The 'sexual abuse' class was the next highest endorsing class with a range of 3.2% to 11.8%. The baseline class endorsed in the lowest frequencies, 1.0% to 5.4%.

Frequencies overall were higher compared to the cognitive/perceptual symptom grouping. The overall range for the social-interpersonal symptom grouping at this

level was 1.0% to 13.2% while for the cognitive/perceptual symptom grouping it was 0.1% to 2.9%.

Looking specifically at the items endorsed at this level for social/interpersonal items, both the 'sexual abuse' class and the 'physical abuse' class endorsed the item, 'Have there been few people that you're really close to outside of your immediate family?' in the lowest frequencies. The 'baseline' class endorsed the item 'Have you often felt nervous when you are with other people, even if you have known them for a while?', in the lowest frequencies. All three classes endorsed the item 'Have you had trouble expressing your emotions and feelings?' in the highest frequencies.

Female Endorsement

For females, Table 3.5 shows frequencies in terms of unweighted counts and weighted percentages for each of the social/interpersonal PLEs, across the four female classes. In terms of the PLEs, the item, 'Have there been few people that you're really close to outside of your immediate family?', was endorsed in the highest frequencies. For this item, endorsement ranged from 4.4% to 40.2% at the level of female participants who replied yes. The item 'Have you felt suspicious of people, even if you have known them for a while', was endorsed in frequencies from 6.8% to 17.5%. The item, 'Have you often felt nervous when you are with other people, even if you have known them for a while?', was endorsed in frequencies from 4.4% to 15.9%. In comparison to males endorsing the social/interpersonal PLE items at this level of saying 'yes', females overall endorsed the items in lower percentages at the upper range, with the one exception of the item 'Have you often

Table 3.4 Counts, Percentage of PLE Grouping and Percentage of Class Membership Grouping Against Responses to PLE Social/Interpersonal Questions for Males.

		Physical Abuse (N=1061:3.1%)			Sexual Abuse (N=117:0.3%)			Baseline (N=13299:38.7%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have you trouble expressing your emotions and feelings?	14446									
No	12114	745	5.7	69.4	85	0.7	77.8	11284	93.7	84.9
Yes	1443	170	11.6	17.4	17	0.8	10.4	1256	87.6	9.7
Yes and has disrupted my life	889	142	15.0	13.2	15	1.5	11.8	732	83.6	5.4
$X^2(4,14446)=180.110,P<0.01$										
Have you rarely shown emotion?	14428									
No	11138	740	6.2	69.9	81	0.7	71.1	10317	93.2	78.0
Yes	2856	242	8.0	23.0	27	0.8	22.7	2587	91.2	19.4
Yes and has disrupted my life	434	75	17.0	7.1	7	1.6	6.1	352	81.5	2.5
$X^2(4,14428)=82.696,P<0.01$										
Have you often felt nervous when you were with other people, even if you have known them for a while?	14458									
No	13623	925	6.4	87.9	94	0.6	80.6	12604	93.0	95.0
Yes	651	102	14.6	9.3	14	2.3	13.6	535	83.1	3.9
Yes and has disrupted my life	184	32	16.0	2.8	7	3.5	5.8	145	80.5	1.0
$X^2(4,14458)=141.218,P<0.01$										

	PLE Response	Physical Abuse (N=1061:3.1%) N	PLE %	Class %	Sexual Abuse (N=117:0.3%) N	PLE %	Class %	Baseline (N=13299:38.7%) N	PLE %	Class %
Have you felt suspicious of people even if you have known them for a while?	14444									
No	12562	763	5.7	73.3	75	0.5	65.3	11724	93.8	89.3
Yes	1468	199	13.3	18.4	30	2.1	26.8	1239	84.6	8.6
Yes and has disrupted my life	414	94	22.3	8.3	11	2.3	8.0	309	75.4	2.1
$X^2(4,14444)=316.492,P<0.01$										
When you are around people, have you often had the feeling that you are being watched or stared at?	14456									
No	13156	864	6.1	82.4	88	0.6	75.8	12204	93.3	92.6
Yes	1060	149	14.4	14.3	22	1.9	17.7	889	83.7	6.2
Yes and has disrupted my life	240	44	15.8	3.3	7	3.4	6.5	189	80.8	1.2
$X^2(4,14456)=166.192,P<0.01$										
Have there been very few people that you're really close to outside of you immediate family?	14436									
No	9683	590	5.7	57.0	60	0.6	55.7	9033	93.7	69.2
Yes	4557	432	9.0	40.1	50	1.0	41.1	4075	90.0	29.7
Yes and has disrupted my life	196	35	16.8	2.9	5	2.0	3.2	156	81.2	1.1
$X^2(4,14436)=103.513,P<0.01$										

felt nervous when you are with other people, even if you have known them for a while?' which females endorsed in higher frequencies at this level.

Those items which were at the lowest end in terms of frequencies of endorsement were the items, 'Have you rarely shown emotion?', which was endorsed by 8.2% to 9.9% of female participants and 'Have you had trouble expressing your emotions and feelings?', which was endorsed by 6.7% to 10.6% of female participants. The range of frequencies for those females who said 'yes' across all PLE items in the cognitive/perceptual grouping was from 4.4% to 40.2%. This was a wider range of frequencies and in higher percentages than endorsement of the cognitive/perceptual symptom cluster for females, 1.1% to 34.9%. For each social/interpersonal PLE in this cluster, the 'baseline' class reported the lowest frequency while again, for each PLE, the 'physical and sexual abuse' class reported the highest frequency.

In terms of class membership for this level of endorsement of the social/interpersonal PLEs (those who said 'yes'), those in the 'physical and sexual abuse' class which is the smallest class for females representing 1.2% of the total sample, showed the highest rates of endorsement with frequencies ranging from 9.9% to 40.2%. The second smallest class for females, the 'sexual abuse' class which represented 2.6% of the entire sample had the next highest frequency of endorsement over all the social/interpersonal items. Endorsement ranged from 7.9% to 36.4%. The 'physical abuse' class which represented 4.6% of the entire sample endorsed the social/interpersonal PLEs at this level in frequencies from 8.8% to 34.7%. The 'baseline' class showed the lowest levels of endorsement with frequencies ranging from 5.8% to 27.3%. In comparison to the cognitive/perceptual symptom cluster, the

social/interpersonal endorsement of PLEs at this level of saying ‘yes’, was higher in each class for females.

In terms of class membership endorsement, each class endorsed the same item in the highest frequencies, ‘Have there been few people that you’re really close to outside of your immediate family?’. Each class endorsed a different item at the lower end of the frequencies. The ‘sexual and physical abuse’ class endorsed the item, ‘Have you rarely shown emotion?’ (9.9%). The ‘sexual abuse’ class endorsed the item, ‘Have you had trouble expressing your emotions and feelings?’ (7.9%). The ‘physical abuse’ class endorsed the item, ‘Have you often felt nervous when you are with other people, even if you have known them for a while?’ (8.8%) as well as ‘Have you had trouble expressing your emotions and feelings?’ (8.8%). The ‘baseline’ class also endorsed the item ‘Have you often felt nervous when you are with other people, even if you have known them for a while?’ (4.4%) in the lowest frequencies for that class.

Females Endorsement with Disruption

This section will address endorsement of the social/interpersonal items, for females, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies with the one exception of the item ‘Have you had trouble expressing your emotions and feelings?’ which had an upper range of 12.1% at this level where disruption had also occurred compared to an upper range of 10.6% for replying yes without disruption. Endorsement was at higher percentages

for the upper range than for males in the same symptom cluster in four out of the six items.

In terms of the individual PLEs, the item which was endorsed at the highest frequency for females at this level was, ‘Have you felt suspicious of people, even if you have known them for a while’. This was endorsed in the range 1.9% to 13.2%. The next highest item that was endorsed was, ‘Have you had trouble expressing your emotions and feelings?’ which was endorsed at this level from 3.4% to 12.1%. The lowest endorsed item was, ‘Have there been few people that you’re really close to outside of your immediate family?’, which was endorsed in frequencies from 1.0% to 7.7%. Again, as for males, this item was the highest endorsed at the level of replying ‘yes’ but became the lowest endorsed of the PLE items at the level of replying that it had reached a level of causing disruption to the respondent’s life.

In terms of class membership for this level of endorsement of the social/interpersonal PLEs the same pattern emerged than at the level of those who said ‘yes’ but who did not indicate that the item had disrupted their lives. Those in the ‘physical and sexual’ abuse class, the smallest female class, endorsed in both larger and in a wider range of frequencies, from 6.7% to 13.2%. Those in the ‘sexual abuse’ class which is the second smallest class for females representing 2.6% of the total sample, endorsed at this level, with disruption, in frequencies that ranged from 3.3% to 11.0%. The ‘physical abuse’ class which represented 4.6% of the entire sample endorsed the social/interpersonal PLEs at this level in frequencies from 2.7% to 9.3%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 0.9% to 3.4%. In terms of class membership endorsement, there was no

Table 3.5 Counts, Percentage of PLE Grouping and Percentage of Class Membership Grouping Against Responses to PLE Social/Interpersonal Questions for Females

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have you had trouble expressing your emotions and feelings?	19928												
No	17570	307	1.5	77.3	1279	6.9	81.9	726	4.2	81.1	15258	87.4	89.9
Yes	1487	43	2.7	10.6	146	9.4	8.8	83	5.2	7.9	1215	82.7	6.7
Yes and has disrupted my life	871	54	4.8	12.1	147	15.9	9.3	93	11.6	11.0	577	67.7	3.4
$X^2(6,19928)=317.994,P<0.01$													
Have you rarely shown emotion?	19898												
No	17473	326	1.6	83.4	1343	7.3	87.0	785	4.6	88.6	15019	86.6	89.6
Yes	2111	49	1.9	9.9	172	7.9	9.9	87	4.0	8.2	1803	86.2	9.3
Yes and has disrupted my life	314	29	8.2	6.7	57	15.7	3.0	31	10.5	3.3	197	65.6	1.1
$X^2(6,19898)=166.479,P<0.01$													
Have you often felt nervous when you were with other people, even if you have known them for a while?	19944												
No	18531	301	1.6	75.5	1374	7.0	88.0	760	4.1	83.0	16096	87.5	94.7
Yes	1107	65	5.3	15.9	146	12.5	8.8	99	10.1	11.6	797	72.2	4.4
Yes and has disrupted my life	306	39	10.0	8.6	54	16.2	3.1	44	17.3	5.4	169	56.0	0.9
$X^2(6,19944)=531.159,P<0.01$													

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have you felt suspicious of people, even if you have known them for a while?	19930												
No	17405	264	1.4	69.4	1208	6.6	78.7	681	4.0	77.8	15252	88.1	91.3
Yes	1907	84	3.9	17.5	246	14.0	14.8	147	8.2	14.3	1430	73.9	6.8
Yes and has disrupted my life	618	57	8.6	13.2	122	18.0	6.5	74	13.5	7.9	365	59.9	1.9
$X^2(6,19930)=640.234,P<0.01$													
When you are around people, have you often had the feeling that you are being watched or stared at?	19928												
No	17902	291	1.5	76.2	1291	6.8	83.9	719	4.2	83.5	15601	87.5	92.8
Yes	1586	64	3.4	12.7	195	13.1	11.5	127	7.8	11.2	1200	5.8	5.8
Yes and has disrupted my life	440	49	9.8	11.1	88	17.4	4.6	55	12.3	5.3	248	60.5	1.4
$X^2(6,19928)=538.934,P<0.01$													
Have there been very few people that you're really close to outside of you immediate family?													
No	13557	201	1.3	52.1	916	6.6	62.7	520	3.9	59.6	11920	88.2	71.7
Yes	6072	171	2.5	40.2	602	9.1	34.7	354	5.9	36.4	4945	82.6	27.3
Yes and has disrupted my life	296	33	9.6	7.7	53	14.1	2.7	28	13.2	4.0	182	63.1	1.0
$X^2(6,19925)=344.795,P<0.01$													

common pattern for the items that were endorsed at the lowest frequencies. In terms of the highest frequencies, the ‘sexual abuse’, ‘physical abuse’ and ‘baseline’ classes all endorsed, ‘Have you had trouble expressing your emotions and feelings?’ in the highest frequencies, 11.0%, 9.3% and 3.4% respectively. The ‘physical and sexual abuse’ class endorsed ‘Have you felt suspicious of people, even if you have known them for a while’ in the highest frequencies at 13.2%.

Disorganised Symptom Cluster

Males Endorsement

For males, Table 3.6 shows frequencies in terms of unweighted counts and weighted percentages for each of the disorganised PLEs, across the three male classes. This is the smallest of the symptom clusters, containing three symptoms. The range of frequencies for those males who said ‘yes’ across all PLE items in the disorganised grouping was from 7.8% to 33.9%. In terms of the individual PLEs, the item, ‘Have people thought you were odd, eccentric or strange?’, is endorsed in the highest frequencies. For this item, endorsement ranges from 10.0% to 33.9% at the level of male participants who replied yes. The item which was at the lowest end in terms of frequencies was the items, ‘Have people thought you have strange ideas?’, which was endorsed by 12.9% to 25.8% of male participants.

In terms of class membership for this level of endorsement of the disorganised PLEs (those who said ‘yes’), those in the smallest class for males, the ‘sexual abuse’ class, showed the highest rates of endorsement. The ‘sexual abuse’ class frequencies ranged from 25.8% to 33.9%. The ‘physical abuse’ class endorsed the disorganised

PLEs at this level in frequencies from 17.2% to 24.9%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 7.8% to 12.9%.

In terms of class membership endorsement at the level of individual PLEs in this symptom cluster, two of the lower end frequencies were for the item ‘Have people thought you act strangely?’, which was endorsed in the lowest frequencies by the ‘baseline’ class and the ‘physical abuse’ class. The sexual abuse class endorsed the item ‘Have people thought you have strange ideas?’ in the lowest frequencies. That same item, ‘Have people thought you have strange ideas?’ was endorsed by the ‘baseline’ and ‘physical abuse’ class in the highest frequencies, however it is worthy of note that the ‘sexual abuse’ class endorsement range was 25.8% to 33.9% which made the lowest ‘sexual abuse’ class endorsement larger than either of the highest frequency endorsements for the ‘baseline’ or ‘physical abuse’ classes. The ‘sexual abuse’ class endorsed the item, ‘Have people thought you were odd, eccentric or strange?’ in the highest frequencies.

Males Endorsement with Disruption

This section will address endorsement of the disorganised items, for males, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies than for those who said ‘yes’ but who did not indicate disruption. The item endorsed at the highest frequency with a range of 1.3% to 6.6%, was ‘Have people thought you have strange ideas?’. The lowest endorsed

item was, ‘Have people thought you act strangely?’, which was endorsed in frequencies from 1.1% to 3.8%.

In terms of class membership, the ‘sexual abuse’ class endorsed in the highest frequencies from 3.8% to 6.6%. The ‘physical abuse’ class was the next highest endorsing class with a range of 3.5% to 3.9%. The ‘baseline’ class endorsed in the lowest frequencies, 1.0% to 1.3%.

The overall range for the disorganised symptom grouping at this level was 1.0% to 6.6%. The social/interpersonal symptom cluster had an overall range at this level from 1.0% to 13.2% and the cognitive/perceptual symptom grouping which had an overall range of 0.1% to 2.9%.

Females Endorsement

For females, Table 3.7 shows frequencies in terms of unweighted counts and weighted percentages for each of the disorganised PLEs, across the four female classes. In terms of the individual PLEs, the item, ‘Have people thought odd, eccentric or strange?’, was endorsed in the highest frequencies. For this item, endorsement ranged from 6.4% to 18.3% at the level of female participants who replied yes. The item which was at the lowest end in terms of frequencies of endorsement was the items, ‘Have people thought you act strangely?’, which was endorsed by 4.4% to 12.1% of female participants.

The range of frequencies for those females who said ‘yes’ across all PLE items in the disorganised grouping was from 4.4% to 18.3%. The overall range in the

cognitive/perceptual group of symptoms for females was 1.1% to 34.9%. The overall range in the social/interpersonal symptom cluster for females was 4.4% to 40.2%, making the disorganised symptom cluster the lowest endorsed in terms of the overall range for females at this level of replying ‘yes’ to the PLE item.

For each PLE in this cluster, the ‘baseline’ class reported the lowest frequency while, the ‘physical and sexual abuse’ class reported the highest frequencies for the items, ‘Have people thought you have strange ideas?’ and ‘Have people thought you were odd, eccentric or strange?’. The ‘sexual abuse’ class reported the highest frequencies for the item, ‘Have people thought you act strangely?’.

In terms of class membership for this level of endorsement of the disorganised PLEs (those who said ‘yes’), those in the ‘physical and sexual abuse’ class which is the smallest class for females representing 1.2% of the total sample, showed the highest rates of endorsement with frequencies ranging from 10.1% to 18.3%. The second smallest class for females, the ‘sexual abuse’ class which represented 2.6% of the entire sample had the next highest frequency of endorsement over all the disorganised items. Endorsement ranged from 12.1% to 15.3%. The ‘physical abuse’ class which represented 4.6% of the entire sample endorsed the disorganised PLEs at this level in frequencies from 9.9% to 14.1%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 4.4% to 7.7%.

Table 3.6 Counts, Percentage Of PLE Grouping and Percentage Of Class Membership Grouping Against Responses To PLE Disorganised Questions For Males.

		Physical Abuse (N=1061:3.1%)			Sexual Abuse (N=117:0.3%)			Baseline (N=13299:38.7%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have people thought you act strangely?	14379									
No	12932	847	6.0	79.3	81	0.6	66.9	12004	93.4	91.0
Yes	1236	165	13.6	17.2	31	2.5	29.2	1040	83.9	7.8
Yes and has disrupted my life	211	40	18.3	3.5	5	2.2	3.8	166	79.5	1.1
$X^2(4,14379)=179.747,P<0.01$										
Have people thought you have strange ideas?	14366									
No	12112	753	5.7	71.3	75	0.6	67.5	11284	93.7	85.8
Yes	2011	250	12.3	24.9	35	1.4	25.8	1725	86.4	12.9
Yes and has disrupted my life	243	45	17.7	3.9	7	3.3	6.6	191	78.9	1.3
$X^2(4,14366)=189.839,P<0.01$										
Have people thought you are odd, eccentric or strange?	14374									
No	12556	791	5.9	75.7	70	0.5	61.7	11695	93.6	89.0
Yes	1618	220	13.0	20.7	40	2.3	33.9	1358	84.7	10.0
Yes and has disrupted my life	200	41	19.8	3.5	6	2.7	4.5	153	77.5	1.0
$X^2(4,14374)=248.087,P<0.01$										

In terms of class membership endorsement, the highest frequency endorsement for the ‘physical abuse’ and ‘baseline’ classes were for the item, ‘Have people thought you have strange ideas’, while for the ‘physical and sexual’ abuse and ‘sexual abuse’ classes, the highest endorsements were for the item, ‘Have people thought you are odd, eccentric or strange?’. All classes endorsed the item, ‘Have people thought you act strangely?’ in the lowest frequencies. For the ‘sexual abuse’ class, the item, ‘Have people thought you have strange ideas?’, was endorsed in equally low frequencies.

Females Endorsement with Disruption

This section will address endorsement of the disorganised items, for females, at the level of endorsement accompanied by disruption. The frequencies reflect those participants who said yes, they had experienced the PLE and that they had experienced it at such a level that it had disrupted their life. Overall, endorsement at this level was in lower frequencies than for the level of replying ‘yes’. In terms of the individual PLEs, the item which was endorsed at the highest frequency for females at this level was, ‘Have people thought you have strange ideas’. This was endorsed in the range 0.8% to 7.9%. The lowest endorsed item was, ‘Have people thought you were odd, eccentric or strange?’, which was endorsed in frequencies from 0.7% to 4.7%.

In terms of class membership for this level of endorsement of the disorganised PLEs, at the lower end of the range of frequencies for the ‘physical and sexual abuse’ class and for the ‘sexual abuse’ class was the item, ‘Have people thought you are odd, eccentric or strange?’. For the ‘physical abuse’ class and the ‘baseline’ class the item

endorsed in the lowest frequencies was ‘Have people thought you act strangely?’. In terms of the PLE endorsed in the highest frequencies, it was the same item for the ‘physical and sexual abuse’ class, the ‘physical abuse’ class and the ‘baseline’ class – ‘Have people thought you have strange ideas?’. For the ‘sexual abuse’ class, the item least frequently endorsed was, ‘Have people thought you act strangely?’

In terms of endorsement of the PLEs by the classes, those in the ‘physical and sexual’ abuse class, the smallest female class, endorsed in both larger and in a wider range of frequencies, from 4.7% to 7.9%. Those in the ‘sexual abuse’ class which is the second smallest class for females representing 2.6% of the total sample, endorsed at this level, with disruption, in frequencies that ranged from 4.0% to 4.4%. The ‘physical abuse’ class which represented 4.6% of the entire sample endorsed the disorganised PLEs at this level in frequencies from 2.2% to 2.8%. The ‘baseline’ class showed the lowest levels of endorsement with frequencies ranging from 0.6% to 0.8%.

Table 3.7 Counts, Percentage of PLE Grouping and Percentage of Class Membership Grouping Against Responses to PLE Disorganised Questions for Females.

		Physical and Sexual Abuse (N=405:1.2%)			Physical Abuse (1576: 4.6%)			Sexual Abuse (N=903:2.6%)			Baseline (N=17090:49.6%)		
	PLE Response	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %	N	PLE %	Class %
Have people thought you act strangely?	19853												
No	18494	317	1.5	82.5	1367	7.0	87.9	744	4.1	83.5	16066	87.4	95.0
Yes	1117	51	3.3	10.1	156	13.9	9.9	115	10.4	12.1	795	72.3	4.4
Yes and has disrupted my life	242	34	13.0	7.4	42	16.2	2.2	39	20.3	4.4	127	50.6	0.6
$X^2(6,19853)=528.986,P<0.01$													
Have people thought you have strange ideas?	19837												
No	17752	292	1.5	76.2	1296	6.9	83.2	701	4.0	78.7	15463	87.6	91.5
Yes	1804	76	3.2	15.9	215	12.0	14.1	159	9.0	12.1	1354	75.8	7.7
Yes and has disrupted my life	281	33	11.3	7.9	57	16.8	2.8	40	16.0	4.3	151	56.0	0.8
$X^2(6,19837)=492.154,P<0.01$													
Have people thought you are odd, eccentric or strange?	19833												
No	17996	298	1.5	77.0	1309	6.9	84.8	713	4.1	80.7	15685	87.6	92.9
Yes	1600	93	4.3	18.3	208	12.6	12.7	148	9.4	15.3	1151	73.8	6.4
Yes and has disrupted my life	237	22	7.6	4.7	46	17.4	2.5	37	16.8	4.0	132	58.2	0.7
$X^2(6,19833)=511.663,P<0.01$													

Chi-Square Results

Tables 3.2 to 3.7 also show the results of the chi-square analysis. All chi-square test results across genders and symptom clusters were significant. For males, the largest effect sizes were to be found in the social/interpersonal symptom cluster. This was followed by the disorganised cluster. The smallest effect sizes over the three symptom clusters were to be found in the cognitive/perceptual cluster. For females the largest effect sizes were also to be found in the social/interpersonal cluster. However, the next largest effect sizes for females were found in the cognitive/perceptual cluster and the smallest in the disorganised cluster.

Males by Symptom Cluster

For males, in the cognitive/perceptual symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was for the item, 'Have you believed that you have a 'sixth sense' that allows you to know and predict things that others can't?', $X^2(4,14447)=184.403,P<0.01$. There was a wide range of effect sizes over the seven items with the smallest being for the item, 'Have you often thought that shadows or objects are really people or animals, or that noises are actually people's voices?, $X^2(4,14446)=47.594,P<0.01$.

For males, in the social/interpersonal symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was for the item, 'Have you felt suspicious of people even if you have known them for a while?' which was, $X^2(4,14444)=316.492,P<0.01$.

Table 3.8 Range of Percentages Endorsement and Endorsement with Disruption of PLE Symptom Clusters by Class Membership for Males

	Cognitive/Perceptual (lowest % - highest%)	Social/Interpersonal (lowest % - highest%)	Disorganised (lowest % - highest%)
Sexual Abuse			
Yes	6.3 – 41.1	10.4 – 41.1	25.8 – 33.9
Yes and has disrupted my life	0.1 – 2.9	3.2 – 11.8	3.8 – 6.6
Physical Abuse			
Yes	2.3 – 25.6	9.3 – 40.1	17.2 – 24.9
Yes and has disrupted my life	0.3 – 2.9	2.9 - 13.2	3.5 – 3.9
Baseline			
Yes	1.1 – 16.0	3.9 – 29.7	7.8 – 12.9
Yes and has disrupted my life	0.1 - 0.8	1.0 – 5.4	1.0 – 1.3

Table 3.9 Range of Percentages Endorsement and Endorsement with Disruption of PLE Symptom Clusters by Class Membership for Females

	Cognitive/Perceptual (lowest % - highest%)	Social/Interpersonal (lowest % - highest%)	Disorganised (lowest % - highest%)
Physical and Sexual Abuse			
Yes	2.7 – 30.1	9.9 – 40.2	10.1 – 18.3
Yes and has disrupted my life	1.0 – 5.1	6.7 – 13.2	4.7 - 7.9
Sexual Abuse			
Yes	1.8 – 34.9	7.9 – 36.4	12.1 – 15.3
Yes and has disrupted my life	0.7 – 3.4	3.3 – 11.0	4.0 – 4.4
Physical Abuse			
Yes	2.6 – 26.5	8.8 – 34.7	9.9 – 14.1
Yes and has disrupted my life	0.4 – 2.1	2.7 - 9.3	2.2 – 2.8
Baseline			
Yes	1.1 – 16.4	4.4 – 27.3	4.4 – 7.7
Yes and has disrupted my life	0.1 - 0.7	0.9 – 3.4	0.6 – 0.8

There was a wide range of effect sizes over the six items with the smallest being for the item, ‘Have you rarely shown emotion?’, $X^2(4,14428)=82.696,P<0.01$.

For males, in the disorganised symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was for the item, ‘Have people thought you were odd, eccentric or strange?’, $X^2(4,14374)=248.087,P<0.01$. There was a smaller range of effect sizes over the items, however there were a much smaller number of items in this symptom cluster. The smallest effect size being for the item, ‘Have people thought you act strangely?’, $X^2(4,14379)=179.747,P<0.01$.

Females by Symptom Cluster

For females, in the cognitive/perceptual symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was for the item, ‘Have you had the sense that some force is around you, even though you cannot see anyone?’ which was, $X^2(6,19898)=538.911,P<0.01$. There was a wide range of effect sizes over the seven items with the smallest being for the item, ‘Have you often thought that shadows or objects are really people or animals, or that noises are actually people’s voices?’ which was, $X^2(4,14446)=47.594,P<0.01$.

For females, in the social/interpersonal symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was, as for males in the same symptom cluster, for the item, ‘Have you felt suspicious of people even if you have known them for a while?’, $X^2(6,19930)=640.234,P<0.01$. There was a wide range of effect sizes over the six items with the smallest, as for males in the same

symptom cluster, being for the item, ‘Have you rarely shown emotion?’, $X^2(6,19898)=166.479,P<0.01$.

For females, in the disorganised symptom cluster all formal tests of association between class membership and PLE were significant. The largest effect size was for the item, ‘Have people thought act strangely?’ which was, $X^2(6,19853)=528.986,P<0.01$. There was a smaller range of effect sizes over the items, however there were a much smaller number of items in this symptom cluster. The smallest effect size being for the item, ‘Have people thought you have strange ideas?’ which was, $X^2(6,19837)=492.154,P<0.01$.

Discussion

The first aim of this chapter was to explore endorsement rates of schizotypal experiences and PLEs in the sample within the context of trauma profiles developed in chapter 2. Of particular interest was if experiences are related to the level of distress reported. This leads to the second aim which was to examine if responses to the questions asked reflected a skewed distribution in line with the continuum i.e. are responses decreasing in line with responses of ‘no’, ‘yes’ and ‘yes with distress’. Thirdly, this chapter sought to expand the existing literature concerning gender differences around schizotypal experiences and PLEs. Finally, this chapter sought to address if there was an ordered relationship between experiences of abuse (represented by the trauma profiles), and endorsement rates of schizotypal experiences and PLEs. An overall summary will be presented and each individual aim will be addressed.

This chapter has established that PLEs are not only present but are present on a continuum which contains those experiences which do not create disruption or distress. Those which do not can be interpreted as schizotypal experiences, while those that do are moving towards PLEs. These experiences are found to follow the same pattern for males as well as females. The shape of the distribution representing those experiences is positively skewed with the majority of people not experiencing any type of psychotic manifestation. This can be seen in the responses given as 'No' in Tables 3.2 to 3.7 and summarised over all clusters in Tables 3.8 and 3.9. The distribution then moves into the range of people who experience schizotypal traits such as magical thinking or superstitious beliefs. These do not impinge on the life of participants and cause no distress. These are the individuals who responded 'Yes', reflected in Tables 3.2 to 3.7 and summarised over all clusters in Tables 3.8 and 3.9. The next section of the continuum contains those whose experiences may be accompanied by a degree of distress. These are those in Tables 3.2 to 3.7 who responded that the experience they had had affected their life in some way, again with summaries over all clusters shown in Tables 3.8 and 3.9. These experiences are related in a significant way to the classes established in chapter 2 which reflect respondents experiences of childhood adversity. All relationships between the gender based trauma profiles and the schizotypal experiences or PLEs were found to be significant. The final section of the continuum, represent those for whom experiences become clinically relevant and for which a clinical diagnosis is given.

To address the first aim, in terms of endorsement rates of schizotypal experiences and PLEs within the sample both proved to be not uncommon in this general population sample. Schizotypal experiences were reported by 0.1% to 41.1% of the sample. PLEs

were reported by 0.1% to 13.2% of the sample as seen in Tables 3.2 to 3.7 and summarised in Tables 3.8 and 3.9. Existing literature supports the theory of a continuum of psychosis which exists from those who do not experience any form of psychotic manifestation along to those who experience schizotypal experiences which are there but which do not result in disruption or distress (Cochrane et al., 2010; Lataster et al., 2006; Shevlin et al., 2007; Shevlin et al., 2015a; Sommer et al., 2010; van Os, 2009; van Os et al., 2000). If the continuum was reflected in the findings of this chapter it would be expected that, as was found, when examining endorsement of the individual items, a response of 'no', would be given by the majority of participants. Next, a smaller proportion would respond that they had experienced the item and finally a small percentage would respond that they had experienced the item and also that it had been disruptive. As this pattern was identified as summarised in Tables 3.8 and 3.9, it strongly supports that the distribution of these experiences is represented by a skewed distribution along a continuum from no pathology to schizotypal experiences, to PLEs and heading towards a point at which symptoms become clinically relevant. Understanding this continuum and how and when these experiences develop into a condition needing clinical care clearly is of value for identifying those at risk of developing such a condition (van Os, 2009).

Understanding when these experiences do not evolve into a clinical manifestation is as important as understanding when they do. To develop effective interventions for what is arguably the most stigmatising of mental health disorders (Looisjestin et al., 2015; Read et al., 2001; Read, van Os, Morrison, & Ross, 2005), requires an understanding of all the pathways that can lead to manifestation (Krabbendam et al., 2004). Interventions consist of medications as well as psychological and vocational interventions (van Os &

Kapur, 2009) however around a third of those who are diagnosed with the most extreme set of psychotic symptoms – schizophrenia, still remain symptomatic. For those who do develop psychosis at a level that requires clinical intervention understanding the reasons why can be a fundamental part of adjusting to what has happened (Bendall et al., 2008). In addition, studying the continuum of psychosis is one way to understand the underlying causation (Johns & van Os, 2001).

Of particular interest was if there were differences in endorsement depending on levels of distress experienced. This allows the second aim to be addressed. Do the differences in response depending on distress, reflect psychotic experiences as being on a continuum? Those experiences which occurred at a level which created disruption are moving towards those which would be accompanied by help-seeking behaviour and which might require clinical intervention. Those experiences which did not create disruption would not have these characteristics and would be comparable with normal experiences and behaviours, existing at a subclinical level. This finding is in line with previous findings that PLEs exist along a continuum (Cochrane et al., 2010; Johns & van Os, 2001; Lataster et al., 2006; Sommer et al., 2010; Shevlin et al., 2007; van Os, 2009; van Os et al., 2009).

In line with existing research (Dominguez et al., 2011; Johns et al., 2004; Kendler et al., 1996; Perala et al., 2007; Poulton et al., 2000; van Os et al., 2000) these experiences are being endorsed at higher rates than prevalence rates of clinical psychosis. The value of distress as an element in helping to assess where along the continuum an individual should be placed, is clearly seen (Shevlin et al., 2015a). By looking at Tables 3.2 through to 3.9 it can be seen that in every single case, for both genders, across all

symptom clusters for each individual item, the numbers who report experiencing the item with accompanied distress are less than for those who are experiencing the item with no distress. When assessing individuals therefore, if distress is part of the experience under discussion, this places the individual further along that continuum, closer to the small section of those for whom a diagnosis is the outcome.

The third aim of this chapter was to examine gender differences in the findings in response to reports that gender is an often under addressed variable in studies of the relationship between trauma and psychosis (Shevlin et al., 2011). Results for males are shown in Tables 3.2, 3.4, 3.6, and summarised in Table 3.8. Results for females are shown in Tables 3.3, 3.5, 3.7 and summarised in Table 3.9. The use of the symptom clusters from the three-factor model allows comparisons between types of symptoms. The fact that these are addressed in this study using the gender specific profiles allows further context to be added. At this level of the symptom clusters, Table 3.8 shows that for males the highest endorsement rates of schizotypal experiences across all classes are in both the cognitive/perceptual and social/interpersonal symptom clusters. For females, shown in Table 3.9, the social/interpersonal cluster receives the highest endorsement rate at the schizotypal level. In terms of PLEs, for both genders, the social/interpersonal cluster receives the highest endorsement rates. To address each cluster specifically, for the cognitive/perceptual cluster females report in higher rates at both the schizotypal and PLE level. In terms of the social/interpersonal cluster, males report in higher percentages at the schizotypal level and at the PLE level. The most dramatic difference in gender reporting however is to be found in the disorganised cluster with males reporting endorsement in much higher percentages.

In terms of individual items, the cognitive/perceptual and social/interpersonal clusters followed the same pattern. These two clusters had the same item endorsed at the 'yes' level but different items endorsed at the 'yes with distress' level. For the disorganised cluster both genders endorsed the same items at each level in terms of largest percentages. Findings are in line with existing research which reports some differences in gender in relation to symptoms which are endorsed (Seeman, 2013).

The final aim of this chapter was to establish if there was an ordered relationship between experiences of abuse represented by class membership, and endorsement rates. In terms of the way in which the classes endorse the symptom clusters, there is a consistent pattern across the genders and that is that those classes which represent the most traumatised members of the overall sample endorse the symptom clusters and the individual items in the highest percentages. For males the most traumatised class is the sexual abuse class representing 0.3% of the entire sample. For females the most traumatised class is the sexual and physical abuse class which represents 1.2% of the whole sample. For males at the schizotypal experiences level, shown in Tables 3.2, 3.4, 3.6 and summarised in Table 3.8, the pattern is completely consistent. The sexual abuse class endorses in the highest quantities, followed by the physical abuse class, followed by the baseline class. At the PLE level for the cognitive/perceptual and the disorganised symptom clusters, shown in Tables 3.2 and 3.6, this pattern continues. For the social/interpersonal symptom cluster, shown in Table 3.4, the physical abuse class endorses in the highest rates, then followed by the sexual abuse class with the baseline class last. For females the ordered pattern is completely consistent with the physical and sexual abuse class endorsing at the highest levels, the sexual abuse class the next highest, the physical abuse class next and the baseline class last. This is consistent for

both schizotypal experiences and PLEs shown in Tables 3.3, 3.5, 3.7 and summarised in Table 3.9. These findings reinforce previous findings supporting the relationship between trauma and the development of psychosis (Ashcroft et al., 2012; Bendall et al., 2008; Braehler et al., 2013; Gallagher & Jones, 2013; Read et al., 2001).

Strengths of this study include the size of, and nature of the sample. Of particular importance in studying the existence of schizotypal experiences and PLEs is that the sample used represents the general population. The inclusion in the study of the range of questions that relate to schizotypal personality disorder and to have them administered to such a large sample is a further strength. In addition, being able to map these items against the three-factor model already in use in the literature is advantageous. A further strength is the inclusion in the structuring of the questions around schizotypal personality disorder, of an assessment of disruption associated with the experience in question. This has allowed that further refinement of exploration around the experience of each individual. Limitations continue to be as outlined in chapter 2, that sections of the population such as those under 18 or those in jail or hospitalised at the time of the interview were not included in the survey. And again that the survey responses were subject to the possibility of recall bias as participants were asked to report on lifetime traumatic events. To reiterate however, research has suggested that such reports are surprisingly reliable (Read et al., 2005).

This chapter firmly established associations between childhood trauma and the PLE classes in use in this thesis. The next step was to move the focus completely onto social factors which are proposed to play a role in these associations. Chapter 4 developed a second independent variable, social defeat and established a similar association between

social defeat and the PLEs. Social support and discrimination were operationalised as the variables used in the mediation section of the model for this thesis. Importantly, the risk factors to be used in the model were also operationalised before the model was tested in chapter 5.

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Chapter 4

Developing Variables for a Mediation Model Exploring Associations between Childhood Adversity and Psychotic-Like-Experiences in a Large Community Sample.

Introduction

Social Context of Psychosis

To move beyond the important foundation of establishing associations and links between childhood adversity and the development of psychosis, means starting to address mechanisms that can explain those links. In the last 20 or 30 years there has been a renewed interest in the social context in which people experience psychosis. Disorder related to psychosis can be viewed as disorder of adaptation to social context (van Os, Kenis, & Rutten, 2010). There is an obvious and intuitive understanding that adversity and trauma in childhood could create the conditions in which a person would struggle to adapt within a social context.

A number of rationales have emerged from this recent resurgence of interest in the role of social factors in psychosis (Morgan, McKenzie, & Fearon, 2008). Studies which have mainly centred on migration and urbanisation (Cantor-Graae & Selten, 2005; Cooper, 2005; van Os & McGuffin, 2003) have lent plausibility to such theories and lead to the conclusion that this is an area important to study further. Two of the overarching theories are those of social causation and social selection. Both attempt to explain the mechanisms which lie behind, for example, the consistently reported association between low Socio-Economic Status (SES) and higher prevalence of psychiatric disorders (Cantor-Graae, 2007; Johnson, Cohen, Dohrenwend, Link, & Brook,1999).

Social selection takes the view that constitutional and environmental factors combine to cause the onset of psychiatric disorders. The presence of mental illness has the effect of either not allowing an individual to rise out of low SES or, causing them to fall into low SES. The social disadvantage is influenced by a person having a mental health condition. Social causation, on the other hand, states that environmental adversity, disadvantage and the stress of low SES are the actual causes of the onset of psychiatric disorder. The social disadvantage is the cause of the illness as opposed to being the consequence.

In terms of the model that is being developed here, factors which come from social causation theory will be investigated. Central to the model is the relationship, established in chapter 3, between childhood trauma and PLEs. The next step was to explore potential mechanisms explaining this relationship using membership of the trauma groups identified in chapter 2 and the PLEs documented and explored in chapter 3. PLEs are of use for studying mechanisms as they are present in larger quantities in the general population than diagnosed occurrences of psychosis, as outlined in chapter 3. They also correlate with the same risk variables as psychosis (Johns et al., 2004; Johns & van Os, 2001). Studying the occurrence of PLEs in the general population, people who are at this more ‘at risk’ end of the continuum for psychosis, but who have not crossed a threshold for clinical intervention, means that the complications of studying clinical populations are not of concern, while many of the other characteristics remain the same. The differences are quantitative.

Social Defeat

Social defeat sits inside the wider context of social disadvantage (Selten, ven der Ven, Rutten, & Cantor-Graae, 2013). Indicators of social disadvantage include separation from or death of parents, education, employment status, living arrangements, housing, relationships and social network size and configuration. Social defeat is conceptually narrower in scope. It is a chronic experience of an inferior position or social exclusion (van Os et al., 2010). Stowkowy and Addington (2012) describe it as an enduring and negative feeling of having an outsider status, of not being part of the majority group, capturing feelings of a failed struggle and of losing rank.

For the operationalisation of social defeat, a number of social disadvantage factors were considered to be important. Selten and Cantor-Graae outlined these in a social defeat model in 2005. The social defeat model is offered as a unifying concept for a number of risk factors for psychosis. The same components are also discussed in numerous other studies (Bourque, van der Ven, & Malla, 2010; Gayer-Anderson & Morgan, 2013; Kuepper, van Os, Lieb, Wittchen, & Henquet, 2011; Pederson & Mortensen, 2001; Stowkowy & Addington, 2012). In their original 2005 paper, Selten and Cantor-Graae hypothesise that the overarching elements of social defeat are,

- having a low IQ,
- being of migrant status,
- the use of illicit drugs and
- having an urban upbringing.

Selten et al. further update the social defeat theory in a 2013 paper to add the experience of early childhood trauma as a risk factor for displaying high levels of social defeat.

One interesting aspect of the theory of social defeat is that its development depends primarily on how an individual interprets their experience. This means that the degree to which a person experiences social defeat is linked closely to how they view social adversity and their own perspective of what has happened. This may help to explain why not all those who experience social defeat develop psychosis or even move towards that more 'at risk' end of the continuum for PLEs. It also helps to explain the difference in social disadvantage versus social defeat. For social disadvantage, not all factors are also risk factors for the development of psychosis, for example, there is no evidence that populations in low income countries are at any increased risk for psychosis (Selten et al., 2013). In contrast, all the named variables that comprise the social defeat model – IQ, migration, drug use and urbanicity do carry an increased risk for the development of psychosis.

This combination of factors is supported by Kuepper et al. (2011) in a study which addresses the roles of cannabis use and urbanicity. They discuss how risk factors may combine in shaping risk for psychosis. The possible risk conveyed by a combination of factors may be higher than the sum of any of them individually. If this is the case for a set of factors such as those which comprise the social defeat model, it would suggest they share a common interactive pathway. It is suggested that this pathway is created because the experience of social defeat increases levels of psychosocial stress which in turn, under chronic conditions, increases the sensitisation of the hypothalamic-pituitary-adrenal (HPA) axis and the mesolimbic dopamine system (Selten & Cantor-Graae,

2005; Selten et al., 2013). Sensitisation refers to the process that occurs when repeated exposure to a stimulus results in increasingly enhanced responses each time.

Studies which involve the use of animals and which have been discussed in detail in chapter 3 support this theory of social defeat and its impact on the dopamine system. Morgan et al. (2002) conducted research on monkeys while Tidey and Mickzek (1996) focused on rodents. Morgan et al. (2002) centred work on housing of monkeys and dopamine levels. They found that when social housing was used for dominant monkeys, levels of dopamine remained the same. For monkeys housed individually or subordinate monkeys placed in social housing, levels of dopamine increased. Tidey and Miazek (1996) used the resident-intruder paradigm to examine dopamine reactivity in rodents. An intruder rat was placed into the cage of a resident rat which then attacked the intruder and forced it to behave submissively. What was reflected in the brain of the submissive rodent was once again increased dopamine levels in the mesocorticolimbic system. Further, it was found that if the intruder was kept isolated for a long time after the forced submission, this change was amplified whereas a return to the group mitigated the effects. Crucially for the social defeat hypothesis, it was also found that repeated experiences lead to lasting behavioural sensitisation, an effect which has been confirmed by a number of studies (Covington & Miazek, 2001; McLaughlin, Li, Valdez, Chavkin, & Chavkin, 2006).

IQ

To address the link between IQ and psychosis, data published from the National Survey of Health and Development (Jones, Murray, Rodgers, & Marmot, 1994) followed a cohort of all births in one week in Britain in March 1946. The cohort was assessed

between the ages of 2 and 43 on a range of social and health variables. Educational attainment was part of this assessment, performed at ages 8, 11 and 15. Cases of schizophrenia were also identified as part of the process. In total, thirty cases of schizophrenia were identified from the cohort of 5000 births and all tended to have lower scores on tests of educational attainment. In 1958, another cohort of births in one week was identified and grew into the National Child Development Survey (Done, Crow, Johnstone, & Sacker, 1994). Assessment occurred at ages 7, 11 and 16. In this cohort, forty cases of schizophrenia were identified which followed the same pattern of lower scores on tests of educational attainment. Educational attainment can be used as a proxy for IQ (Erickson et al., 2016; Lynn & Mikk, 2007; Lynn & Mikk, 2009).

The mechanisms linking lower IQ with the development of psychosis lead once again to brain abnormalities (Murray, Jones, & O'Callaghan, 1991; Murray, Lewis, & Reveley, 1985). These brain abnormalities are associated with early brain development and may lead to the cognitive impairment associated with lower IQ and also with the development of psychosis. Having a low IQ puts people at a social disadvantage (Selten & Cantor-Graae, 2005) in terms of reducing the chances of obtaining resources which are already much sought after. These may be college places, jobs and other opportunities which carry with them increasing levels of social capital. Not having them or repeatedly failing at attempts to get them can cause the chronic stress at the heart of the social defeat model.

As with all risk factors for psychosis, direction of causality must be considered. Development of disorder may lead to the cognitive decline identified in those who have a diagnosis of any of the psychoses, as opposed to the other way round. Population

studies of IQ and schizophrenia however do offer evidence of lower IQ being measured before onset of disorder (David, Malmerg, Brandt, Allebeck, & Lewis, 1997; Done et al., 1994; Jones et al., 1994). When using educational attainment as a proxy, and using the completion of high school as the marker, there can be confidence that the vast majority of people will have attended school during the normal ages in childhood which places the measure used in the social defeat variable in those early years.

Migrant Status

Studies have concluded that being a migrant or being the child of a migrant increases likelihood of experiencing social defeat. This is due to the fact that being a migrant, first or second generation, translates to being a member of a minority group and therefore being more likely to experience feelings of social marginalisation (Bourque et al., 2010; Cantor-Graae & Selten, 2005). Migrants also tend to be concentrated within urban environments where competition is higher for more limited resources (Nazroo, 1998). It has interestingly been shown that effect sizes for second generation migrants are larger than those for first generation (Cantor-Graae & Selten, 2005). It is theorised that this is because this feeling of having an outsider status is even more humiliating for those who have been born in a country and yet do not feel that they are treated as equals. The effect of this outsider status can be illustrated strongly in studies by Kirkbride, Jones, Ullrich, and Coid (2012) and Veling et al. (2008) which found that in both The Hague and London the link between being a member of an ethnic minority group and developing psychosis was stronger for those who lived in an area of low own-group ethnic density than for those who lived in an area of high own-group ethnic density. Being in an environment which consistently highlights outsider status, in spite of living in your country of origin, creates more feelings of social defeat.

Linking the relationship between being of migrant status and the development of PLEs, Morgan, Charalambides, Hutchinson, and Murray (2010) point to the fact that there is consistent and strong evidence linking experience of psychosis to being a migrant. Cantor-Graae and Selten (2005) in a meta-analysis of 18 studies of incidence rates of schizophrenia, found a relative risk of schizophrenia for migrants of 2.9 (95% CI 2.5-3.4) compared to non-migrants. A full exploration of the mechanisms linking being a member of a minority group and the development of psychosis is contained in the 'Discrimination' section of this introduction.

Drug Use

If social defeat has an impact on sensitisation of the mesolimbic dopamine system, it can be no surprise that drug use is part of the social defeat model. Sinha (2008) discusses that stress has been firmly established as a risk factor in the development of drug addiction and in relapses from withdrawal of drug use. The relationship between chronic experiences of social defeat and drug use is a multi-faceted one. Drug use is used as a coping strategy, a way to deal with stress, to reduce tension and to self-medicate (Sinha, 2008). Arsten and Li (2005) point to evidence that one of the results of chronic experiences of stress, such as repeated social defeat, is that executive functions such as impulse control are impaired. Stresses such as social defeat can lead to, and lead from, the use of drugs to deal with the resulting emotional and psychological impact. The connection between drug use and experiences of psychosis and PLEs is robust with much evidence that prevalence of psychosis is higher in people who use drugs (Degenhardt & Hall, 2001; Fergusson, Horwood, & Riddler, 2005; Fergusson, Horwood, & Swain-Campbell, 2003; Johns, 2001; Kessler et al., 1997; Regier et al., 1990). Cannabis is the most studied drug in terms of the link between drug use and

psychosis. Marconi, Di Forti, Lewis, Murray, and Vassos (2016) report that 180.6 million people worldwide use cannabis. That translates as 3.9% of the global adult population. This makes cannabis more widely used than all other illegal substances put together (Ksir & Hart, 2016; Marconi et al., 2016).

In spite of the fact that cannabis use is high, prevalence of diagnosed psychosis is low. If the association between the two was established as causal, the risk from use of cannabis would equate to only two percent in regular cannabis users (Gage, Hickman, & Zammit, 2016). As Ksir and Hart (2016) state, the vast majority of those who use cannabis will not develop a diagnostic level of psychosis. In the same way over 90% of cigarette users will not develop lung cancer and over 90% of women who drink more than two drinks a day will produce normal-appearing offspring (Ksir & Hart, 2016). The important element is the risk ratios relative to abstainers. For heavy users of cannabis, the risk ratio relative to abstainers has been reported as high as 6:1 (Bagot, Milin, & Kaminer, 2015; Di Forti et al., 2015).

Psychosis is a multifactorial and complex phenomenon, with a wide range of variables implicated in its development and as part of that, cannabis use does not happen in a vacuum. The interactions between variables reflect the complexity of the condition itself. To illustrate, two of these interacting variables might be the genetic risk for psychosis and the strain of cannabis used (Di Forti et al., 2015). Gage et al. (2016) estimate that the interaction between these two factors and level of cannabis use, assuming in this case that patterns of risk for co-exposure to risks is multiplicative, could take that two percent to 20%. Attempts to understand the nature of the relationship between cannabis use and psychosis are important in this study as part of

the overall desire to understand the nature of psychosis. Given the strength and consistency of the established link between cannabis use the psychosis, cannabis use might represent the most potentially modifiable risk factor for psychosis (Gage et al., 2016).

Beyond the fact that cannabis is the most widely used drug in the general population, and the potential for risk levels to escalate when interacting with other risk factors, the way in which the active ingredient of cannabis, delta 9 tetrahydrocannabinoil affects the body is of relevance to its relationship with psychosis. Delta 9 tetrahydrocannabinoil indirectly affects the dopamingeric system, which is the same system implicated in the development of psychosis. This provides a viable pathway by which biological effects can translate to psychotic disorder. One of the strongest findings supporting the link between cannabis use and psychosis was in a longitudinal cohort study of 45570 Swedish conscripts. Findings in the 15-year follow-up study were that high consumers of cannabis were 6·0 (95% CI 4·0—8·9) times more likely to develop psychosis than those who did not use cannabis. The study however could not establish if adolescent cannabis use was the cause or the consequence of psychotic symptoms.

This issue of causality was addressed by van Os et al. (2002a). This study aimed to address the issue around drugs being used to self-medicate symptoms of psychotic disorder, versus drug use causing the onset of disorder. A longitudinal, general population based study of 7076 Dutch people was the sample, with measures taken at baseline in 1996, T1 in 1997 and T2 in 1999. The study found that for people with a lifetime absence of psychotic disorder and with a baseline history of cannabis, the risk of developing psychosis at follow-up was increased. In addition, there was a dose-

response relationship between the amount of drug use exposure and the outcome. Baseline use was a stronger predictor than use over the follow-up period. Findings remained intact after controlling for age, sex, ethnic group, being single, level of education, urbanicity and experiences of discrimination. They also remained intact after adjustments for psychiatric diagnosis which caused only a slightly changed outcome.

A powerful interaction effect between cannabis use and the experience of childhood trauma has been reported in a number of studies. Cougnard et al. (2007) look at interactive effects of cannabis, trauma and urbanicity. This study concluded that the environmental risks act additively and combine with developmental exposures to create persistence of behavioural and neurotransmitter sensitisation. Harley et al. (2010) addressed the interactive effects of cannabis use and childhood trauma only and found that there was a greater than additive effect. This study found each factor to be significant independently, however together the risk went beyond the sum of each individual risk level. Houston, Murphy, Adamson, Stringer, and Shevlin (2008) addressed the multiplicative effect of childhood trauma and cannabis use. This study concluded that while there were no main effects when controlling for a wide range of demographic variables, the interaction effect was significant.

Urbanicity

Living in an urban environment increases social competition, with greater numbers of people seeking a limited number of resources which results in lower levels of social capital (Frissen, Lieverse, Drukker, van Winkel, & Delespaul, 2015). Frissen et al. (2015), report that this increased level of competition creates a backdrop of social adversity with increased levels of impoverishment, a greater child care burden and

greater levels of financial disadvantage. An added element of urbanicity that impacts both social defeat and social support, is that living in poor and dangerous neighbourhoods such as those found more often in inner city regions can reduce the protective impact usually afforded by strong levels of social support (Frissen et al., 2015).

Studies have shown that living in an urban area can increase the risk of developing psychosis by 1.5 to 3.0 times (Newbury et al., 2016; Pederson & Mortensen, 2001). Krabbendam and van Os (2005) found this to be true in a meta-analysis of 10 studies looking at rates of schizophrenia in urban versus rural environments. The analysis showed that rates in urban areas were around double that of non-urban areas when controlling for a range of confounders which included but was not limited to age, sex, ethnicity, drug use, social disadvantage, family history and season of birth. Findings were consistent across countries and cultures (McGrath et al., 2004). In addition, they demonstrated a dose response relationship and urban birth and upbringing preceded the onset of disorder which is important for considerations of causality. Importantly, they were also found to be reflected in comparisons of rates of PLEs, independent of increased risk of psychotic disorder, service use or sociodemographic factors which included ethnic group, drug use and social networks (Spauwen, Krabbendam, Lieb, Wittchen, & van Os, 2004; Stefanis et al., 2004; van Os, Hanssen, Bijl, & Vollebergh, 2001; van Os, Hanssen, de Graaf, & Vollebergh, 2002b).

The mechanisms underpinning this relationship are of great interest in psychosis research, particularly as by 2050, two thirds of the population are predicted to be city dwellers (Newbury et al., 2016). Newbury et al. (2016) develop work on urbanicity

further by looking at aspects of living in cities that might be underlying this association. They used a study of children who live in urban environments to look at neighbourhood level characteristics. The aspects addressed were all socially based and were, social cohesion, social control, neighbourhood disorder and being a direct victim of crime. Social cohesiveness measured the supportiveness of relationships between neighbours. Social control looked at the likelihood that neighbours would intervene in issues. Neighbourhood disorder addressed physical and social evidence of threat and disorder. Crime victimisation was a representation of direct experiences of victimisation such as mugging. The study also addressed the background characteristics of the families involved in the study as well as any history of psychiatric illness.

The proposed pathways from these social aspects of urban neighbourhoods to PLEs are linked again by the effect of the resulting stress on the HPA axis, the dopaminergic system and neurodevelopmental impacts. Growing up in a crowded neighbourhood, with social networks which may be insecure at best, with unpredictable or unfriendly interactions with neighbours, and with the very real threat of crime, create these conditions of chronic stress. Added to the stress outside of the home and created by those conditions, is the possibility of increased stress and risk of abuse inside the home, adding further to the levels of and to the chronicity of stress. Chung and Steinberg (2006), found that from the variables used, reduced social cohesion in particular could even reduce the protective effects of positive parenting in urban neighbourhoods.

The study found that children living in urban environments were up to 80% more likely, at age 12, to report experiencing psychotic symptoms than non-urban counterparts. This association was not explained by either socioeconomic status of the family or by the

psychiatric composition. Characteristics which increased the risk were low social cohesion and low social control, high neighbourhood disorder, and a family being a direct victim of a crime. The factor which had the most impact of the four socially driven processes, was low social cohesion, again independent of family-level measurements.

Social Support

If social defeat is a risk-factor, then complementing it as a protective factor, is social support. The web of social relationships around people can be described as a social network, the main function of which is the provision of social support (Heaney & Isreal, 2008). Social support is one form of social capital. It is the sum of the resources that arise from these linkages between people. It tends to be reported that where levels of social defeat are high, levels of social support tend to be lower (Frissen et al., 2015). Berkman and Glass (2000), suggest that social support enhances wellbeing by meeting basic human needs for companionship, intimacy, a sense of belonging and a reassurance of worth. Literature further suggests that core features of social support which link to wellbeing are centred on the development of self-esteem and providing a buffer against the effects of stress and trauma (Gayer-Anderson & Morgan, 2013; Brugha, 2010). So if a person feels properly supported, even in the presence of stressors, this will diminish the negative effects. Even the presence of one strong, intimate relationship has been shown to be an important predictor of good health (Michael, Colditz, Coakley, & Kawachi, 1999).

Studies have consistently shown that those with a diagnosis of psychosis are more likely to have reduced levels of social support. The assumption is often made that this link

between social support and psychosis is a consequence of the disorder. Gayer-Anderson and Morgan (2013) in a systematic review of the literature around social support and early psychosis suggest that the mechanisms may be more complex than that. This review points to a cycle of exclusion which may be worsened by the presence of a clinical disorder but is already present. It suggests that these disorders are influenced by exposure to adverse social contexts and experiences over the life course with lack of social support being a proposed acute and chronic stressor (Morgan et al., 2010; van Os et al., 2010). The review by Gayer-Anderson and Morgan specifically addresses this issue. The study addresses if lack of social support precedes onset in first presentation of those with psychosis and in addition, it examines the types of social networks and support available. This review concludes by stating the need for studies that address this direction of the relationship between social support and psychosis, particularly to identify issues as a potential precedent to onset. Of particular relevance, it feels, are studies which utilise general population samples through the identification of manifestations such as PLEs.

Social support can be looked at from several perspectives. One conceptualisation is offered by House (1981) in which social support is broken into four types. The first of these is emotional support which provides empathy, love, trust and caring to the recipient. The second is instrumental in which the individual is offered tangible aid of a practical nature which is intended to assist in a time of need. The third type of support described by House is informational support which is the provision of advice, suggestions and information which is intended to help solve a problem. The final kind of support is appraisal in which the person is offered information that is useful for self-evaluation such as constructive feedback and affirmation. It is a feature of social support

that it can be difficult to separate the types of support from each other. They are not necessarily mutually exclusive.

Of particular relevance to the concept of social support is the intention behind the support. It is meant to be helpful and it is consciously provided. Also central is the perception of the recipient. Although it may be intended to be helpful, it may not be experienced as such and again, this interpretation by the individual is important. It is this perception rather than the behaviours during the interactions, that link it to health and wellbeing outcomes (Wethington & Kessler, 1986).

Gayer-Anderson and Morgan in their review focus on non-clinical populations. Wiles et al. (2006) found that restricted networks preceded the development of symptoms in their study of 1795 individuals who they studied over 18 months. Freeman et al. (2011) in a study of concomitants of paranoia in the general population found that risk of experiencing paranoid symptoms increased with a decrease in the number of friends and family that respondents felt close to. That issue of perceived support was again documented by Alptekin, Ulas, Akdede, Tumuklu, and Akvardar (2009) who found that those who perceived themselves as having no support where significantly more likely to experience psychotic symptoms. These findings were independent of gender, education, marital status, economic support, family history of mental illness and substance use.

Discrimination

Discrimination is the behaviour associated with prejudice (Allport, 1979). It has consistently been found to be correlated with negative health outcomes (Janssen et al., 2003; Karlsen & Nazroo, 2002; Veling et al., 2007). These negative outcomes have

been found to include a correlation with higher levels of psychosis in populations which are more likely to experience discrimination (Janssen et al., 2003; Veling et al., 2007). These populations are typically minority groups including those in the minority in terms of ethnic background, race, skin colour, sexual orientation and gender. Experiences of discrimination may be direct, for example, an assault on a person due to colour or sexuality. It may also be found in less visible forms, such as a landlord being less likely to offer rental property to people due to colour or sexual orientation. In addition to this direct versus indirect distinction, discrimination can also be classified as happening at the individual level through interpersonal experiences, or at the institutional level as structural discrimination (Veling et al., 2007). Structural discrimination will involve the use of policies which control access to resources like housing and employment. It can be seen in behaviours towards groups of people as opposed to specific individuals. The effect of such discrimination on that group will be that they will have less access to desirable social resources and capital (Karlsen & Nazroo, 2002). As with many of the social structures that this study has used, types of discrimination are seldom mutually exclusive (Karlsen & Nazroo, 2002). Group experiences of discriminations do not preclude differences across individual level experiences of discrimination (Veling et al., 2007).

An important aspect of discrimination involves perception. Two individuals can have the same experience, one will perceive it as discrimination and the other will not. The reasons for this difference may be related to previous experiences, they may be related to individual differences in personality, outlook or attributional style. This issue of perceived discrimination is very strongly linked in the literature to the impact it will have on the individual (Krieger, 1990; Krieger & Sydney, 1996; Ruggiero & Taylor,

1995). It is not what happens to the individual but how they interpret what happens to them (Kessler, Mickelson, & Williams, 1999b).

Kessler et al. (1999b) address experiences of perceived discrimination in a general US population study by looking at lifetime and day to day experiences. It concluded that it was the perception rather than the actual experience of discrimination that was linked to mental ill health. It found that 33.5% of respondents felt they had been discriminated against over a lifetime, while 60.9% perceived they were discriminated against on a day to day basis. The study reported associations between this perceived discrimination and mental health problems. For major depression, Odds Ratios (OR) of 1.5(95% CI 1.3-1.7) were reported for lifetime experience of perceived discrimination, while for day to day experiences, ORs of 2.1(95% CI 1.5-2.9) were reported. In terms of generalised anxiety disorder, ORs of 3.3(95% CI 1.9-5.7) were reported. The report also looked at experiences within the context of Social Economic Status (SES) and found that the association did not vary in terms of SES, although Ruggiero and Taylor (1995) do point out that there is potentially lower reporting of discrimination among lower SES classes due to lower access to resources. The high prevalence and wide distribution of perceived discrimination found by the study gives an indication of its relevance. Janssen et al. (2003) found that perceived discrimination predicted delusional ideation in a sample of 7076 participants which was part of The Netherlands Mental Health Survey and Incidence Study (NEMESIS). Participants were asked about perceived experiences of discrimination in the context of race, gender, appearance and sexual orientation. No discrimination was reported by 85% of the sample, 11% reported discrimination within one of the domains and three percent reported discrimination across more than one domain. Of those, 0.5% of those who reported no discrimination experienced delusional

ideation, 0.9% of those who reported discrimination in one domain experienced delusional ideation and 2.7% of those who reported discrimination in more than one domain experienced delusional ideation.

Ethnic minorities have been used extensively in the literature for the study of discrimination. This group provide rich context to address further dimensions of the experience of discrimination. In relation to the development of psychosis, perceived discrimination operates at both the individual level and the group level (Veling et al., 2007). Being part of a group that experiences discrimination means that a shared understanding is developed in the group around group status. These may include knowledge of negative cultural stereotypes, awareness that as a group they are devalued, and recognition that they can be targeted for acts of discrimination (Cantor-Graae & Selten, 2005; Crocker & Major, 1989). Veling et al. (2007) study in particular the relationship between this group level experience and the development of psychotic symptoms. Further, the study looked at the variation which exists in perceived experience of discrimination across minority groups. In The Netherlands risk is greater for immigrants, for example, from Morocco than from Turkey (Veling et al., 2007). Veling et al. (2007) found that the more stigmatised the group was, the higher the levels of perceived discrimination reported were. The study rated experiences of discrimination as high for those from Morocco, as medium for those from Netherlands-Antilles and Surinam, as low for those from Turkey and as very low for those from western or westernised countries. In terms of the relationship between those experiences of perceived discrimination and the development of schizophrenia within the same groups, for those in the ‘high’ groups incidence rates of 4.0(95% CI 3.0-5.3) were reported compared to 1.99(95% CI 1.5-2.5) in the medium group, 1.58(95% CI 1.1-2.3)

in the low group and 1.2(95% CI 0.8-1.9) in the low group. This same pattern across groups is also seen in the UK where the risk is greater for the African-Caribbean population than for other ethnic minority groups (Fearon et al., 2006).

One model which is offered to explain the pathways from discrimination to the development of psychosis is contained within the Minority Stress Model (Meyer, 1995, 2013). This model was developed from studies of sexual minority groups but applies to any groups which are stigmatised. The three elements of the model are that the stressors are:

1. Unique to the group and are not experienced by non-stigmatised groups.
2. Chronic.
3. Socially based.

Discrimination is one of the stressors contained within the model. Gevonden et al. (2014) used the framework to address mechanisms underlying the association between sexual minority status and the development of psychosis and found that discrimination mediated the effect of sexual orientation on the occurrence of psychotic symptoms, accounting for 34% of the effect. This was by far the factor with the strongest mediating effect in the study underlining the importance again of social context in the development of psychosis. Mirroring the findings of the ethnic density buffering hypothesis, Hatzenbuehler, Keyes, and McLaughlin (2011) found in a US study that the health of sexual minority communities was better in states that have a larger lesbian, gay and bisexual community.

Discrimination in the current study is addressed in terms of

- Sexual orientation.
- Weight.
- Being of Latino/Hispanic race.
- All other races.
- Gender.

Risk Factors

Risk factors have been selected based on being commonly used and being consistently found to correlate with PLEs and schizotypy (Johns et al., 2004; Johns & van Os, 2001). These risk factors are routinely controlled for in studies addressing the link between childhood trauma and psychosis (Johns et al., 2004; Johns & van Os, 2001). The risk factors which have been selected are:

- Age.
- Income (low).
- Marital status (living alone).
- A diagnosis of depression.
- A diagnosis of anxiety.

Summary

A recurring and strong theme emerging from development of the variables for use in the mediation is the power of the cumulative and interactive effects of social and environmental contributors to the potential for psychosis. Each variable on its own constitutes an established risk with potential mechanisms underlying each one. When

brought together with common pathways to the development of psychosis, the complexity of this multifactorial model start to become clear.

The first aim of this chapter was to produce a social defeat variable which used a person-centred approach to describe the experiences of the respondents. It was expected that distinct groups of people would be present in the data in terms of IQ, migrant status, urbanicity and drug use. With the establishment of these groups, or classes, of people in terms of common experiences of social defeat, this chapter would secondly aim to address the association between these classes and the PLE clusters used in this study. This would be done in the same way as it was for the childhood trauma classes as documented in chapter 3. It was expected that there would be significant associations between social defeat and the PLE symptom clusters. The third aim was to produce a social support variable. Social support was predicted to be made up of distinct factors which would each be explored and established by this chapter. Each factor would then be represented by an individual score. The fourth aim was to construct a discrimination variable which would represent discrimination in terms of race, gender, weight and sexual orientation. Finally, the fifth aim was to compute covariates which would be used in the mediation to control for age, marital status, income, diagnosis of depression and diagnosis of anxiety.

Method

Sample and Procedures

Analysis was conducted on the second wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Dawson, & Hasin, 2004), as described in chapter 2. For the development of the socially based variables needed for

the mediation, the Wave 1 dataset was linked to the Wave 2 dataset and this joint database was used as much as possible. A selection of variables from sections in both wave 1 and wave 2 were used to construct the social defeat, social support and discrimination variables, as well as the covariates. The relevant NESARC sections are referenced in the analytical plan.

Analytical Plan and Variables

Social Defeat

Measures

The social defeat variable was computed from several fields described below, all from Section 1 of wave 1 (background information) and section 1 of wave 2 (background Information I).

- Low educational attainment: S1Q6A.

Educational attainment was used as a proxy for IQ (Erickson et al., 2016; Lynn & Mikk, 2007; Lynn & Mikk, 2009). A number of studies utilise completion of high school or 12 years of education as an appropriate indicator of educational attainment (Gilman et al., 2008; Kessler et al., 2003; Kessler, Borges, & Walters, 1999a; Lee et al., 2010). The education field is categorical with categories 1 through 7 indicating a level of education below the completion of high school. Categories 8 through 14 indicate a level of education from completion of high school to completion of master's degree or higher graduate degree. This field was recoded to a new binary field with 1 representing not completing high school or the presence of the risk factor, and 0 representing completing high school or the absence of the risk factor.

- Being of migrant status: S1Q1F

Country code where mother was born: W2S1Q2D

Country code where dad was born: W2S1Q2E

Migration was constructed from the fields asking about country of birth of the respondent and both of the respondent's parents. If all three were born in the USA the migrant field was coded as 0 indicating the absence of the risk factor. If any of the three parties were born outside of the USA, the field was coded as 1 to indicate the presence of the risk factor. With the exception of the questions relating to country of birth for mother and country of birth for father, the data came from wave 1 of NESARC.

- Lifetime drug use status: DGSTATUS

Lifetime drug use was recoded again to a new binary field with 1 representing the presence of the risk factor and 0 representing the absence. The original field was categorical and contained four categories. Categories 1 through 3 indicated drug use at different points in relation to the NESARC interviews while category 4 indicated no drug use ever. Categories 1 through 3 were recoded as a binary 1 to indicate the presence of the risk variable while category 4 was the only value to be recoded as a binary 0 to indicate the absence of this activity.

The source question from which drug use status was derived was preceded by the statement (wave 1 questionnaire):

'Now I'd like to ask you about your experiences with medicines and other kinds of drugs that you may have used ON YOUR OWN - that is, either WITHOUT a doctor's prescription (PAUSE); in GREATER amounts, MORE OFTEN, or LONGER than prescribed (PAUSE); or for a reason other than a doctor said you should use them.

Statement J People use these medicines and drugs ON THEIR OWN to feel more alert, to relax or quiet their nerves, to feel better, to enjoy themselves, or to get high or just to see how they would work.'

The question was, 'Have you EVER used any of these medicines of drugs?'. (Section 3B – medicine use, question 1a).

The question was accompanied by a flashcard listing the items below and the respondent was asked to specify which drug or medicine if they selected any from the list.

1. Sedatives, for example, sleeping pills, bar-bit-your-ates, Seconal, Kway/-ludes, or Khlor/-all Hydrate.
2. Tranquilizers or anti-anxiety drugs, for example, Valium, Librium, muscle relaxants, or Zanax.
3. Painkillers, for example, Codeine, Darvon, Per/-ko-dan, Dill-odd/-id, or Demerol.
4. Stimulants, for example, Pray-lude/-in, Benzadrine, Methadrine, uppers, or speed.
5. Mariwa/-na, hash, THC, or grass.
6. Cocaine or crack.
7. Hallucinogens, for example, Ecstasy/MDMA, LSD, mescaline, Sillosy/-bin, PCP, angel dust, or pay-o/-tee.
8. Inhalants or solvents, for example, a/-mill nitrate, nitrous oxide, glue, tol/-u- een or gasoline.
9. Heroin.

10. Any OTHER medicines, or drugs, or substances, for example, steroids, Elavil, Thorazine, or Haldol?

Lifetime drug use was computed from this question and carried into wave 2. It was then updated based on wave 2, section 3B – medicine use, question 1a, which was preceded by the statement:

'Now I'd like to ask you about your experiences with medicines and other kinds of drugs that you may have used ON YOUR OWN - that is, either WITHOUT a doctor's prescription (PAUSE); in GREATER amounts, MORE OFTEN, or LONGER than prescribed (PAUSE); or for a reason other than a doctor said you should use them. Statement K People use these medicines and drugs ON THEIR OWN to feel more alert, to relax or quiet their nerves, to feel better, to enjoy themselves, or to get high or just to see how they would work.'

Since your LAST interview in (MO/YR), did you use any of these medicines or drugs ON YOUR OWN? Please do not include any over-the-counter medicines or herbal medicines.

1. Sedatives, for example, sleeping pills, barbiturates, Seconal, Quaaludes, or Chloral Hydrate.
2. Tranquilizers or anti-anxiety drugs, for example, Valium, Librium, muscle relaxants, or Zanax.
3. Painkillers, for example, Codeine, Darvon, Percodan, Oxycontin, Dilaudid, Demerol, Celebrex or Vioxx.
4. Stimulants, for example, Preludin, Benzedrine, Methedrine, Ritalin, uppers, or speed.

5. Marijuana, hash, THC, or grass.
6. Cocaine or crack.
7. Hallucinogens, for example, Ecstasy/MDMA, LSD, mescaline, psilocybin, PCP, angel dust, or peyote.
8. Inhalants or solvents, for example, amyl nitrite, nitrous oxide, glue, toluene or gasoline.
9. Heroin.
10. Any OTHER medicines, or drugs, or substances, for example, methadone, Elavil, steroids, Thorazine or Haldol?

- Living in an urban environment: CC

Metropolitan Statistical Area, (MSA) type is made up of three indicators, urban, suburban and rural. It was also recoded into a new binary field in which 1 represented being in an urban area and the presence of the risk factor, while being in a suburban or rural area was represented by 0 or the absence of the risk factor. This classification is in line with other studies that have looked at urbanicity. Newbury et al. (2016) address the features which create an urban landscape such as population density, building density, proximity to the countryside or to the city centre and use of land. Dichotomising urbanicity allows for ease of interpretation and allows statistical power to be increased (Newbury et al., 2016).

Analysis

A social defeat LCA was conducted to see if there were homogenous groups in the data that represent social defeat. More details on the use of LCA for the type of analysis are

documented in chapter 2 and will not be repeated here. SPSS Version 23 Release 23.0.0.0 was used to construct the variables. Mplus Version 7.3 was used to complete LCA analysis. Stratification and weighting variables were used to balance the sampling strategies (W2WEIGHT, W2STRAT, W2PSU). The fit of five models (2-class through to a 6-class model) was assessed. Selection of the optimal number of latent classes was based on several statistical fit indices. The log-likelihood is a function of the observed responses for each person and the model parameters. The information statistics Akaike Information Criterion (AIC) (Akaike, 1987), Bayesian Information Criterion (BIC) (Schwartz, 1978) and Sample Size Adjusted Bayesian Information Criterium (ssa-BIC) (Schwartz 1978), are goodness-of-fit measures used to compare competing models; lower observed values indicate better fit. The Lo-Mendall-Rubin's adjusted likelihood ratio test (LMRA-LRT) (Lo, Mendell & Rubin, 2001) result was used to compare models with differing numbers of latent classes; a non-significant value ($p<0.05$) suggests that the model with one less fit should be accepted.

Once the social defeat classes were established, cross tabulations were done using the PLE symptom clusters which were outlined in chapter 3. This was done using only wave 2 data as the PLE information only existed in wave 2 and the newly constructed social defeat classes for that data.

Social Support

Measures

The source data for the social support variables originated in wave 2, section 2D of the NESARC, (background information – II). Twelve items (W2S2DQ27A - W2S2DQ27L) were rated relating to the respondent's experiences of a range of socially focused

activities. Six of these questions were recoded to represent a positive answer to the question. These are indicated by an (R) after the question below. The items were responded to using a Likert scale:

- 1= false
- 2=probably false
- 3= probably true
- 4=definitely true

1. If I wanted to go on a trip for a day (to the country, city, mountains, or beach) I would have a hard time finding someone to go with me. (R)
2. I feel there is no one I can share my most private worries and fears with. (R)
3. If I were sick I know I would find someone to help me with my daily chores.
4. There is someone I can turn to for advice about handling problems with my family.
5. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.
6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.
7. I don't often get invited to do things with others. (R)
8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (taking care of my plants, garden, or pets, getting the mail, or watching the house in general). (R)
9. If I wanted to have lunch with someone, I could easily find someone to join me.

10. If I were stranded 10 miles from home, someone I know would come and get me.
11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it. (R)
12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me. (R)

Analysis

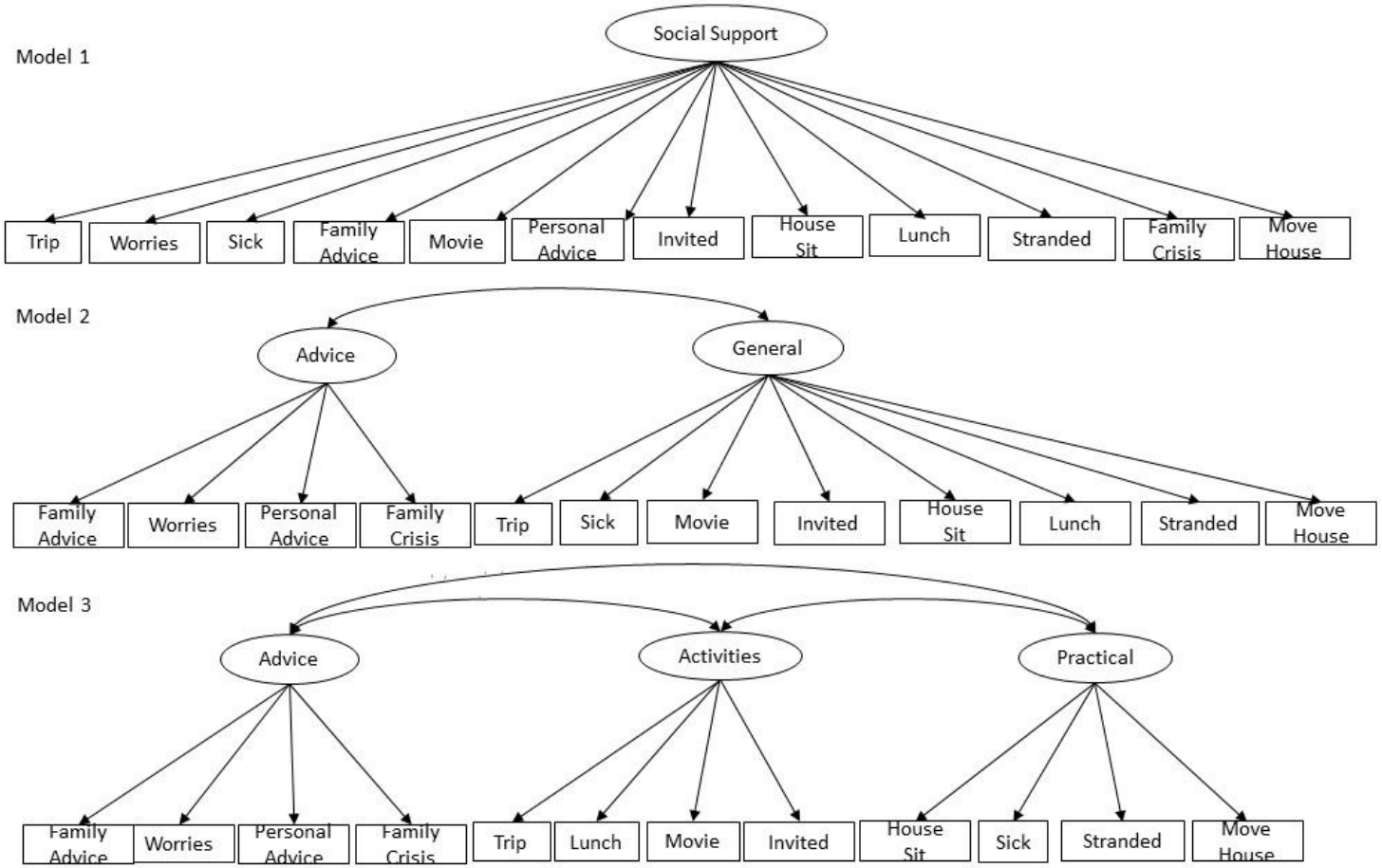
Dimensionality of social support was assessed using CFA. SPSS Version 23 Release 23.0.0.0 was used to construct the variables. Mplus Version 7.3 was used to complete CFA analysis. Three alternative models were specified (see Figure 4.1) and tested. Model 1 is a one-factor model where social support items load on a single latent variable. Model 2 is a two-factor model (a general social support factor and an advice factor). Model 3 is a three-factor model (an advice factor, a practical support factor and a social activities factor). In line with the types of support that House (1981) proposes are the advice factor which aligns with the informational factor and the practical factor which aligns with the appraisal type of support. In addition there seemed to be a type of support offered by providing friendship in the form of attending everyday social activities. This did not reflect clearly any of the categories suggested by House, although it could be seen as a type of practical or indeed emotional support and reflective of the difficulty in separating these non-mutually exclusive factors.

Each of the models outlined were specified and estimated using the robust weighted least squares estimator (WLSMV). Other methods of analysis tend to produce incorrect standard errors, attenuate the relationships between observed variables and produce

possible pseudo-factors (Brown, 2006). The WLSMV estimator has been shown to produce correct parameter estimates, standard errors and test statistics (Flora & Curran, 2004). The proportion of missing data for all variables was low and ranged from 0.5 to 0.9%. This was handled using pairwise present analysis which is the default when the WLSMV estimator is used (Asparou & Muthen, 2010). Goodness of fit for each model was assessed with range of fit indices including the Comparative Fit Index (CFI) (Bentler, 1990) and the Tucker-Lewis Index (TLI) (Tucker & Lewis, 1973). The chi-square (χ^2), would not become non-significant in a sample of this size so a value greater than .90 for the CFI and TLI were considered to reflect acceptable model fit. Additionally, the Root Mean Square of Approximation (RMSEA) (Steiger, 1990) was reported, where a value of less than .05 indicated close fit and values of up to .08 indicated reasonable errors of approximation (Jöreskog & Sörbom, 1993).

Before the data was used to formulate a score, a CFA was performed to verify the presence of underlying factors which appear to exist in the questions. Firstly, the six questions which were constructed from a negative perspective i.e. 'I would have difficulty achieving this' were recoded to represent a positive perspective. This meant for all questions, lower scores represented low levels of social support for this item, with rising scores representing higher levels of support. The data was then exported to Mplus before running the CFA. On confirmation of the factors, details of which are in the results section, scores were calculated for each of the factors in preparation for the mediation analysis.

Figure 4.1 Social Support Models.



Discrimination

Measures

The discrimination variable was constructed from the fields below, taken from three sections within wave 2 of NESARC:

- section 1, background information – I
- section 2D, background information – II
- section 14, medical conditions and practices.

The items were responded to using a Likert scale:

- 1=Never
- 2=Almost Never
- 3=Sometimes
- 4=Fairly Often
- 5=Very Often.

- During the Past Year (PY) how often did you experience discrimination in public (on the street, in stores, in restaurants) because you are male/female: W2S2DQ13A4.
- During the PY how often did you experience discrimination in public (on the street, in stores, in restaurants) because of your race/ethnicity (not Hispanic/Latino): W2S2DQ10A3.
- During the PY how often did you experience discrimination in public (on the street, in stores, in restaurants) because you are Hispanic/Latino: W2S2DQ3A3

- During the PY how often did you experience discrimination because of your weight in public settings (on the street, in restaurants, stores, public transportation): W2S1Q43A3.
- During the PY how often did you experience discrimination in public (on the street, in stores, in restaurants) because you were assumed to be gay, lesbian, or bisexual. W2S14Q12A3.

Analysis

The responses were used to formulate a score. First of all the fields were recoded into new variables:

- a response of 1 (never) was recoded to 0,
- a response of 2 (almost never) was recoded to 1,
- a response of 3 (sometimes) was recoded to 2,
- a response of 4 (fairly often) was recoded to 3
- a response of 5 (very often) was recoded to 4.

An overall discrimination code was then computed by summing the recoded responses. Because there are two mutually exclusive questions concerned with discrimination around race, the maximum score would be 16, with 0 as the minimum representing no discriminatory experiences.

Covariates

Covariates were of two types. Demographic variables were taken from wave 1 section 1 and from wave 2 section 1 which both contain background information. The variables

used were age, income and marital status. The diagnostic variables of a DSM diagnosis of depression and anxiety were taken from section 14 of wave 1(DSM-IV Diagnosis) and section 16 of wave 2 (Diagnostic Variables).

- Age is represented as a continuous variable. Age fields were taken from wave 1(AGE) and from wave 2 (W2AGE) to allow as full a dataset as possible. Where age was missing from Wave 2 due to lack of follow up, age was calculated by taking the wave 1 age and adding 3 years to it. Three years was the mean of all differences in recorded ages between wave 1 and wave 2 data.

- Marital Status: Marital status fields were taken from wave 1 (MARITAL) and wave 2 (W2MARITAL). Wave 2 data was used where available, where wave 2 was incomplete, wave 1 data was used. Both fields had the same categorical structure:

• 1 – married • 2 – living with someone as if married	0
• 3 – widowed • 4 – divorced • 5 – separated • 6 – never married.	1

Marital status was coded as a binary variable for use as a covariate. In terms of risk, it was coded 1 for the presence of risk in line with all binary risk variables

in the study, and 0 for no risk. The categories married or living as if married were coded as 0 and the remainder were coded as 1.

- Income was also taken from both wave 1 (S1Q12BR) and from wave 2 (W2S1Q20BR). There were a number of income fields available – personal, family and household. It was decided that household would give the best indicator of the environment. Again, where data was unavailable in wave 2, wave 1 data was used. This was a categorical field which was recoded to show the presence of risk (1), the or absence (0). The fields were made up from 21 categories from category 1 at the lowest level (less than $5000) to category 21 at the highest level ($200000 or more). Frequencies were used to identify the lowest quartile of the data which was indicated as those in categories 1(less than $5000) up to and including category 6 ($13000 to $14999) and these were coded as 1. The remainder of the categories were coded as 0.

- Lifetime non-hierarchical diagnosis of depression was recorded in wave 1 (MAJORDEPLIFE) and in wave 2 (DEPLIFEW12) and were already coded as 1 for the presence of diagnosis and 0 for no diagnosis. Both fields were examined and if a respondent had a lifetime diagnosis indicated in either wave 1 or in wave 2 the field was coded as 1. If neither field indicated the presence of a diagnosis, the field was coded as 0.

- Lifetime non-hierarchical diagnosis of anxiety was recorded in wave 1 (GENAXLIFE) and in wave 2 (GENLIFEW12) and were already coded as 1 for the presence of diagnosis and 0 for no diagnosis. Both fields were examined and

if a respondent had a lifetime diagnosis indicated in either wave 1 or in wave 2 the field was coded as 1. If neither field indicated the presence of a diagnosis, the field was coded as 0.

Results

Social Defeat Latent Class Analysis

Table 4.1 shows the rates of endorsement of the low-level variables that make up the social defeat construct. The most heavily endorsed risk variable is that of urbanicity, endorsed by 29.5% of the sample. The least endorsed was having a low I.Q. which in this case was represented by not having competed high school Those in this risk group represented 15.7% of the sample.

Table 4.1. Frequencies and Weighted Percentages Of Endorsement Of Social Defeat Items At Binary Variable Level.

Binary variable	**Yes Count**	**Yes %**
Low IQ	7849	15.7
Drug Use	9140	22.8
Urbanicity	15002	29.5
Migrant Status	12564	25.6

Table 4.2 shows endorsement in terms of the number of defeats experienced by each respondent. Numbers which show the largest percentages of endorsement are zero and one defeats with percentage endorsement decreasing as number of defeats increases. In terms of counts, 17325 respondents or 39.8% have experienced at least one of the defeats. Only 134 respondents which is .2% have experienced all four defeats.

Table 4.2. Frequencies and Weighted Percentages by Number of Defeats Experienced

Defeat	**Count** N=43093	**%**	**Cumulative %**
0	13593	35.9	35.9
1	17325	39.8	75.7
2	9429	19.3	95.0
3	2612	4.7	99.8
4	134	.2	100.0

The fit indices from the LCA are reported in Table 4.3. The 4-class solution is considered to be the best model. The BIC and ssa-BIC start to increase with the 4-class model which would indicate that the 3-class solution is best. However, the AIC does not start to increase until the 5-class model which suggests the 4-class model may also be worth considering. On analysis of the models, the 4-class solution contains a more refined baseline class with the drug use items and the urbanicity items being pulled into other classes. In addition, addressing the LMRA-LRT and associated p-value, there was some difficulty with estimation of the five and six class models. On the basis of interpretability of the solution and of the results, the 4-class model is selected as the preferred solution.

The latent class profile plot is shown in Figure 4.2. Class 4 was the largest class (N=23,422: 54.4%). This class was characterised by low likelihood of having experienced any of the social defeat variables. This class was considered to be the 'baseline' or normative group. Class 2 was the smallest class (N=4708: 10.9%) and was characterised by a relatively high probability of endorsing the item related to drug use. In contrast, this class had low likelihoods of endorsing all three of the other social

defeat risk variables. This class was labelled the ‘drug abuse’ class. Class 3 (N=6858: 15.9%) was characterised by a higher probability of endorsing the migrant status item.

Table 4.3. Fit Indices for the Social Defeat Latent Class Analysis.

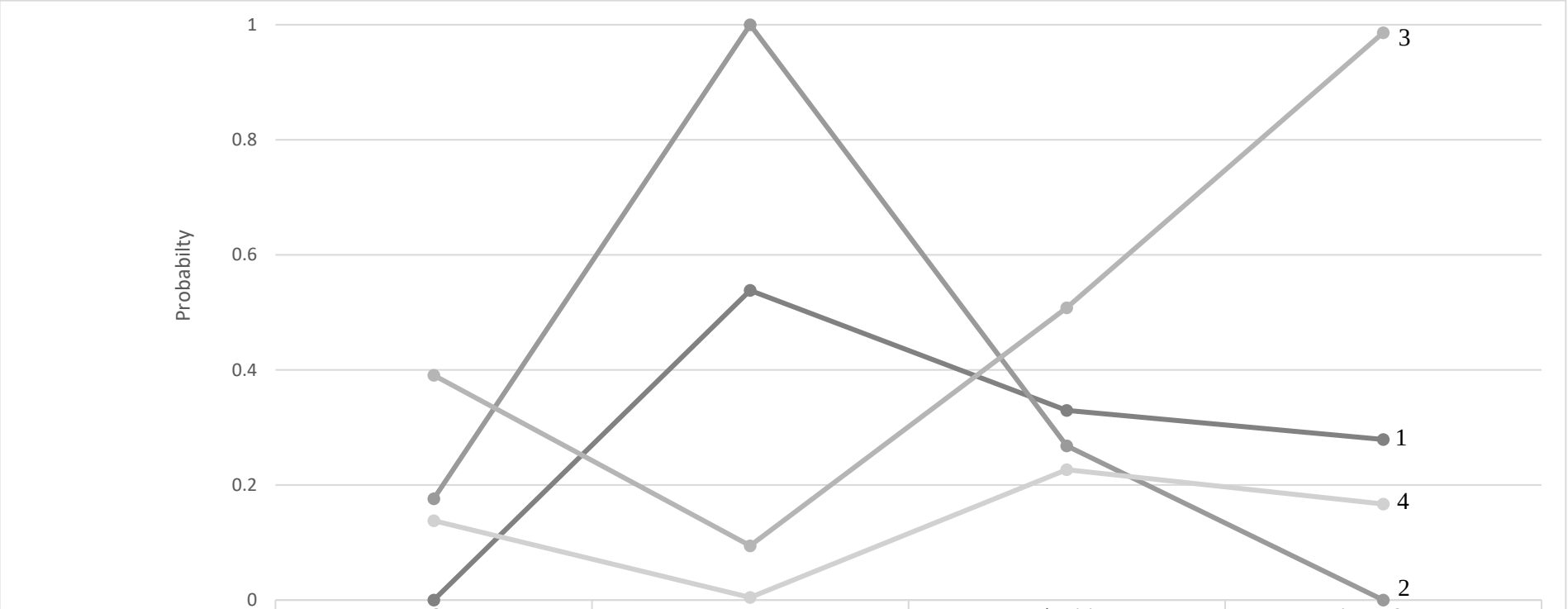
Number of Classes	Loglikelihood	AIC	BIC	ssa-BIC	LMRA-LRT	P-Value
1	-90521.618	181051.236	181085.921	181073.209		
2	-89308.296	178634.593	178712.633	178684.031	2382.000	.469
3	-89229.276	178486.552	178607.947	178563.455	155.134	.485
4	-89216.100	178470.199	178634.950	178574.568	25.868	.501
5	-89216.100	178480.199	178688.306	178612.034	0.000	.500
6	-89216.100	178490.199	178741.662	178649.499	0.000	.305

AIC = Akaike information criterion, BIC = Bayesian information criterion, ssa-BIC = sample size adjusted BIC, LMRA-LRT = Lo-Mendell-Rubin’s adjusted likelihood ratio test.

This class had low probability of endorsing the drug use item with more mid-sized probability of endorsing both the low I.Q. and urban items. This class was labelled the ‘migrant’ class. Class 1 was an intermediate group (N=8105: 18.8%) and was characterised by a mid-range probability of endorsing all but the low I.Q. item, for that this class had low probability. This class was labelled the ‘intermediate’ class.

Tables 4.4, 4.5 and 4.6 show the chi-square results for the relationships between each of the PLE items and the social defeat classes. Table 4.4 shows the results for the cognitive/perceptual symptom dimension. Table 4.5 shows the results for the social/interpersonal symptom dimension. Table 4.6 shows the results for the disorganised dimension. As with the childhood trauma classes, all the social defeat classes show significant relationships with the PLE items. The largest effect sizes were seen in the

Figure 4.2 Profile Plot- Social Defeat Latent Class Analysis.



	IQ	Drug Use	Urbanicity	Migrant Status
1. Intermediate 18.8%	0	0.53825	0.32985	0.27902
2. Drug Use 10.9%	0.17619	1	0.26806	0
3. Migrant 15.9%	0.39061	0.09445	0.5079	0.98615
4. Baseline 54.4%	0.13815	0.00454	0.22662	0.16708

Table 4.4 Chi-Square Results for Class Membership Against Responses to PLE Cognitive/Perceptual Questions.

PLE Item	Chi-Square
Have you had personal experiences with the supernatural?	$X^2(6,34373)=230.317,P<0.01$
Have you had the sense that some force is around you, even though you cannot see anyone?	$X^2(6, 34377)=287.646,P<0.01$
Have you believed that you have a 'sixth sense' that allows you to know and predict things that others can't?	$X^2(6, 34405)=58.474,P<0.01$
Have you often seen auras or energy fields around people?	$X^2(6,34416)=70.355,P<0.01$
Have you ever thought you can make things happen just by making a wish or thinking about them?	$X^2(6,34418)=55.653,P<0.01$
Have you often thought that shadows or objects are really people or animals, or that noises are actually people's voices?	$X^2(6,33410)=30.570,P<0.01$
Have you often had the feeling that things that have no special meaning to most people are really meant to give you a message?	$X^2(6,34201)=54.542,P<0.01$

Table 4.5 Chi-Square Results for Class Membership Against Responses to PLE Social/Interpersonal Questions.

PLE Item	Chi-Square
Have you had trouble expressing your emotions and feelings?	$X^2(6,34414)=278.059,P<0.01$
Have you rarely shown emotion?	$X^2(6,34366)=144.959,P<0.01$
Have you often felt nervous when you were with other people, even if you have known them for a while?	$X^2(6,34443)=100.693,P<0.01$
Have you felt suspicious of people, even if you have known them for a while?	$X^2(6,34412)=134.249,P<0.01$
When you are around people, have you often had the feeling that you are being watched or stared at?	$X^2(6,34428)=56.886,P<0.01$
Have there been very few people that you're really close to outside of your immediate family?	$X^2(6,34401)=118.214,P<0.01$

Table 4.6 Chi-Square Results for Class Membership Against Responses to PLE Disorganised Questions.

PLE Item	Chi-Square
Have people thought you act strangely?	$X^2(6,34267)=324.485,P<0.01$
Have people thought you have strange ideas?	$X^2(6,34340)=322.128,P<0.01$
Have people thought you are odd, eccentric or strange?	$X^2(6,34249)=519.645,P<0.01$

relationship with the disorganised dimension, followed by the social/interpersonal dimension and then the cognitive/perceptual dimension.

Social Support Confirmatory Factor Analysis

Table 4.7 shows endorsement of the social support items in terms of unweighted counts and weighted percentages. The values are shown in terms of responses to each level on the Likert scale. Firstly, to address the items that people showed least issue with, in that they struggled least with support for these issues, there was one item that stood out. 'If I were stranded ten miles from home, someone I know would come and get me.' had both the lowest percentage in terms of a 'false' response and the highest in terms of a 'true' response. At the other end of the scale was 'If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me', which had only 54.5% in the 'true' category.

The item, 'I often get invited to do things with others' was another item which had a low response in the 'true' category, with only 59.2% responding in this category. In terms of a high percentage response in the 'false' category which also indicates an item that respondents found difficult to access support in, the highest percentage was a 'false' response of 8.0% for the item, 'If I had to go out of town for a few weeks, it would be easy to find someone who would look after my house or apartment (taking

care of plants, garden or pets, getting the mail, or watching the house in general)' , which was closely followed by the item, 'If a family crisis arose, it would be easy to find someone who could give me good advice about how to handle it', which had a 'false' response of 7.7% compared to, for example, the item, 'When I need suggestions on how to deal with a personal problem, I know someone I can turn to', which had a 'false' response of only 1.9% accompanied by a 'true' response of 75.1%. The mean scores for all items were all above 3, indicating a mean score of at least 'probably true'.

The fit statistics for the three models of social support are shown in Table 4.8. Although the chi-square statistics were statistically significant, this should not lead to rejection of the models as the power of the chi-square is positively related to sample size (Tanaka, 1987). All three models met the criteria for an acceptable model based on the CFI and the TLI as well as the RMSEA. Model three had the lowest RMSEA making it the preferred model based on model fit and theoretical consistency. Model three factor loadings for the advice, practical and activities factors are shown in Table 4.9.

Table 4.7 Frequencies and Weighted Percentages of Endorsement of Social Support Items.

Item	**False (1)** (%)	**Probably False (2)** (%)	**Probably True (3)** (%)	**Definitely True (4)** (%)	**Mean (SD)**
If I wanted to go on a trip for a day (to the country, city, mountains, or beach) I would find someone to go with me. (R)	2067 (5.2)	3847 (9.8)	7498 (21.9)	20995 (62.5)	3.46 (.97)
I feel there is some one I can share my most private worries and fears with. (R)	1689 (4.2)	2065 (5.3)	4475 (12.6)	26220 (77.3)	3.67 (.86)
If I were sick I know I would find someone to help me with my daily chores.	1593 (4.4)	1321 (3.5)	6982 (19.4)	24569 (72.2)	3.63 (.84)
There is someone I can turn to for advice about handling problems with my family.	1383 (3.7)	1298 (3.6)	7012 (20.2)	24703 (71.9)	3.65 (.84)
If I decided one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.	1643 (4.2)	3026 (8.0)	11067 (32.5)	18605 (54.5)	3.43 (.95)
When I need suggestions on how to deal with a personal problem, I know someone I can turn to.	745 (1.9)	841 (2.3)	7058 (20.2)	25790 (75.1)	3.73 (.73)
I often get invited to do things with others. (R)	2000 (5.1)	4035 (11.2)	7987 (23.9)	20412 (59.2)	3.41 (.97)

Item	False (1) (%)	Probably False (2) (%)	Probably True (3) (%)	Definitely True (4) (%)	Mean (SD)
If I had to go out of town for a few weeks, it would be easy to find someone who would look after my house or apartment (taking care of plants, garden or pets, getting the mail, or watching the house in general). (R)	2978 (8.0)	2568 (6.9)	5996 (17.6)	22862 (66.9)	3.48 (1.03)
If I wanted to have lunch with someone, I could easily find someone to join me.	906 (2.4)	1707 (4.5)	9567 (27.8)	22257 (64.7)	3.59 (.80)
If I were stranded ten miles from home, someone I know would come and get me.	535 (1.4)	478 (1.1)	5576 (15.3)	27861 (81.7)	3.81 (.65)
If a family crisis arose, it would be easy to find someone who could give me good advice about how to handle it. (R)	2922 (7.7)	2870 (7.4)	6314 (18.6)	22296 (65.6)	3.47 (1.03)
If I needed some help in moving to a new house or apartment, I could find someone to help me. (R)	2139 (5.4)	2302 (6.0)	6266 (18.2)	23739 (69.9)	3.56 (.92)

Table 4.8 Fit Statistics for the Alternative Social Support Models

Model	Chi-square (df)	RMSEA (90% CI)	CFI	TLI
1	6744.847 (54)*	.060 (.059 - .061)	.942	.929
2	5632.058 (53)*	.055 (.054 - .056)	.952	.940
3	4891.429 (51)*	.052 (.051 - .054)	.958	.946

Note: * P<0.05; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA= Root-Mean-Square Error of Approximation.

Table 4.9 Factor Loadings for Model 3.

Item	Advice	Practical	Activities
Worries	.71		
PersAdvice	.86		
FamAdv	.82		
FamCrisis	.66		
Sick		.70	
HouseSit		.57	
Stranded		.75	
MoveHou		.67	
Trip			.66
Lunch			.78
Movie			.75
Invites			.64
Factor Correlations			
Advice	1		
Practical	.88	1	
Activities	.80	.88	1

Note: All factor loadings and correlations $p<0.05$

Discrimination

Table 4.10 shows endorsement of each of the questions related to discrimination. The largest discrimination is reported around race followed by gender then weight and finally sexual orientation. In terms of total discrimination scores, 18.3% of respondents describe experiences of discrimination. Scores exist in a range from 0-13 indicating that a percentage of respondents have experienced more than one type of discrimination.

Covariates

Covariates are reported in terms of the presence of risk with the exception of age. Age range in the sample is from 20 years to 93 years with a mean of 49.5 years and a standard deviation of 18 years. In terms of the presence of risk factors for the remaining covariates, 20.2% of respondents are in the lower quartile for income, 37.8% live alone, 22.4% have a lifetime diagnosis of depression and 7.4% have a lifetime diagnosis of anxiety.

Table 4.10 Frequencies and Weighted Percentages of Endorsement of Discrimination Items.

Item During the last 12 months, how often did you experience discrimination in public, on the street, in stores or in restaurants, because	**Response** N=34653	**1** Never % response N	**2** Almost Never % response N	**3** Sometimes % response N	**4** Fairly Often % response N	**5** Very Often % response N	**Unknown** % response N	**Mean (Std Dev)**
You were assumed to be gay, lesbian or bisexual.	3023	2617 (86.6) (6.9)	85 (3.0) (.2)	79 (2.3) (.2)	12 (.4) (0)	5 (.1) (0)	225 (7.5) (.6)	1.69 (2.12)
Of your weight.	21136	20121 (95.3) (56.9)	468 (2.2) (1.3)	363 (1.7) (1.0)	83 (.4) (.2)	50 (.2) (.1)	51 (.2) (.1)	1.10 (.55)
You are Hispanic or Latino.	6359	5314 (83.7) (8.7)	458 (7.2) (.7)	465 (7.1) (.7)	68 (1.2) (.1)	28 (.4) (0)	26 (.5) (.0)	1.30 (.8)

Item During the last 12 months, how often did you experience discrimination in public, on the street, in stores or in restaurants, because	**Response** N=34653	**1** Never % response N	**2** Almost Never % response N	**3** Sometimes % response N	**4** Fairly Often % response N	**5** Very Often % response N	**Unknown** % response N	**Mean (Std Dev)**
Of your race/ethnicity.	28294	24834 (90.4) (81.0)	1657 (4.9) (4.4)	1446 (3.8) (3.4)	188 (.5) (.4)	75 (.2) (.2)	94 (.3) (.2)	1.22 (.73)
You are (male/female).	34653	32485 (94.3) (94.3)	1259 (3.4) (3.4)	687 (1.7) (1.7)	78 (.2) (.2)	34 (.1) (.1)	110 (.3) (.3)	1.11 (.58)

Discussion

The central aim of this chapter was to construct variables which would allow social factors to be tested in the relationship between childhood trauma and PLEs. This would be done by adding a second independent variable and two mediators as well as a number of covariates. Social defeat would be developed to be used alongside childhood trauma as an independent variable as the first aim. It was expected that LCA would describe distinct groups of people in terms of IQ, migrant status, urbanicity and drug use. The second aim of this chapter was to test if these latent class groupings were associated with the PLE symptom cluster groupings, defined in chapter 3 – cognitive/perceptual, social/interpersonal and disorganised. It was expected that they would be. The third aim was the development of a social support variable which would be used as a mediator. It was predicted that this variable would be made up of distinct factors which would then be represented by an individual score. The fourth aim was to develop a discrimination score which would act as a second mediator. This would reflect experiences in the sample of discrimination based on race, gender, weight and sexual orientation. The final aim was to compute variables which would be covariates in the mediation. These would be age, income, marital status, lifetime diagnosis of depression and lifetime diagnosis of anxiety.

The literature shows the development of the construct of social defeat as largely theoretical (Selten & Cantor-Graae, 2005; Selten et al., 2013). Empirical research has been done on the individual elements which comprise social defeat:

- IQ (Jones et al., 1994; Selten & Cantor-Graae, 2005);

- Migrant status (Bourque et al., 2010; Kirkbride et al., 2012; Morgan et al., 2010);
- drug use (Fergusson et al., 2005; Kessler et al., 1997) and
- living in an urban environment (Frissen et al., 2015; Newbury et al., 2016).

Social defeat as a unified single entity remains largely untested. Empirical research which does exist tends to use affective response to the experience of social defeat as a proxy for being socially defeated (Valmaggia et al., 2015; van Nierop et al., 2014). These studies have been done using constructs such as entrapment which have their own tailored measures and which act as analogues to social defeat. They are not however social defeat itself.

The first aim was met by producing a model of social defeat as opposed to these proxy measures by meaningfully combining those constituent elements. LCA has proved to be a useful way of identifying complex patterns of occurrence and co-occurrence that may not be seen using techniques such as calculating chi-squares to assess the relationships. Murphy, Shevlin, Houston, and Adamson (2014) showed that LCA can be used to summarize patterns of co-occurrence for variables that are not necessarily within the same psychological or behavioural domain which is potentially true of the constituent elements in the social defeat model. The 2014 study used LCA to identify classes of people within a general population sample who were characterised by the presence, co-occurrence or absence of PLEs and Childhood Sexual Abuse (CSA). Four distinct groups of people were found in the study. One of these was the group who had the highest probability of experiencing

rape before the age of 16 and also endorsing questions relating to thought control/interference, paranoia and strange experiences.

With respect to the second aim of this chapter, Tables 4.4, 4.5 and 4.6 show that membership of these latent classes is significantly associated with the PLE items. These are reported by the cluster types of cognitive/perceptual, social/interpersonal and disorganised symptoms. To meet the third aim, this chapter has established a social support variable for use in the mediation model. In line with existing literature social support was found to be best described by a number of dimensions. The 12 items on the scale used fit well within a three-factor model. This model comprised the provision of support in terms of advice, in terms of practical help, and in terms of enjoying social activities. To explore the details of each factor in terms of endorsement within the dataset, Table 4.7 shows the scale in terms of counts and percentages. Within the sample, practical support was the easiest type of support for people to access, with emotional support following, while finding people to do social activities with seemed to be harder. The different factors identified within the model do fall in line to a degree with the types of elements identified by House (1981) with the provision of support in the form of advice and the provision of practical support. These fall in line with the informational and instrumental groupings identified by House. Also in line with this research is that these factors are not mutually exclusive and are difficult to separate which accounts for the high degree of correlation found.

To address the fourth aim, discrimination incorporated experiences involving sexual orientation, weight, race and gender. Each category was seen to exist along a skewed continuum with most people not experiencing discrimination moving along to a

small group of people in each category experiencing discrimination very often. Overall scores, recorded as 0-16, reflect this as well as the fact that a small group of people experience discrimination over more than one category shown by the fact that the highest score recorded was 13. The fifth and final aim of this chapter was to produce the covariates of age, marital status, income, diagnosis of depression and diagnosis of anxiety.

Strengths of this study include the size of, and nature of the sample. Of particular importance in studying the existence of schizotypal experiences and PLEs is that the sample used represents the general population. The size of the sample allows the power needed to run analysis such as the LCA and CFA performed in this chapter which is powerful in allowing the data to be explored using state of the art statistical tools such as the LCA approach to modelling social defeat. The range of questions included in the NESARC study allow these topics to be addressed and explored within this large dataset. Limitations do arise as discovered in the development of the social factors model due to the secondary nature of the data used. There are a wide range of topics addressed but of course these are not selected and specifically designed for the current study. The most significant limitation identified in conducting this portion of the study was the compromises that must be made when working with secondary data. These are illustrated by the absence of IQ tests and the substitution of an IQ measure with a correlate, in the form of an educational attainment measure. In addition, use of LCA for the analysis of social defeat did carry with it limitations. One of these is centred on the fact that the study was attempting to summarise natural occurrence and co-occurrence of unobservable clusters of disparate entities such as lower IQ and living in an urban environment.

This meant that the clusters are in all likelihood not that tightly bound which was reflected in the low entropy value recorded in the LCA. This echoes the difficulty of the research question itself and points to why social constructs are an ambitious area to approach.

The next step in this thesis was to describe the latent variable model in its entirety and to run the mediation section of the model. Chapter 5 describes the model and its conceptual and theoretical framework. It addresses each phase of the model development and focuses on the literature on mediation studies in particular. It then shows the results of running the model, moving the work from being bivariate in nature to being multivariate.

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Chapter 5

The Mediating Effects of Social Support and Discrimination in the Relationship between Childhood Adversity, Social Defeat and PLEs

Introduction

The medical model has fallen short in explaining the nature of psychosis (Read, Bentall, & Fosse, 2009). A model which has helped to eradicate or vastly reduce diseases such as smallpox and polio has not had the same effect for mental disorders (Read, Mosher, & Bentall, 2004). The psychoses are arguably the most stigmatising of the serious mental health illnesses and bring with them a great burden and cost for the individual and for society (Read et al., 2004). Understanding the entirety of the multiple pathways to psychosis is the only feasible way to build interventions which address these complex and multifaceted conditions in a way that promotes recovery.

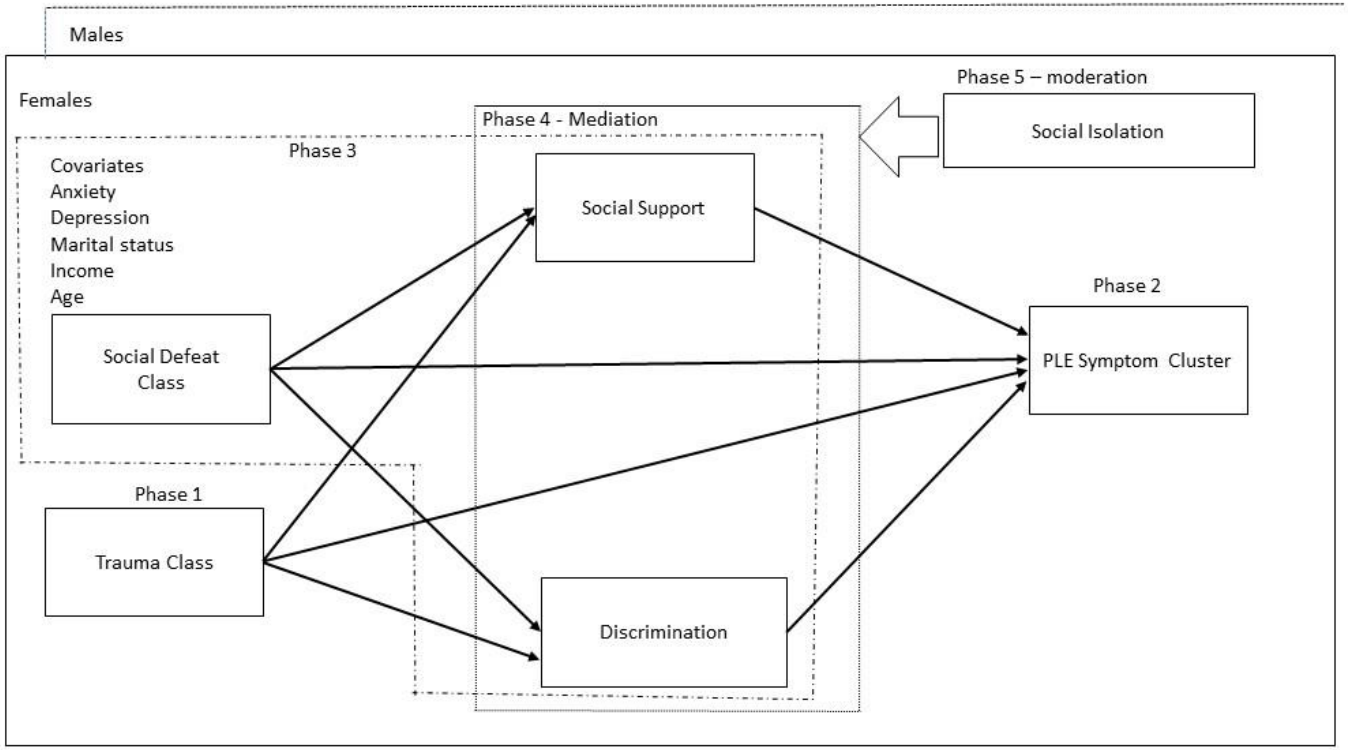
This chapter introduces a model which explores some of these potential pathways. Figure 5.1 shows the theoretical framework for this model. Previous chapters have documented the ground work for the development of this model. The method section contains the statistical frameworks for the model in terms of both males and females. The model has been developed following a number of guiding principles which are the first thing described in this introduction. Development has followed a number of phases as shown in Figure 5.1. Phases 1, 2 and 3 are next described in this introduction in order to set the context for phase 4 which is the main subject of this chapter. The introduction then signposts towards the final phase of the model which is documented in chapter 6. Finally, in this section, predictions for this chapter are made.

Defining Features

The first defining feature is that the model moves beyond addressing direct effects to address indirect effects. Plentiful bivariate work exists which has addressed the direct effects between childhood adversity and psychosis and these have been fully addressed in phase 1. This framework includes this foundation. This phase expands this foundation to become multivariate in nature. As discussed by Brand, Rossell, Bendall, and Thomas (2017), it is time to understand why these bivariate relationships exist. Like for physical disease, our goal must be effective interventions that allow people to recover. The aim of phase 4 and phase 5 is to address this.

A second guiding principle of this work was that the complexity of the questions being asked would be handled by techniques that respect that complexity. These would be used in the development of the foundation work and in the multivariate stages. Techniques such as LCA which was used to summarize patterns of both childhood trauma and patterns of social defeat. Techniques like mediation and moderation which are now of use to explore potential underlying mechanisms between these classes and PLEs. Mediation allows a variety of models to be explored with parsimony being one of the criteria applied to choose the best fitting answer. Moderation is used in chapter 6 to assess the impact of social isolation on the model. Variables used for the mediation have been grounded in theory which provide social and environmental reasons for the development of psychosis. The mediators and moderator selected have continued that belief that social factors contribute to understanding these multifactorial issues. What is the machinery that takes people from experiencing childhood trauma to developing psychosis? Why does this happen to some people and not happen to others? The complexity of the question and the

Figure 5.1 Conceptual Model of the Latent Variable Framework



impact of associated conditions, the human cost, the global cost, these all make it imperative that we understand.

The final guiding principle of this study is the issue of gender. There is consistent evidence that gender does play a role in psychosis (Abel, Drake, & Goldstein, 2010; Falkenburg & Tracy, 2014). A review of gender related issues can leave little doubt that this is an important aspect in the relationships under study in this thesis. Gender has been shown to be important in terms of prevalence and incidence rates, age of onset of illness, symptom profile and expression, the course of the condition and outcomes. While prevalence rates themselves show little gender difference, this, in itself is of interest. Incidence rates are higher for males in a ratio of 1.4:1 (Abel et al., 2010; Falkenburg & Tracy, 2014) and females are also reported to have better clinical and functional outcomes. These things together would lead to the conclusion logically that males would actually show higher prevalence rates. It makes the role of gender therefore a compelling factor to research and understand.

Age of onset is reported as being earlier for males with females reporting later (Abel et al., 2010; Falkenburg & Tracy, 2014; van Os & Kapur, 2009). Females also show a second modal spike in terms of age in relation to menopause. Some literature has suggested a further spike for females in the early 60s age bracket (Abel et al., 2010). In terms of symptom expression, again gender differences are reported. Females tend to report more positive symptoms and more depressive symptoms while males tend to report more negative symptoms and less affective symptoms. Abel et al. (2010) ponder if this may be related to a general finding concerning gender in that females are more likely to express affective symptoms than males.

The gender differences in age of onset and in symptom profile combine to create a difference in course of illness. Older age of onset and the expression of affective symptoms predict more favourable course and outcome for illness and are associated with females. Younger age of onset and presentation with negative and disorganised symptoms predict less favourable progression and outcomes and are associated with being male (Abel et al., 2010; Falkenburg & Tracy, 2014; van Os & Kapur, 2009). Also of interest are gender differences in response to treatment. Females show greater treatment compliance and tend to form better therapeutic alliances (Brady & McCain, 2004; Falkenburg & Tracey, 2014). Poorer premorbid and social functioning in males can exacerbate the course of illness, it is harder for males to engage with treatment and they tend to be more socially isolated (Abel et al., 2010). A further significant factor in the relationship between gender and outcomes for psychosis is that males show higher rates of substance abuse which has a profound and negative impact on illness course, on relapse rates, on hospitalisation rates and on all the social factors which are associated with illness outcomes (Falkenburg & Tracey, 2014).

This interesting link between gender and psychosis has been developed further specifically in terms of childhood trauma and psychosis. A relationship which is at the core of this thesis. Fisher et al. (2009) looked at the potential for gender to be a moderator in this relationship. The study looked at gender differences around the prevalence of Childhood Sexual Abuse (CSA) and Childhood Physical Abuse (CPA) for a group of people with psychosis compared to a control group with none. This study found, amongst other gender related findings that females were twice as likely to report either type of abuse compared with the control group. The study itself

reported a number of limitations concerning the statistical power achieved in the analysis. The limitations were concerned with the low prevalence of both psychosis and of sexual trauma for males in the sample. Shevlin, Murphy, and Read (2015c) focused on these concerns by using a prison population sample to address the same question. They found that the odds ratios for males and females did not in fact differ significantly when using sexual trauma to predict psychosis. This remained the case after controlling for confounding variables. The conflicting nature of these findings highlight the importance of addressing gender.

Project Phases

Phase 1

Phase 1 of this study addressed the measurement and operationalisation of childhood adversity. The exploration of childhood adversity has developed over the years of study of this global, complex problem. Early studies typically centred on one kind of abuse (Baker & Duncan, 1985; Molnar, Buka, & Kessler, 2001). However, abuse does not occur in isolation and if the issue of co-occurrence is not addressed, results have the potential to become distorted (Finkelhor, 2008; Finkelhor, Ormrod, & Turner, 2007; Finkelhor, Ormrod, & Turner, 2009). To illustrate using the bivariate nature of the relationship between CPA and psychosis for example, the person answering questions may be a victim of both CPA and CSA. This cannot be discovered without the use of a model that specifically addresses CSA also. In studies which focus on one type of abuse, the abuse may have served as a proxy for other abuses. These abuses may interact in ways other than having summative effects which highlights beautifully the guiding principle used for the development of this

model, this issue of addressing the parts without addressing the overall and the need for techniques that allow that overall picture to be addressed.

Another illustration can be seen in the inclusion of questions which centre on seemingly less malign forms of adversity. One of the questions focusing on neglect asks the respondent, ‘How often did a parent or other adult living in your home ignore or fail to get you medical treatment when you were sick or hurt?’. If a person answers ‘yes’ to this question it actually gives a lot of information about the conditions and the situation in their home as a child. Questions which focus on a child being asked to perform tasks inappropriate to their age will often inherently contain the information that the structure and configuration of the family unit may not be healthy, the child may be unsupervised for example. By examining what we can see we can explore what we cannot see. This of course necessitates the correct statistical procedures, such as LCA.

Childhood adversity was addressed in this study with concern for the complex and multifaceted variable that it is. At the core of this is the use of a person-centred approach, with again, an emphasis on social aspects and relationships between people and their social environment. LCA embodies this person-centred ethos and so was utilised, placing the human experience of childhood adversity at the forefront. This method allows for the identification of heterogeneity in experiences of trauma, to explore if distinct groups of people with shared experiences are present in the data.

To expand the understanding of shared experiences of childhood adversity, adversities studied have been grown beyond the most commonly addressed traumas of CSA and CPA to include neglect, having a parent with mental health issues and witnessing interpersonal violence against mum. In order to address CSA in more detail, it was divided into abuse which attempts or includes penetration and abuse which does not – molestation. With respect for the many aspects that can lead to family configurations that promote conditions for abuse and adversity, familial context was included in the LCA. The process of LCA resulted in empirically derived classes being used as one of the main foundations for the study. These resulting classes showed gender differences, with females having that interesting extra class, and having different experiences of abuse and adversity. In summary, phase 1 prepared the context for the study of childhood trauma and established the trauma classes which would be used to facilitate that within the model.

Phase 2

Phase 2 addressed the core relationship at the centre of this study between these trauma classes and PLEs. As documented in chapter 3, research shows PLEs to have a number of characteristics. Firstly, they are hierarchical in nature. Secondly, within these hierarchies, dimensions exist. Thirdly, within both the hierarchies and the dimensions of psychosis, specificity is to be found in terms of the expression of symptoms (Shevlin, McAnee, Bentall, & Murphy, 2015a; Shevlin et al., 2011). This specificity can be seen in the increased odds ratios of a person who has experienced sexual trauma such as rape, developing specific symptoms. In terms of the hierarchy of symptoms, these types of symptom are more likely to be positive and be within the hallucinations subgroup. In terms of the dimensional nature of psychotic

symptoms, this individual is more likely to experience hallucinations that are visual or auditory in nature. Finally, PLEs are part of the continuum of psychotic expression that run from no expression to clinical diagnosis of psychosis (Rossler et al., 2007; van Os, Hanssen, Bijl, & Ravelli, 2000; van Os & Kapur, 2009; van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009).

An exploration of PLEs in this large community sample showed their expression to be more than a dichotomous, on or off, phenomenon. This binary concept of psychosis is favoured by those who view psychosis in terms of the medical model (Craddock & Owen, 2005; Kraepelin, 1919). An illness that is either present or absent. A state that can be defined by a set of criteria applied subjectively by a trained clinician. The continuum view of psychosis presents the condition as much more part of the human experience, as being viewed along a sliding scale (Strauss, 1969; van Os et al., 2009). This scale ranges from being absent to being present without any need for intervention, up to and including experiences which cause distress and require intervention.

Unlike childhood adversity which is undeniably a social issue, the development of psychosis with inherent social aspects to it has been controversial. This can be illustrated by focusing on hallucinations. Early theories of psychosis on which psychiatric training was based explicitly advocated ignoring the content of hallucinations as being of no relevance other than as a symptom of an illness. It was believed they could potentially be a distraction, whereas research shows that content of both hallucinations and delusions can contain information that is personally meaningful and significant (Fowler, Garety, & Kuipers, 1998). It has been shown

that actually the content of hallucinations can be related to the experiences of the individual, experiences which may incorporate childhood adversity as well as other adversity and which give clues as to why the person has crossed the threshold to needing clinical intervention (Murphy, Shevlin, Houston, & Adamson, 2014). Theories of why the content of hallucinations is important centre on the link between hallucinations and inner speech. Disruptions in normal development such as CSA can create misattribution of inner speech to external sources resulting in experiences of hallucinations (Fernyhough, 2015; Fernyhough & McCarthy-Jones, 2013).

Factor analysis provides a way of identifying clusters of variables within theory and has been used to group experiences along the psychosis continuum (Ahmed et al., 2013; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003; Raine et al., 1994; Wigman et al., 2009). One such grouping is the one used in this study which is based on a 3-factor result. The factors identified in this research are cognitive/perceptual, social/interpersonal and disorganised (Ahmed et al., 2013; Fossati et al., 2003; Raine et al., 1994).

The analysis done in this study reflects the theory of psychosis as being along a skewed continuum. The questions used for the development of the PLE variable allowed degrees of distress to be separated, which is critical for examining this question of a continuum. Answers were recorded as being; ‘yes’, ‘no’, or ‘yes and caused distress’. The data showed the majority of people did not experience unusual thoughts, feelings or perceptions. A smaller group of people did. And an even smaller group of people did and were distressed by them. This chapter then addressed the relationship between the individual PLE items and groupings of the

items at the cluster level with the childhood adversity groupings, firmly establishing a link.

In summary, phase 2 had a number of outcomes. It set the context for the study of PLEs on the continuum of psychosis. It established the 3-factor pattern of symptom clusters as being the way in which this study would operationalise PLE experiences. It firmly established the bivariate link between the trauma classes established in Phase 1 and these symptom clusters in support of many previous studies which have been discussed in detail in chapter 3.

Phase 3

Phase 3 of this study moved beyond this bivariate relationship between childhood adversity and PLEs, and started the groundwork for the multivariate phases of the model. Having established the bivariate link, the next step was to prepare variables to explore potential mechanisms explaining it. Much work has centred on the bivariate link and has often included the various elements of this model in isolation. The theoretical and statistical framework used here sought to bring these multiple predictors of psychosis together. The aim was to provide one explanation for how these fit and work together to combine into pathways to psychosis. Any research that focuses on bivariate relationships at this point is potentially of little value in furthering knowledge.

Addressing the perspective of the impact of social determinants on the development of psychosis has enjoyed a renewed surge of interest over the last few decades. It allows a pathway to address the full, and as yet incomplete, understanding of why

certain people move along the psychosis continuum and others do not. Social defeat provides a socially based construct which contains variables that have something in common. On their own they are risk factors for psychosis. Social defeat attempts to provide a cohesive and meaningful pathway by which these variables are linked and work together to contribute to the development of psychosis.

The model of social defeat used in this study was that of Selten and Cantor-Graae (2005), updated by Selten, ven der Ven, Rutten, and Cantor-Graae (2013). The initial model contained the elements of lower IQ, the use of drugs, being a migrant and living in an urban neighbourhood. Childhood adversity was not added as a component until the expansion of the initial model in 2013. As childhood adversity is already part of the main focus of this study it was addressed here as a single independent variable in phase 1 respecting it central role. The remaining elements of social defeat were added together operating as a second independent variable. How social defeat was operationalised was in keeping with that central theme of being aware that the whole cannot be assumed to be a sum of the parts. LCA was used to extract a set of empirically derived classes with its use allowing heterogeneity to be identified in social defeat. The independent variable of social defeat was operationalised in the form of these classes.

Continuing the social context theme, social support and experiences of discrimination were added as the mediators. Existing work on social support as a construct has consistently shown it to be a multidimensional construct with a range of aspects embodied within it (House, 1981; Wethington & Kessler, 1986). These aspects can be difficult to separate and they are often highly correlated (Wethington

& Kessler, 1986). In keeping with the repeated findings around social support that it is dimensional in nature and using that theory to develop this variable, Confirmatory Factory Analysis (CFA) showed that there were three separate dimensions to social support as used in this study. They were centred on being able to seek advice when needed, being able to get practical support when necessary and having access to people for the purposes of routine social activities such as having lunch or going to the cinema. As the literature suggested, these factors were highly correlated in this study also.

Discrimination was operationalised as an ordered variable. A range of experiences were addressed in terms of typical situations in which discrimination is likely to occur. Groups of people who are likely to find themselves in the minority and therefore subject to discrimination included groups such as those who were of an ethnic minority group, those who are of a sexual orientation other than heterosexual, those who are judged to be overweight and females. In line with these typical groups, the discrimination variable was constructed from questions regarding being publicly discriminated against.

In summary, phase 3 set the context for the study of the second independent variable in the model, social defeat. It operationalised social defeat in a unique way by using the actual conditions of social defeat as opposed to measures of affective response to experiences of social defeat. Social defeat would be represented by a number of classes in the same way as childhood trauma. Phase 3 also established the bivariate link between the social defeat classes and the PLEs. Phase 3 prepared the mediators

of social support and discrimination as well as the covariates which would be used in the mediation.

Phase 4

The current phase brings all the previous phases together and runs the first stage of the multivariate model. The method selected for the first phase of the multivariate exploration is mediation. This section addresses studies identified which used mediation to explore links established by bivariate work and then summarises findings from the review. This review intended to target work done on both childhood trauma and social defeat as independent variables. The gap in exploration of trauma versus social defeat can be illustrated by the fact that only one study found focused on mediation between social defeat and psychosis. There is also a clear lack of studies which address discrimination as a mediator based on this review. The studies are explored in terms of a number of criteria which are relevant to phase 4 of the thesis.

- The level of psychopathology addressed - at a general level, at the level of addressing psychosis or PLEs in particular, or at the level of specific symptoms of psychosis.
- Sample type and size – was a general population study used, was a high-risk sample used, was a control group used?
- Type of factor used as a potential mediator – either psychological or social.
- Specific use of social support as a mediator.
- Specific use of discrimination as a mediator.
- Theoretical implications addressed relevant to phase 4.

- Covariates and the level to which they were included in the study.
- Was mediation found?
- Did the study assess the role of gender?
- Clinical implications which were relevant to phase 4.

Childhood trauma and Non-Psychotic or Mixed Psychopathology

General Population

Shevlin, McElroy, and Murphy (2015b) used a general population sample to address the link between childhood trauma and psychopathology in terms of generalised anxiety disorder, mixed anxiety and depression, phobia, depression, PTSD and psychosis. This study used a sample of 7403 participants. It addressed social factors as mediators in the form of loneliness. Theories addressed in the study were both the social deafferentation hypothesis (Hoffman, 2007) and the loneliness loop (Hawkley & Cacioppo, 2010). The social deafferentation theory (Hoffman, 2007) is based in simple terms, on how an individual, if suddenly deprived of social interaction during specific vulnerable times, will produce meaning to fill that void. This may be in the form of delusions or hallucinations. The loneliness loop, is the theory that feeling lonely to a chronic level may create a state of hypervigilance towards the social environment. This then results in faulty cognitions and bias and a self-fulfilling prophecy loop which creates great distress. Both the social deafferentation theory and the loneliness loop are described in more detail in chapter 6 which explores the topic of social isolation in depth. In terms of the use of covariates this study is an example of a comprehensive list of potential confounders being employed. It controlled for age, sex, education, ethnicity and cannabis use. Mediation was found in the study with no particular gender based findings being addressed. Clinical

implications were identified with loneliness at the core. Findings suggested that interventions should be based on an evaluation of a person's perceived rather than objective level of social engagement and using these to target the psychopathologies covered by the study.

High Risk

Sperry and Widom (2013) looked specifically at the role of social support in linking childhood adversity with anxiety, depression and drug use. This study used a high-risk group of children who had documented histories of abuse from ages 0-11, matched with a group of controls who did not. The abused group contained 388 people. The control group contained 308. The study addressed social factors as mediators and specifically used social support. This study was unique in that it addressed the role of social support as both a mediator and a moderator. Theory which was addressed by the study and which is relevant to phase 4, included the buffering hypothesis (discussed in chapter 4) in which the role of social support is seen as a buffer against stressful events. Another theory addressed was the deterioration model (Barrera, 1986; Eckenrode & Wethington, 1990; Kaniasty & Norris, 1993; Wheaton, 1985) which purports that stressors such as child abuse which are heavily stigmatising are more likely to erode social support due to the way in which they affect a person. They create confusion, helplessness and an aversion to others. In terms of the covariates used in this study these were age, sex, race and having a prior diagnosis of a mental health issue. This is a fair representation but not as comprehensive as other studies such as the Shevlin et al. (2015b) study previously discussed. Mediating effects were found for social support for all three psychopathologies with gender differences which were specifically addressed.

Higher levels of social support had more impact on males in this study in the relationship with both anxiety and depression. For females this was only the case for the relationship with depression. This study addressed clinical implications which are relevant to phase 4 in terms of the type of social support that can be useful in different scenarios. There were three factors of social support used in the study under review. Appraisal which refers to having someone to talk to about difficulties, belonging which refers to having people to do things with, and self-esteem which refers to having access to people to whom a person feels they favourably compare. The CFA used in this thesis confirmed the presence of three different types of social support – access to advice, access to practical help, and access to people to perform everyday social activities with. Appraisal seems to line up with the factor of advice while belonging seems to line up with the factor of activities. In clinical settings, the type of issue being confronted can be matched with the best type of support to help resolve that. House, Khan, Khan, McCloud, and Williams (1985) for example, whose work provided some levels of parallel with the work on social support in this thesis, found that emotional support was the type of support most directly linked to health.

A second study which specifically addresses social support as mediator again looked at non-psychotic disorders in the link with childhood trauma. Vranceanu, Hobfoll, and Johnson (2007) used a high-risk sample of 100 females who were all low income to look at links between childhood trauma and symptoms of PTSD. Stress was used as a second mediator alongside social support. The theory addressed was that childhood abuse would distort perceptions of social support. This theory links in with one of the common themes of chapter 6, that of perception and is one that will

be returned to in that chapter. The kind of trauma that is experienced may differ but the pathway between that trauma and the development of psychopathology may be the same. Social resources become deteriorated and stress increases. Again, this role of stress has been significant in previous chapters related to childhood trauma, experiences of PLEs, experiences of social defeat and experiences of discrimination. In terms of the covariates used, none were specifically addressed although the sample recruited was narrow in focus and had in common not only that they were females and came from a low SES background, but that they were inner city, young, mostly migrants, mostly unemployed and most had not graduated high school. Social support was found to partially mediate the link between childhood trauma and PTSD symptoms in this study. Gender comparisons were not possible with this all female sample.

Childhood Trauma and Psychosis or PLEs

General Population

Some studies have addressed the mechanisms between childhood trauma and psychosis or PLEs in particular. This section reviews these in the context of the criteria laid out above. Murphy, Shevlin, Adamson, and Houston (2013) use mediation to address the link between childhood sexual abuse in particular and the development of psychosis. They use the psychological factor of using avoidance to do this, although this is closely linked to the social factor of social withdrawal. The study used a general population sample of 8580 participants and was heavily focussed on the social deafferentation theory once again. It used a comprehensive list of covariates – age, gender, level of education, living alone, ethnicity, hazardous alcohol consumption, drug dependence and a diagnosis of depression. Mediation

effects were found. Gender differences were not a focus of this study. Clinical implications were addressed in the context of the study of subclinical experiences in the general population and their potential utility for identifying those at clinical risk from help-seeking patterns at the GP level.

The second study reviewed which used a general population sample (N=6646), looked at social factors and specifically at social defeat in a mediating role. Chapter 4 of this thesis developed social defeat as a second independent variable. In the 2014 study reviewed (van Nierop et al.) social defeat was operationalised from the perspective of the affective reaction to perceived experiences of defeat. It looked at the link from childhood trauma to experiences of psychosis and used a good range of covariates – age, sex, cannabis use, and affective dysregulation to complete the theoretical framework used. It again found that some mediation had occurred and again it did not address findings in the context of gender. It did address the impact in clinical terms and particularly addressed the importance of having a full trauma history in a clinical setting.

Convenience Sample

This review now turns to studies which have looked at this link between childhood trauma and psychosis within the context of samples other than general population samples. Sheinbaum, Kwapil, and Barrantes-Vidal (2014) used a convenience sample of 546 undergraduates. They used a psychological factor as opposed to a social factor in looking at the results of attachment in terms of how they would mediate this relationship. They were interested in links between childhood trauma and schizotypy or PLEs with the mediating effect of fearful, preoccupied or

dismissing attachment styles. The theory behind the study was that the formation of a fearful attachment style would lead to the development of negative schemas of the self, others and the world and set the individual on a negative trajectory which could lead to the development of schizotypy or PLEs. There was no mention of the use of any covariates in the study. Mediation effects were found for fearful attachment but not for preoccupied or dismissing attachment. There was no reporting of any gender-based findings and there was some discussion of the significance of assessing early life trauma and attachment style when working with people who may be at risk of developing psychosis.

Adolescent Sample

Murphy, Murphy, and Shevlin (2015) used a sample of 785 school aged children from Northern Ireland in a study which used both mediation and moderation. The moderator was social isolation but for this phase of the thesis, the mediation will be the focus. Social factors and psychological factors were addressed in the mediation as peer victimisation and negative evaluations of self and others respectively. The theory again was that these events in childhood would create cognitive distortions in the form of negative views of the self and others by disrupting social and emotional development. This could result in the adoption of submissive behaviours which make the children vulnerable to peer victimisation. There was again no mention of the use of any covariates at either the mediation or the moderation stage of the study. The mediating paths did show significant effects in the model. Findings were not reported on the basis of gender. Clinical implications of the study were addressed in particular as this was a study of adolescents and would influence intervention programmes particularly in schools and related to peer victimisation.

Childhood trauma and Specific Symptoms of Psychosis

Social Defeat

Other studies have addressed the mechanisms between childhood trauma and particular symptoms or groups of symptoms in psychosis. This section reviews these in the context of the criteria laid out above. This section also contains the one report that addressed potential mediators between social defeat and the development of positive symptoms of psychosis. That was a study which used a psychological mediator. It looked at negative evaluations of the self, others and the world (Stowkowy & Addington, 2012). Although this study looked at social defeat it was operationalised as the affective response to perceived experiences of defeat, unlike in this thesis. It used emotional responses to social defeat, internal entrapment and external entrapment to produce an overall score as it found these three concepts to be highly correlated. Chapter 4 of this thesis discussed that scales of entrapment were frequently used as indicators of social defeat. The study used a sample of 38 participants who were identified as being at high risk of developing psychosis and matched them with 23 controls who were not. The groups were matched on gender, marital status, ethnicity and employment type. Mediation was found to be present and findings were not reported by gender. In terms of clinical implications this study focused on risk assessment and ways in which to clinically intervene to prevent transition to psychosis.

Wickham, Taylor, Shevlin, and Bentall (2014) used not specifically social defeat but the broader concept of social adversity as an independent variable in a general population study (N = 7353). This study used a multivariate model to look at the

mediating effects of stress, trust, social support and discrimination between social adversity and specific positive symptoms of psychosis – paranoia, mania and hallucinations, as well as depression. Findings included partial mediation for paranoia through discrimination. Again, social defeat could not be distinguished as a clear independent variable.

General Population

Sitko, Bentall, Shevlin, and Sellwood (2014) used a general population sample (N=5877) to look at attachment styles as a potential mediator between childhood adversity and psychotic symptoms. This study was particularly interested in any specificity between particular adversities and particular symptoms and using these specificities to explain potential underlying mechanisms. The basic theory underpinning the study is that insecure attachment styles can lead to difficulties in trusting others and can produce a paranoid attribution style. Insecure attachments can be of three kinds. An anxious style (Hazan & Shaver, 1987) will produce a negative view of the self and a positive bias towards others as this person excessively seeks approval from others while feeling unworthy of love. An avoidant style (Hazan & Shaver, 1987) will lead to a positive view of the self but a negative view of others. So, the person feels worthy of love but yet avoids close relationships as they view others as rejecting and untrustworthy. The third style is fearful (Bartholomew & Horowitz, 1991) a negative view of both the self and others is present which results in the person feeling unworthy of love and avoiding close relationships to protect against rejection. A basic set of covariates – age and gender – were controlled for in the mediation, however depression was also added to the model as a second mediator and this did impact findings by removing mediation of existing variables. Evidence

of mediation was found between neglect and paranoid beliefs in terms of the anxious and avoidant attachment styles. Clinical implications were focused on a number of areas. A full trauma history with emphasis on co-occurring traumas was highlighted as useful. Again, targeting internal models of the self with clinical interventions, dictated by the type of attachment style displayed. This study even recommended tools such as thought diaries to uncover those thought processes and the meaning attached to every day events.

Convenience Sample

The role of negative self-schemas comes into focus again in a study by Fisher, Appiah-Kusi, and Grant (2012). This uses a convenience sample (N=212) from the general population all recruited through university advertising. It addresses the role of negative self-schemas and also anxiety, as mediators between childhood trauma and the development of paranoia in particular at a subclinical level. No specific theory was addressed, this was a high-level study which addressed support for looking at social factors in relation to mechanisms that underpin this relationship. Covariates included were age, gender, ethnicity and the presence of psychiatric disorder in a first degree relative. Mediation models were run separately for a range of different traumas. Mediation was found to have occurred between emotional abuse and paranoia and between physical abuse and paranoia. Findings were not reported by gender. Clinical implications were at a general level focused on risk assessment and prevention.

Clinical Sample

Attachment styles feature again in a study addressing mediation between trauma and specifically voice-hearing (Pilton et al, 2016). This used a clinical sample of 55 participants and focused on insecure attachment. The theory underlining the study was that negative beliefs about voices and negative styles of relating to voices both reflect negative relationships in the external world due to insecure attachment. No covariates were documented. Mediation did occur, findings were not reported on the basis of gender. In respect to clinical implications, again reference was made to the need to properly address trauma in a clinical setting and again, to use attachment patterns to direct therapeutic interventions used.

A second clinical sample study (N=71), looks at dissociative experiences as a potential mediator in the relationship between trauma and auditory hallucinations (Perona-Garcelan et al., 2012). The theory behind this study is that these dissociative experiences develop in response to the traumatic experience. The result of this is that events which are internal become attributed to external sources due to the way in which they are experienced as not seeming to belong to the person. Two mediations were run. One of these used an overall dissociative score while the other used a breakdown into three subscales of dissociation – dissociative amnesia, absorption and imaginative involvement and depersonalisation. No covariates are documented as part of this study. Mediation occurred between the overall dissociative score and hallucinations in the first mediation and only between depersonalisation and hallucinations in the second model. Results were not reported by gender. Clinical implications were discussed. These addressed the planning into therapy of

approaching the trauma and identifying the dissociative experiences and then exploring how these relate to the persons relationship with their voices.

Temporal Ordering

Interpreting results of mediations requires taking account of temporal ordering (Kraemer, Kiernan, Essex, & Kupfer, 2008). For that to be possible there must be at least a plausible argument for the validity of temporal ordering of variables in the model. Figure 5.1 shows how the phases, 1-5, come together in a complete model. The model has been developed by the selection of the questionnaire items, by the nature of how the variables have been constructed, by their placement within the model and by the statistical techniques selected in a way that allows causality to be addressed. Questions about childhood adversity which underlie the childhood adversity variables were asked in the context of experiences of respondents when they were under 18 years old. The remaining social defeat variables make up the second independent variable. The questionnaire items from which they were constructed are concerned with IQ, migrant status, drug use and urbanicity. Education was used as a proxy for IQ and specifically addressed if a respondent finished high school, an experience which typically happens under the age of 18. Migrant status concerned information about where the respondent and their parents were born, again specifically related to early life. Urbanicity asked about where a respondent resides. Living in a city at any point is highly correlated with being born and spending childhood years in a city. The drug use question covers all the respondents lifetime and so while not specifically tied to childhood years, it does include them. The model's mediators are social support and discrimination. The social support items from the questionnaire specifically ask about experiences for the

respondent now. The discrimination questions used are restricted to experiences in the past year. The dependent variables were the PLE classes and the items underlying these classes are asked in the context of the present time. This allows causality to be addressed, not unequivocally, but at least in a plausible manner.

Summary of the Literature

The review of mediation studies highlights a number of themes which occur across the various studies. Differences may exist in the size and type of samples, in the way that psychopathology is operationalised, in the type of factors used for the mediations, and in the range of covariates used but there are also a number of common themes. Social factors are often used. Where covariates are used, sex and gender form the basic covariate package with levels of sophistication beyond that varying among studies. Mediation occurs to some extent or another in every study. There are certain theories which reappear across studies. One of these is attachment theory which is discussed in more detail in the chapter covering phase 5 which is the role of social isolation. The role of negative evaluations of the self, others and the world and the impact of that. The social deafferentation hypothesis and the loneliness loop which both again are discussed in the next chapter. The role of stress which has appeared in all previous chapters is found again in this review of mediation studies. And in direct contrast to the content in the guiding principle section of this introduction, the complete lack of focus placed on gender differences is striking. Finally, the wide range of clinical implications as a result of addressing these underlying pathways which are embedded in social factor approaches shows the usefulness of these multivariate models.

Given these findings, there are a number of conditions which would help progress the work done in addressing social factors as potential mediators in this area. Conditions which were met by phase 4 of this study. The first is the power of a large sample. One of the guiding principles of this study has been the use of a certain type of technique, like LCA and mediation. Larger samples allow the power of these techniques to be fully utilised. LCA to summarise the patterns seen over large populations of people. Mediation and moderation to help understand the pathways between variables and what can affect the strength of these relationships. Mediation and moderation allow another of the guiding principles to be implemented, to take the work from bivariate to multivariate. Larger samples mean that results are less likely to be distorted. A larger sample size also means that splitting the sample in terms of gender, another of the guiding principle of this study, still maintains that advantage of sample size and means more meaningful statistical results. For that sample to be general population, as the sample used here is, means that findings can be addressed that support the continuum theory of psychotic experiences. As established in phase 2 this is one of the basic assertions upon which this thesis is constructed. It means that findings can be interpreted without the confounders that come with a diagnosis of serious mental illness and the treatment patterns that come with that. An ideal dataset, like the one used, provided access to a wide range of social information so that the development of relevant social factors was possible. Factors that fit inside the theory on which this thesis is based. Data that can be used to construct the types of variables needed for use in the techniques applied. In addition, it contained the basis for a comprehensive range of covariates to be used. Findings would ideally be reported based on gender. This is one area which is clearly lacking from the review of relevant studies. Given the importance of gender in terms

of age of onset (Abel et al., 2010; Falkenburg & Tracy, 2014; van Os & Kapur, 2009), symptom profile (Abel et al., 2010), course and outcome of illness (Abel et al., 2010; Falkenburg & Tracy, 2014; van Os & Kapur, 2009), response to treatment (Brady & McCain, 2004; Falkenburg & Tracey, 2014), it is pertinent that this issue was addressed. This is of particular interest in light of conflicting evidence found in studies already performed which addressed specifically the role of gender as a moderator in the trauma psychosis relationship (Fisher et al., 2009; Shevlin et al., 2015c). Finally, the ability to draw conclusions around clinical implications was also important. One of the basic and most relevant uses of research in this area is to find ways in which it can applied to recovery for those who reach that level of the continuum where clinical intervention is needed.

Phase 5

Phase 5 which was the final stage of the model was concerned with a moderation looking at the role of social isolation. At this point the model was expanded to include groupings of loneliness. These groups were based on participants being allocated to the groups of Not Lonely, Lonely or Lonely and Distressed. The model was run for each group and effects were compared. Phase 5 is the subject of the next chapter in this thesis.

Summary of the Introduction

Phases 1-5 describe the separate phases of the model to allow for an in-depth understanding of each compartment of the model development. The power of the model however is in the unification of these parts, the phases may have been developed separately but they were designed to be tested as a whole. The study now

moved from bivariate analysis to the power of multivariate models. All of the variables, phases, techniques and power are brought together in one unified, fully testable, latent variable model framework.

There were a number of predictions for this chapter. Firstly, the review of the studies in the phase 4 section suggested strongly that the social factors for the mediation phase would result in effects along all of the pathways and that the best model would be that which included direct effects and indirect effects. Next, it was predicted that mediation would be impacted by the addition of the covariates. Finally, it was predicted that there would be gender differences in mediation effects.

Method

Sample and Procedures

Analysis was conducted on the first and second waves of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Dawson, & Hasin, 2004), as described in chapters 2 to 4. Details are documented in chapter 2 and will not be repeated here.

Analytical Plan and Variables

Figures 5.2 and 5.3 show the statistical models. Figure 5.2 shows the statistical model for males. Figure 5.3 shows the statistical model for females. All variables used in the analysis are included in this model and have been developed as documented in chapters 2-4. Childhood trauma and social defeat are described in terms of each class, social support is described in terms of each factor. Each PLE dimension is noted. Block arrows are used to indicate the multiple relationships from

the trauma and social defeat independent variables, to the mediating variables, i.e. the a paths. Lighter coloured block arrows are used to denote the relationships from these variables to the dependent variables, i.e. the c' paths. The paths from the mediators to the dependent variables, i.e. the b paths are denoted with standard arrows.

The covariates with the exception of age were all binary. A binary 1 value represented the presence of risk. For marital status that meant 1 indicated not living with someone. For income, 1 represented being in the bottom 25th percentile for income. For both anxiety and depression, 1 represented having a lifetime diagnosis. Age was continuous.

The independent variables were social defeat and childhood trauma. Social defeat was represented as membership of classes. Social defeat classes were the same for both genders and were, the baseline class, the intermediate class, the drug use class and the migrant class. Social defeat was dummy coded. Childhood trauma was also represented by class membership. This differed for males and females. Males were represented by three classes. These were the baseline class, the physical abuse class and the sexual abuse class. For females there was an extra class, the combined physical and sexual abuse class. Childhood trauma was dummy coded.

The mediators were social support and discrimination. Social support was represented by three factors, advice, activities and practical help. Each had a score associated with it. The higher the score the more support the individual had access to. Discrimination was represented as a score from 0 to 16. The higher the score, the

more discrimination was experienced. The dependent variable was PLE experiences which were represented by three symptom clusters. These were cognitive/perceptual, social/interpersonal and disorganised. These were represented by a mean score for each.

Six models were tested using the male data and six models were tested using the female data. The models were as listed in Table 5.1 and Table 5.2. The models tested direct only effects, indirect only effects, direct and indirect effects and each of these models again with the inclusion of the covariates. The models were specified and estimated using Mplus 7 based on maximum likelihood estimation. The adequacy of each model was assessed using the Akaike Information Criterion (AIC) (Akaike, 1987), the Bayesian Information Criterion (BIC) (Schwartz, 1978), and the sample size adjusted Bayesian Information Criterion (ssa-BIC) (Schwartz, 1978) with lower values indicating better model fit.

Figure 5.2 Statistical Model for Males

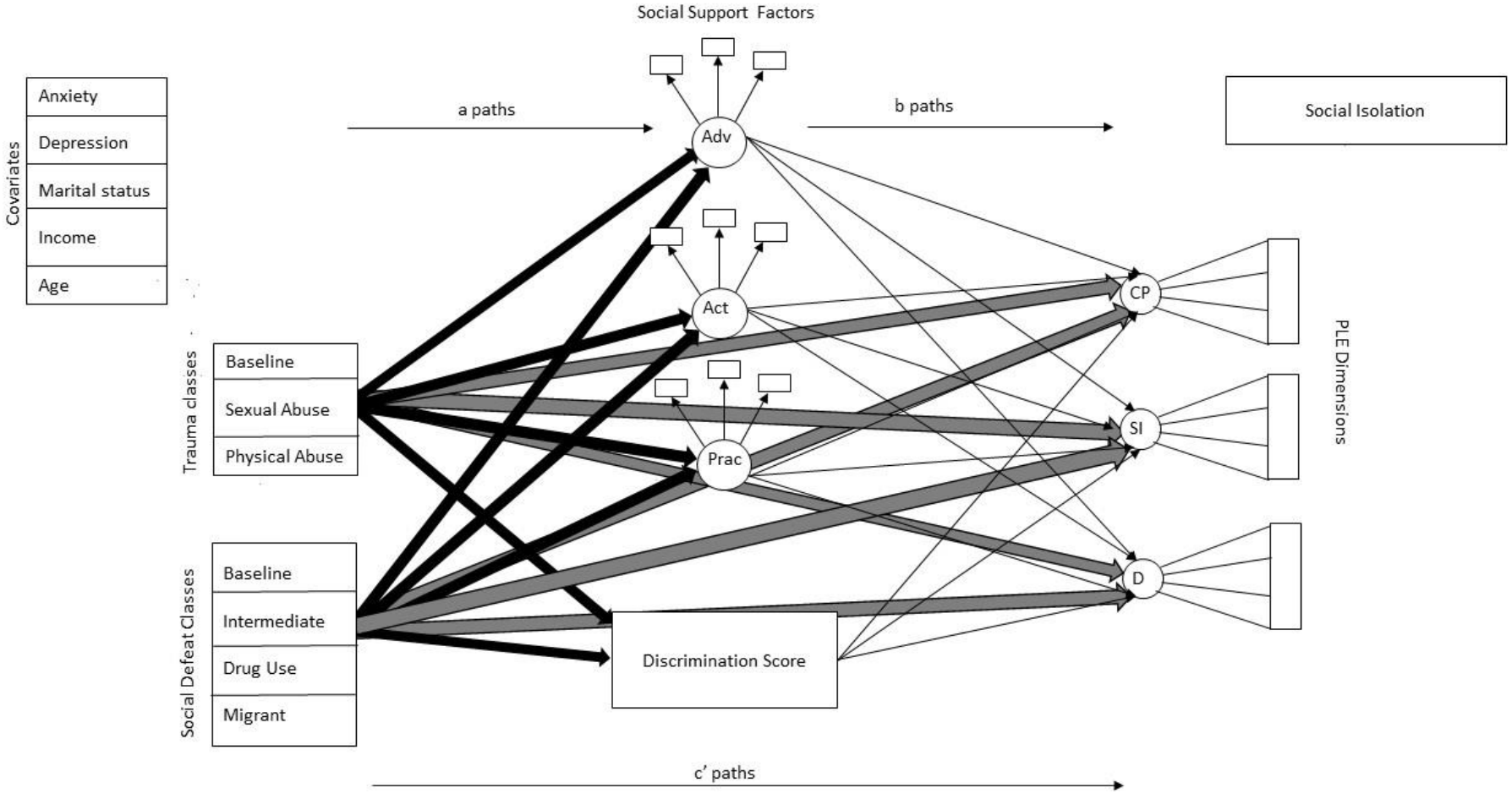
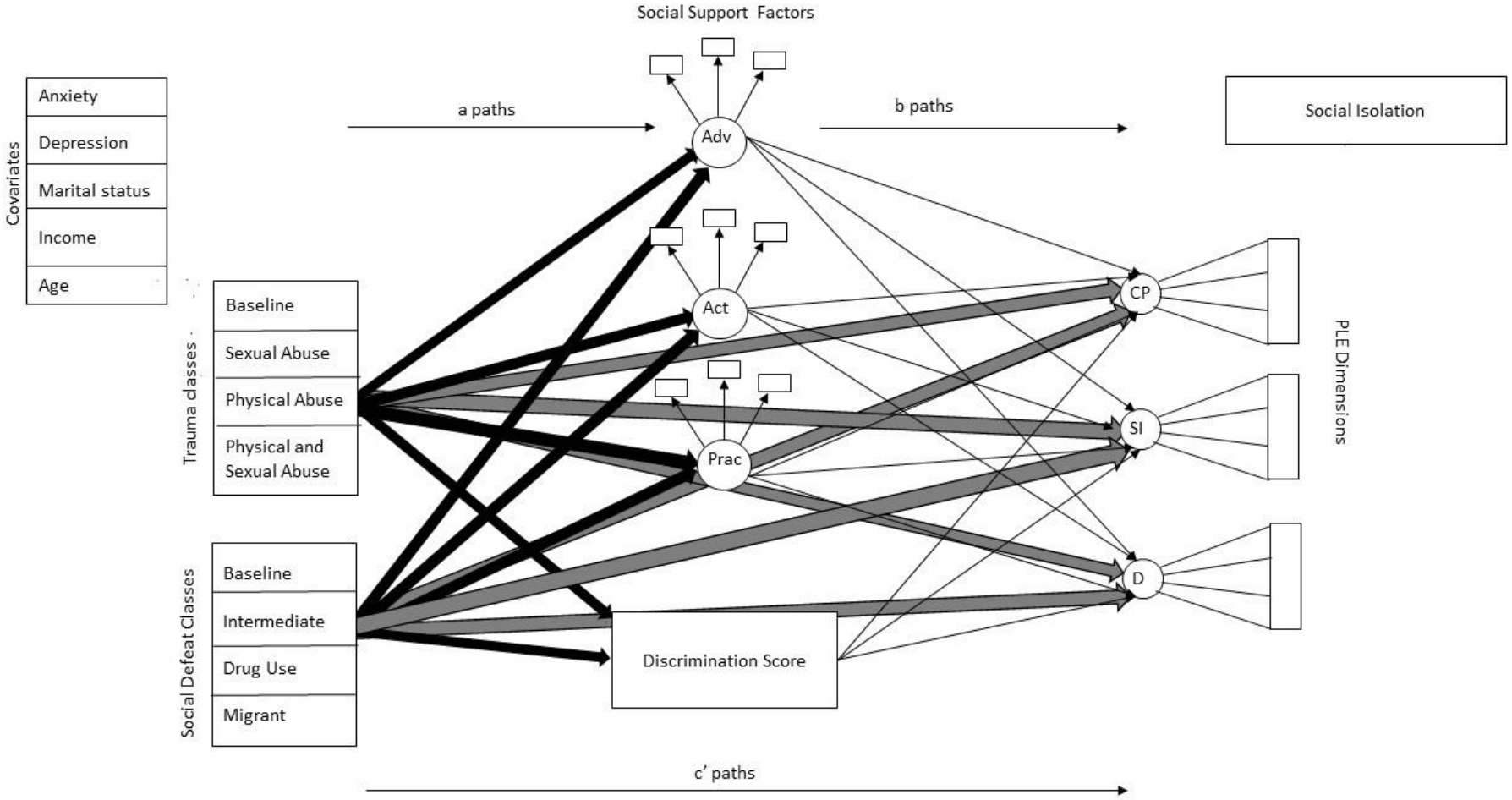


Figure 5.3 Statistical Model for Females



Results

Introduction

The results section begins by addressing overall model fit for males and then for females. Results for a paths are then described by gender, followed by b paths then c' paths. Each path section description looks first at variance explained by the path and then at effect estimates between variables. The results section then moves on to an overall description which describes relationships of interest when addressing the paths from a unified view.

Model fit results are documented in Tables 5.1 and 5.2. Fit indices show that for each gender the direct and indirect model with covariates was the best fit. Tables 5.3, 5.4, and 5.5 show the results for males and females using this model. Table 5.3 shows the adjusted and unadjusted estimates for a paths, from the independent variables to the mediators. Table 5.4 shows the same for b paths, from the mediators to the dependent variable. Table 5.5 shows the results for c' paths, from the independent to the dependent variables. All relationships in Tables 5.3, 5.4 and 5.5 are described in the presence of mediators and covariates with the unadjusted results shown in parenthesis.

Table 5.3 shows a path results for males and females in terms of variance explained by each path and the estimates for each relationship in the path. Table 5.4 shows the same for the b paths and Table 5.5 shows the same for the c' paths. These results will document the output by gender, by path and by variable relationship.

Table 5.1 Fit Indices for Mediation Models for Female Data.

Model	Loglikelihood	#Free Parameters	AIC	BIC	ssa-BIC
Direct	-141354.176	41	282790.353	283114.340	282984.044
Direct + covariates	-140309.770	56	280731.540	281174.060	280996.094
Indirect	-140082.081	59	280282.163	280748.389	280560.890
Indirect + covariates	-137880.753	94	275949.506	276692.307	276393.580
Direct and indirect	-139566.160	77	279286.380	279894.845	279650.142
Direct and indirect + covariates	-137565.709	112	275355.418	276240.457	275884.526

Table 5.2 Fit Indices for Mediation Models for Male Data.

Model	Loglikelihood	#Free Parameters	AIC	BIC	ssa-BIC
Direct	-100744.291	38	201564.582	201852.632	201731.871
Direct + covariates	-99986.744	53	200079.488	200481.241	200312.811
Indirect	-100066.917	55	200243.834	200660.747	200485.962
Indirect + covariates	-98497.773	90	197175.546	197857.769	197571.756
Direct and indirect	-99726.463	70	199592.925	200123.543	199901.088
Direct and indirect + covariates	-98291.717	105	196793.434	197589.360	197255.679

Males a Paths

The a paths describe the relationships between the independent variables and the mediating variables. For this model that is from the social defeat and childhood trauma classes to the social support factors and discrimination score. Each path for males reached significance in terms of the variance explained by the path. The strongest R^2 value was for the relationship between the independent variables and the social support activities factor. This was also greater than for females on this path. The remaining social support factors of advice and practical support reported greater R^2 values for females, as did the pathway from the independent variables to discrimination.

All significant effects from the social defeat classes to the social support factors are negative. Individuals who belong to each of the classes will have less social support across all three social support factors. The only social defeat class which reaches significant levels for all three social support factors is the migrant class. This class also shows the strongest effects. Effects are stronger for females in the migrant class except for between the migrant class and the practical help factor where effect sizes are comparable for both genders. Where relationships reach significance for males, they are negative so those males in the migrant, drug use and intermediate social defeat classes will have less social support in terms of access to advice, practical help and people to do routine social activities with. The only relationship which reaches significance in the drug use social defeat class for males is with the social support activities factor. The only relationship to reach significance in the

Table 5.3 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the IV – Mediators Pathways (a Paths)

Pathway	Social Support Advice Adjusted (Unadjusted)	Social Support Practical Adjusted (Unadjusted)	Social Support Activities Adjusted (Unadjusted)	Discrimination Adjusted (Unadjusted)
Social Defeat				
Migrant				
Female	-.108* (-.119)	-.090* (-.099*)	-.064* (-.070*)	.011 (.010)
Male	-.083* (-.082*)	-.091* (-.096*)	-.049* (-.046*)	.044* (.052*)
Drug Use				
Female	.023* (.044*)	-.008 (-.001)	-.017 (.001)	.021 (.062*)
Male	.009 (.014)	.007 (-.016)	-.031* (-.023*)	.028* (.062*)
Intermediate				
Female	-.003 (.009)	-.021* (-.016)	-.016 (-.006)	.024* (.040*)
Male	-.014 (-.009)	-.027* (-.028*)	-.019 (-.012)	.012 (.028*)
Trauma				
Physical Abuse				
Female	-.044* (-.056*)	-.043* (-.056*)	-.036* (-.051*)	.075* (.090*)
Male	-.053* (-.070*)	-.044* (-.060*)	-.044* (-.065*)	.055* (.062*)
Sexual Abuse				
Female	-.019* (-.030*)	-.030* (-.043*)	-.022* (-.037*)	.049* (.069*)
Male	-.029* (-.042*)	-.021 (-.035*)	-.003 (-.020)	.076* (.085*)

Pathway	Social Support Advice Adjusted (Unadjusted)	Social Support Practical Adjusted (Unadjusted)	Social Support Activities Adjusted (Unadjusted)	Discrimination Adjusted (Unadjusted)
Sexual and Physical Abuse				
Female	-.047* (-.061*)	-.073* (-.088*)	-.032* (-.049*)	.050* (.065*)
Male	-	-	-	-
R^2				
Female	.081* (.024*)	.055* (.021*)	.073* (.010*)	.057* (.023*)
Male	.064* (.014*)	.052* (.014*)	.084* (.007*)	.040* (.017*)

intermediate social defeat class is with the social support practical help factor.

For males, the relationships between the social defeat classes and discrimination scores are all positive in direction. Those in the social defeat classes report more discrimination experiences. The relationships between the migrant social defeat class and the drug use social defeat class reach significant levels while the intermediate class relationship with discrimination scores does not. The strongest effect was for the migrant social defeat class. This relationship is much stronger than the relationship is for females which does not reach significant levels. This pattern exists again between the social defeat drug use class and discrimination scores, significance is reached for males but not for females. The situation is reversed for the intermediate social defeat class and discrimination scores. This relationship reaches significance for females but not males.

For males, the relationships between the childhood trauma classes and the social support factors show more consistency in both direction and significance. Only two do not reach significance, those between the male sexual abuse class and both the practical help and activities social support factors. By comparison all female relationships do reach significance. For males the strongest effects are seen for the physical abuse class. The effects are also stronger than for females in this physical abuse class. For males, the relationships between the childhood trauma classes and the discrimination score are consistent in that they are all significant and they are all positive. Each of the childhood trauma class members experiences more discrimination. The largest effect is for the sexual abuse class, this is also stronger than for females in the same class. For males in the physical abuse class, the

relationship is still positive and significant, it is however not as strong as for females in the physical abuse class.

Females a Paths

Each path for females reached significance in terms of the variance explained. The strongest R^2 value was for the relationship between the independent variables and the social support advice factor. This was also greater than for males on this path as was the variance explained between the independent variables and the practical support social support factor. The pathway from the independent variables to discrimination also showed more variance explained for females than for males.

All significant effects from the social defeat classes to the social support factors are negative with the exception of the drug use class which is significant and positive. Individuals who belong to each of the classes will have less social support across all three social support factors with this one exception. The only social defeat class which reaches significant levels for all three social support factors is the migrant class. This class also shows the strongest effects with the result for females being particularly strong. Effects are higher than for males in the migrant class except for between the migrant class and the practical help social support factor where the effect sizes are almost identical.

For females, the relationships between the social defeat classes and discrimination scores are all positive in direction. Those in the social defeat classes report more discrimination experiences. The only path to reach significant levels for females was between the intermediate social defeat class and discrimination. For the drug use

social defeat class, the relationship lost significance when the covariates were introduced. For the migrant class there was no significance with or without the presence of the covariates.

For females, the relationships between the childhood trauma classes and the social support factors show consistency in both direction and significance. Every relationship reaches significance. For females the strongest single effect is seen between the sexual and physical abuse class and the social support practical help class. This class also shows strong a strong effect size for its relationship with the social support advice factor. Again, the sexual abuse class shows stronger relationships than for the males in this class in terms of significance and size of effects except for in relation to the advice factor which shows males having a larger effect size. The physical abuse class relationships are all significant, of intermediate size and not quite as strong as male effect sizes for this childhood trauma class. For females, the relationships between the childhood trauma classes and the discrimination classes are consistent in that they are all significant and they are all positive. Each of the childhood trauma class members experiences increased levels of discrimination. The largest effect is for the physical abuse class, this is also stronger than for males in the same class. For females in the sexual abuse and physical and sexual abuse classes, the relationships are still positive and significant, males however in the sexual abuse class have a stronger relationship with discrimination and there is no combined physical and sexual abuse class for males.

Males b Paths

The b paths describe the relationships between the mediating variables and the dependent variables. For this model that is from the social support factors and discrimination scores to the PLE dimensions mean scores. Each path for males reached significance in terms of the variance explained by the path. The strongest R^2 value was for the relationship between the mediating variables and the social/interpersonal PLE dimension. This was also the strongest relationship for females although the females R^2 value was higher.

Males show the one path to reach significance for either gender in the relationship between the three social support factors and the PLE cognitive/perceptual dimension. Significance was reached for males in the social support activities factor group in relation to this PLE dimension. No other social support factor in any social support class for either gender reached significant levels for this dimension. In relation to the social/interpersonal PLE dimension, there was no significance for the social support practical support factor but for males both the social support advice and activities factors showed significance. The strongest effect size was for the activities social support factor. For the relationship with the disorganised PLE dimension again the social support practical factor did not reach significance and the strongest effect size was again for the activities factor. For males the strongest effect sizes across the three PLE dimensions were to be found in the relationship with the social support activities factor.

Table 5.4 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the Mediators – DV Pathways (b Paths)

Pathway	Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
Social Support			
Advice			
Female	-.022 (-.028*)	-.137* (-.143*)	-.046* (-.050*)
Male	.008 (.001)	-.079* (-.086*)	.012* (.006)
Practical Support			
Female	-.021 (-.025*)	-.009 (-.019)	-.022 (-.029*)
Male	-.011 (-.022)	-.001 (-.011)	-.020 (-.034*)
Activities			
Female	-.020 (-.039*)	-.143* (-.161*)	-.082* (-.094*)
Male	-.047* (-.067*)	-.148* (-.169*)	-.112* (-.131*)
Discrimination			
Female	.122* (.144*)	-.089* (.125*)	-.109* (.134*)
Male	.145* (.163*)	.105* (.126*)	.106* (.129*)
R^2			
Female	.092* (.066*)	.191* (.138*)	.104* (.079*)
Male	.093* (.064*)	.153* (.105*)	.116* (.077*)

For males, the relationships between the discrimination scores and the PLE dimensions are all significant and positive in direction. For all three PLE dimensions, being male produces stronger positive relationships than being female. The largest effect size is for the relationship with the cognitive/perceptual PLE dimension.

Females b Paths

Each path for females reached significance in terms of the variance explained. The strongest R^2 value was for the relationship between the mediating variables and the social/interpersonal PLE dimension. This was the strongest relationship across all paths for both genders. The least strong effect was again the same for both genders and that was on the path from the mediators to the cognitive/perceptual PLE dimension.

Females show no significant paths in the relationship between the three social support factors and the PLE cognitive/perceptual dimension. For females, the introduction of the covariates removed significance for these relationships. In relation to the social/interpersonal PLE dimension, females show some of the strongest effects seen in the b paths in terms of the relationships between this PLE dimension and both the social support advice and activities factors. The strongest effect size was for the activities social support factor. The social support practical support factor did not reach significance either with or without the presence of the covariates. For the relationship with the disorganised PLE dimension again the social support practical factor did not reach significance and the strongest effect size was again for the activities factor.

For females, the relationships between the discrimination scores and the PLE dimensions are all significant and for the cognitive/perceptual PLE dimension the relationship is positive as would be expected. An anomaly appears in the relationships between discrimination scores and both the social/interpersonal and disorganised PLE dimensions. Both of these are negative in direction.

Males c' Paths

The c' paths describe the relationships between the independent variables and the dependent variables in the presence of both mediators and covariates. For this model that is from the social defeat and childhood trauma classes to the PLE dimensions mean scores. Each path for males reached significance in terms of the variance explained by the path. The strongest R^2 value was for the relationship between the independent variables and the social/interpersonal PLE dimension. This was also the strongest relationship for females although the females R^2 value was higher.

For males, two paths reach significance in terms of the relationship between the social defeat classes and the PLE cognitive/perceptual dimension. These are from the drug use class and the intermediate class. These relationships are both positive in direction and virtually the same in terms of effect size. Between the social defeat classes and the social/interpersonal PLE dimension, the migrant and the drug use class show significance while the intermediate class does not. Significance disappeared when the covariates were introduced for this relationship. Again, in terms of effect size the results were virtually identical for the migrant and drug use class, however for the migrant class the relationship was negative in direction.

Males in the migrant class report significantly less social/interpersonal PLE experiences while males in the drug use class show a virtually identical effect size but with more social/interpersonal PLE experiences reported. In relation to males and the relationship between social defeat classes and the disorganised PLE dimension, a similar pattern emerges. The migrant and drug use social defeat classes reach significance while the intermediate social defeat class does not. The

relationship between the migrant class and the disorganised PLE dimension is negative in direction while the relationship with the drug use class is positive in direction. Males report six significant relationships in the paths from social defeat to PLE dimensions while females report only two. The strongest overall effect size reported for males is between the drug use social defeat class and the disorganised PLE dimension.

For males, the relationships between the childhood trauma classes and the PLE dimensions are all significant and positive in direction. The strongest effect sizes for males are seen in the physical abuse trauma class however the relationships in the sexual abuse class are all significant also. The strongest overall effect for males is between being in the physical abuse childhood trauma class in relation to the social/interpersonal PLE dimension.

Females c' Paths

Each path for females reached significance in terms of the variance explained by the path. The strongest R^2 value was for the relationship between the independent variables and the social/interpersonal PLE dimension. This was also the strongest effect overall irrespective of gender.

For females, no paths reached significance in terms of the relationship between the social defeat classes and the PLE cognitive/perceptual dimension. The same was true between the social defeat classes and the social/interpersonal PLE dimension. For the relationship with the disorganised PLE dimension, two social defeat classes reached significance, the migrant class and the drug use class. Mirroring the pattern for males

in these paths, the relationship with the migrant class was negative in direction, those in the migrant class reported less disorganised symptoms while those in the drug use class had a positive relationship with the disorganised PLE dimension, they reported more disorganised symptoms. Females report only two significant relationships in all the pathways from social defeat to PLE dimensions with the only positive effect being between females in the drug use class and the disorganised dimension.

For females, the relationships between the childhood trauma classes and the PLE dimensions are all significant and positive in direction. The strongest effect sizes for females are seen in the sexual abuse trauma class followed closely by the combined sexual and physical abuse class however the relationships in the physical abuse class are relatively strong also. The strongest overall effect for females is between being in the sexual abuse childhood trauma class in relation to the cognitive/perceptual PLE dimension.

Summary

By taking an overall view of all pathways, some interesting relationships are worthy of note. The effect of covariates is striking from looking at the overall picture of results. The covariates had the effect of changing the size of effects, the significance of some relationships and the direction of others.

The mediating effects in the model are stronger for social defeat than for childhood trauma. In terms of childhood trauma, all relationships remain significant. Mediation does exist as all pathways have values but not to the point of removing significance

Table 5.5 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the IV – DV Pathways (c' Paths)

Pathway	Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
Social Defeat			
Migrant			
Female	.002 (-.002)	-.006 (-.008)	-.025* (-.026*)
Male	.008 (.008)	-.026* (-.029*)	-.038* (-.038*)
Drug Use			
Female	.017 (.040*)	-.005 (.033*)	.041* (.068*)
Male	.041* (.070*)	.028* (.066*)	.063* (.100*)
Intermediate			
Female	.007 (.013)	-.005 (.006)	.013 (.021*)
Male	.039* (.041*)	.012 (.028*)	.040 (.056*)
Trauma			
Physical Abuse			
Female	.069* (.084*)	.067* (.088*)	.053* (.068*)
Male	.085* (.100*)	.095* (.116*)	.082* (.097*)
Sexual Abuse			
Female	.098* (.117*)	.070* (.097*)	.080* (.098*)
Male	.050* (.065*)	.018* (.038*)	.038* (.054*)
Sexual and Physical Abuse			
Female	.064* (.079*)	.078* (.100*)	.060* (.075*)
Male	-	-	-
R^2			
Female	.092* (.066*)	.191* (.138*)	.104* (.079*)
Male	.093* (.064*)	.153* (.105*)	.116* (.077*)

from any of the childhood trauma classes in relation to the PLE dimensions. For social defeat however, the effects of introducing the mediators are that some of the pathways are no longer significant. The chi-square results in chapter 3 showed that the bivariate relationships between the social defeat classes and the PLE dimensions were all significant.

The impact of physical abuse is greater for males than for females. The impact of sexual abuse is greater for females than for males. The extra female class containing females who have been both physically and sexually abuse remains important in that it does not exist for males. The strong relationship between females who are in the sexual abuse class, and the cognitive/perceptual class reflects the literature in showing specificity between sexual abuse and the development of hallucinations. For females being a member of any of the trauma classes reduces social support across all three factors. This is however only true to a significant level for males in the physical abuse class. For males in this class access to activities is the strongest social support factor impacted by the abuse.

The mediation shows that for males, activities is the social support factor which has the most positive impact on outcomes on the PLE dimensions. For each dimension it consistently leads to less reporting. Practical support has no significant influence which is a consistent theme for males and females. For males in the sexual abuse class, the c' path shows that the relationship with all three PLE dimensions is significant and positive, being sexually abused leads to more reporting of all three PLE dimension types. Males in the sexual abuse class however only have a significant relationship with the social support advice factor. It can be seen that the relationship between being male and having access to advice improves the outcome against the social/interpersonal dimension. So, while activities is the most favourable of the social support factors for being male, for males in the sexual abuse class, advice is also important particularly for the social/interpersonal dimension.

It can be consistently seen that belonging to any of the social defeat or trauma classes leads to more reporting of discriminatory experiences. These do not always reach significant levels for the social defeat classes but they do for the trauma classes. In terms of the social defeat classes, being a member of the migrant class has the worst outcomes for both males and for females. In a pattern which is different than for every other social defeat grouping, all relationships between the migrant class and the social support factors are significant. They all work in the same direction, being in the migrant class results in less support in the form of advice, activities and practical support. That is the same for both males and females in the migrant class. For males the story continues in the relationship between being in the migrant class and reporting discrimination. Being male and in the migrant class results in significantly more discriminatory experiences being reported. While for females the relationship does not reach significance, it is nonetheless in the same direction. None of the remaining social defeat classes show such consistent and significant relationships with the mediators.

Discussion

This chapter has moved forward the framework for this study from a theoretical model (Figure 5.1) into a unified, fully testable latent variable framework. Trauma classes were established in chapter 2. Bivariate relationships between trauma classes and PLEs were addressed in chapter 3. Chapter 4 addressed social defeat classes and established the bivariate relationship between these and PLEs. Chapter 4 also saw the creation of mediators and a range of covariates. The focus of this chapter was to bring all of those together. To move work into the multivariate phase. And to do that

for each gender. The framework has been tested for males (Figure 5.2) and for females (Figure 5.3).

Three guiding principles have governed this work. The first being that it would move the study of the trauma psychosis relationship beyond bivariate work and would also do this for the social defeat trauma relationship. It would do this using statistical techniques that complement the complexity of the questions being asked. Techniques such as LCA, mediation and moderation. And it would do this based on gender. This work is firmly based on the contention that social factors are a contributing cause to the aetiology of psychosis. That addressing social factors which contribute to this most stigmatising of mental illnesses can help us understand the multiple pathways to psychosis. And allow us to build interventions which address these complex and multifaceted conditions in a way that promotes recovery.

There were several predictions for this chapter. Firstly, the review of the studies in the phase 4 section suggested strongly that the social factors for the mediation phase would result in effects along all of the pathways and that the best model would be that which included direct effects and indirect effects along with covariates. There would be a role for social support and there would be a role for discrimination. Next, it was predicted that the mediation results would be impacted by the addition of the covariates. Finally, it was predicted that there would be gender differences in mediation effects. This discussion firstly addresses the prediction that mediation would occur and that the best model would include both direct and indirect effects as well as the covariates. It then discusses specifically social support as a mediator, followed by discrimination as a mediator and it discusses these findings in the

context of theoretical implications. This is followed by addressing the prediction concerning the role of the covariates. This is followed by a discussion of the clinical implications of the findings. As the impact of gender differences had mostly clinical implications, this is the section in which the gender differences which were the final prediction, are discussed. The discussion then addresses the strengths and limitations of the current phase. It concludes by looking forward to the final phase of model implementation, the moderating effects of social isolation.

Mediation Effects

As stated, given the findings of background studies that were reviewed, it was predicted that mediation effects would occur in the model. In the review of the most relevant studies identified, they all found mediating effects to some extent. It has been firmly established that there is a bivariate link between childhood trauma and the development of psychotic experiences as documented in chapter 3 of this thesis and as supported by findings from that phase of work. Previous studies have also shown that there is a bivariate link between social defeat and the development of psychotic experiences. Again, this has been documented in and supported by findings from chapter 4 of this study. Further, plentiful work has now been done in the area of the social influences on the development of PLEs and psychosis. This has been fully covered by chapter 4 of this study which also developed the social factors of social defeat, social support and discrimination for use in this thesis.

Mediation can be seen as present under a number of conditions, explained by Sitko et al. (2014) in terms of the a paths, b paths, c' paths and c paths. Figures 5.2 and 5.3 show the a, b and c' paths in this current study. The a paths go from the trauma

and social defeat classes to the social support factors and the discrimination variable. The b paths go from the social support factors and the discrimination variable to the PLE symptom clusters. The c' paths go from the trauma and social defeat classes to the PLE symptom clusters. The c paths exist from the childhood trauma classes and the social defeat classes to the PLE symptom clusters in a purely bivariate relationship with no mediators present. These were established in chapter 2 for the trauma classes, and in chapter 4 for the social defeat classes as all being significant.

For full mediation to have occurred, a c' path that was significant as a c path will have become non-significant with the inclusion of the mediators in the model, while at least one of the mediating effects will have been significant. In this model full mediation only occurs on pathways from the social defeat classes to the PLE symptom scores. One example is given. Table 5.5 shows the c' pathways for both genders from the migrant social defeat class to the cognitive/perceptual PLE symptom cluster is no longer significant while Table 5.3 shows that for both genders from the migrant social defeat class, all of the results to the social support factors are significant. To follow this relationship through the b paths, shown in Table 5.4, there is only one result that maintains significance through the b path also. This is from the activities social support factor to the cognitive/perceptual PLE symptom cluster and is only for males.

Partial mediation is said to have occurred if a c' pathway remains significant, as it does for all the trauma classes in the model once the mediators have been added, but in addition at least one of the mediator pathways is also significant. Table 5.3 shows that for females in each of the trauma groups, the a paths to each of the social

support activities are all significant which means partial mediation has occurred on this finding alone. To carry the mediating effects along the b paths, shown in Table 5.4, significant mediation is maintained from the social support factor of advice to the PLE symptom clusters of social/interpersonal and disorganised and from the social support factor of activities to the same two PLE symptom clusters.

Indirect effects of mediation are said to have occurred when a previously non-significant c path remains so as a c' path and in addition at least one mediating variable is significantly associated with an independent and a dependent variable. This means that the new significant relationship is entirely because of the presence of the mediator. As the model in this study has no non-significant c path effects, this does not apply.

So, the first and main prediction was seen to be correct. Partial and full mediation has occurred and the variance explained along all paths is significant. Tables 5.1 and 5.2 show also that the best models for both males and females were the models which addressed direct and indirect effects and included the covariates. This supports the assertion that research should move beyond bivariate findings that there is a link between social experiences such as trauma and defeat and the development of psychosis. This progression is a necessary next stage in development of social theories of psychosis (Brand et al., 2017). These findings support the notion that experiences along the continuum of psychosis are linked to disruptions in adaptation to social context (van Os, Kenis, & Rutten, 2010). They support the social causation model of mental illness, that factors such those in the present study do in fact combine to help create mental ill health.

Social Support as a Mediator

To specifically discuss social support, examination of results for the a paths (Table 5.3) shows that for both genders, significance is reached in the mediating effects for all three social support factors. Experiencing the patterns of traumas summarised in the trauma classes in this model impacts all three factors of social support. To explore the theoretical implications of this, firstly it lends support to the deterioration model (Barrera, 1986; Eckenrode & Wethington, 1990; Kaniasty & Norris, 1993; Sperry & Widom, 2013; Wheaton, 1985). This theory states that stressors such as the traumas in this study are heavily stigmatising and as such are able to erode social support due to the way in which they affect a person. They create confusion, helplessness and an aversion to others. Sperry and Widom (2013) discuss how those who have had experience of trauma in childhood develop a sense that less support is there for them. To consider social defeat although the results are not as consistent or as strong in the present study, they do still show a general trend that belonging to any of the socially defeated groups will lead to less of each of the social support factors. Social defeat is another stressor which can be categorised as being heavily stigmatising, a chronic feeling that one is not good enough, or does not belong, or cannot succeed. It is clear that these experiences too could create those feelings of confusion, helplessness and an aversion to others. Vranceanu et al. (2007) also studied social support as a mediator with the experience of childhood trauma as an independent variable. This study also supports this theory that the experience of childhood trauma can potentially lead to this deterioration in levels of social support. As a result of the disruptions in normal social and emotional development created by the adversities, distortions in cognition occur. These are manifested as negative views of how these children see themselves, others and the world. This study, like

the present study, found social support to be a mediator although in the Vranceanu study, the dependent variables were PTSD and depression as opposed to psychosis. The theory linking childhood trauma and social support however is sound and is relevant to this present study.

Discrimination as a Mediator

To continue this theme of findings in the context of the deterioration model, the relationship between the trauma groups and experiences of discrimination can be addressed. Table 5.3 shows that some of the most consistently high and again, all significant values can be seen in the mediating effects between trauma and perceived experiences of discrimination. Again, this is true for both genders. So, alongside the deterioration of social support which has already been shown to be plausibly created by traumas in childhood, there are these even stronger effects for discrimination. It seems plausible that both trauma and social defeat can have this deteriorating effect on social support and also that they can lead to a person experiencing more perceived discrimination. Maladaptive beliefs formed as a result of trauma or social defeat, or indeed of both, can be a contributing factor in perceptions of discrimination. What this present study shows is that the relationship between being in any of the social defeat groups and the discrimination mediator is positive. The people in these groups will experience more perceived discrimination. In the migrant and the drug use social defeat classes, the results reach significance for males and in the intermediate social defeat class they reach significance for females.

This lends support to the theory that the traumas and social defeats may create cognitive distortions for the individual, to cause them to evaluate themselves, others

and the world in negative ways. Discrimination was found to have some partial mediating effects in studies which looked at the wider concept of social adversity (Wickham et al., 2014) but these studies did not isolate social defeat in the same way that was done in the present study so it is hard to draw comparisons in terms of mediations, however they do strengthen the evidence that points to social experiences having a role in eroding a positive sense of self, of others and of the world. And of course, with increasing levels of perceived discrimination comes the reinforcement of others and the world as being negative.

The Role of Cognitive Distortion

So, discussion of both social support and discrimination as mediators leads to the subject of cognitive distortion. It is easy to see, and the literature supports, that childhood traumas such as those experienced by those in the trauma classes could lead a person to see the world as negative, to see others as negative and through disruption in attachment, to even see themselves in a negative manner. It is easy to see also how repeated experiences of social defeat could do the same, again this is supported by the literature on social adversity. This issue of negative views of the self, others and the world is repeated in many of the studies that were addressed in the review of the mediation literature. It is examined in the study of child maltreatment and how it leads to the development of PTSD and depression (Vranceanu et al., 2007). This is one of the earliest mediation studies considered in the review. A further range of the studies offer this cognitive bias as a potential route for negative social outcomes (Murphy et al., 2015; Perona-Garcelan et al., 2012; Pilton et al., 2016; Sheinbaum et al., 2014; Shevlin, et al., 2015b; Sitko et al., 2014)

and two of the studies in the review specifically tested the presence of these negative schemas in the mediations performed.

Fisher et al. (2012) found that the presence of negative schemas of the self, mediated the relationship with childhood maltreatment and paranoia. Stowkowy and Addington (2012) found the same in a study looking at negative schemas not only of the self but of others and the world. This supports the theory that this deterioration of social support and increased levels of perceived discrimination could be traced back to childhood trauma and experiences of social defeat through this cognitive bias. To reiterate the argument for plausible temporal ordering within the model, the building blocks for the social defeat variable are the following. Education was used as a proxy for IQ and specifically addressed if a respondent finished high school, an experience which typically happens under the age of 18. Migrant status concerned information about where the respondent and their parents were born, again specifically related to early life. Urbanicity asked about where a respondent resides. Living in a city at any point is highly correlated with being born and spending childhood years in a city. The drug use question covers all the respondent's lifetime and so while not specifically tied to childhood years, it does include them. This gives a plausible argument for social defeat to have firm roots in childhood experiences.

The Loneliness Loop

If the mediating role of social support and discrimination implicates the role of cognitive distortion, the loneliness loop (Hawkley & Cacioppo, 2010) is worth discussing. This theory looks to chronic levels of loneliness to explain the bias towards negativity that may develop as a result of a state of hypervigilance towards

the social environment. Social defeat and trauma in childhood can also plausibly create that same kind of hypervigilance to the social environment, resulting in faulty cognitions. Social isolation is added to the model in chapter 6 as a moderator. It will be of interest to explore if those who report the highest levels of social isolation and who report that it does create difficulties for them also have higher levels of mediating effects through social support and discrimination.

The role of Stress

A common theme has run through discussions of all of the variables which have been used to develop this model. Stress and its effects on the HPA axis. This provides a relevant mechanism to link the mediators of social support and discrimination to the development of PLEs. Read, Perry, Moskowitz, and Connolly (2001) provide compelling evidence that those who experience psychosis have an overdeveloped sensitivity to threat and that one theory of why they do is linked to experiences of trauma, abuse or adversity in childhood. Issues of stress are centred on the HPA axis. Much evidence for this theory comes from studies of the effects of social stress on monkeys (Morgan et al., 2002) and rodents (Tidey & Miczek, 1996). This work was stimulated by the social defeat hypothesis, the same principle which is used as the basis for the development of the social defeat variable for the present study (Selten & Cantor-Graae, 2005; Selten et al., 2013). Stressors such as trauma in childhood or social defeat can lead to these changes in the HPA axis. They can also lead to the erosion of social support and to increased experiences of discrimination through cognitive distortions leading to accumulations of stressors on an oversensitive HPA axis contributing to these experiences along the psychosis continuum. Read, Fosse, Moskowitz, and Perry (2014) revisited the traumagenic

neurodevelopmental model and performed a review of all literature between its publication in 2001 and 2014 when the update was published. The review identified 125 publications which specifically supported the model, either directly or indirectly. It also reported that a multitude of studies had demonstrated this link between over-reactivity of the HPA axis and the dopaminergic system to stress and the development of psychosis. Among the experiences cited as being under investigation in these studies are both reduced social support and experiences of discrimination.

The Role of Aberrant Salience

The theory of aberrant salience links changes to the HPA axis to negative events also. This theory proposes that due to excess striatal dopamine as a result of these changes in sensitivity, salience is assigned to stimuli that would otherwise be irrelevant (Hoffman et al., 2007; Howes & Kapur, 2009; Kapur, 2003; Kapur, Mizrahi, & Li, 2005; Vercammen & Aleman, 2008). These negative events may be the experiences of trauma and abuse, they may be experiences of social defeat, these may then be compounded by lack of social support or by experiences of discrimination. The hypothesis is that psychotic experiences then emerge as a top-down cognitive attempt to make sense of these experiences. Reininghaus et al. (2016), found evidence that aberrant salience may play a role before the onset of psychotic symptoms. This study involved 51 participants who had experienced first episode psychosis, 46 who were at risk of experiencing psychosis and 53 controls with no family or personal history of psychosis. It used experience sampling method to assess intensity of psychotic experiences. It found that aberrant salience was associated with increased intensity of psychotic experiences but only in the at-risk

group, not in either the first episode group or the control group, highlighting that this distortion might precede the onset of psychosis.

The Role of Covariates

The second prediction was based on the use of covariates. The addition of the covariates had an unequivocal impact on the model. Each variance explained value for each a path, b path and c' path increased with the addition of the covariates. Table 5.3 shows that the variance explained for females for the social support advice factor went from 2.4% without the covariates to 8.1% with the addition of covariates. The patterns for the remaining social support factors and the discrimination variable were similar. Table 5.4 shows that the variance explained for males for the social/interpersonal PLE symptom cluster path went from 10.5% without covariates to 15.3% with the addition of covariates. Again, the pattern was repeated for both genders and the remaining two symptom clusters. Table 5.3 shows that no effect size between the social defeat classes and the mediators, or between the trauma classes and the mediators, remained unchanged by the addition of the covariates. In the case of females in the drug use social defeat class and the discrimination mediator, significance was removed because of the adjustment for the covariates. In the case of the relationship between females in the intermediate social defeat class and the practical social support factor, significance was added by adjusting for covariates. For males in the sexual abuse trauma class, the relationship with the practical social support factor lost its significance when covariates were adjusted for. Similar patterns are seen along the b paths, as shown in Table 5.4.

So, if adjusting for covariates means that significance can be added or removed, this necessitates that the mediation studies reviewed are revisited in light of this finding. All of the studies reviewed showed at least partial and sometimes full mediation effects. Shevlin et al. (2015b) contained a comprehensive list of covariates – age, gender, level of education, ethnicity and cannabis use. Loneliness was factored as a moderator and clinical diagnoses were included as dependent variables. Murphy et al. (2013) also utilised a range of covariates – age, gender, level of education, living alone, ethnicity, hazardous use of alcohol, drug dependence and a diagnosis of depression. Studies then ranged in the use of potential confounders from some use of covariates (Fisher et al., 2012; Sperry & Widom, 2013; Stowkowy & Addington, 2012; van Nierop et al., 2014) to studies that adjusted for at least age and gender (Sitko et al., 2014). Five studies however did not document the use of any covariates at all (Murphy et al., 2015; Perona-Garcelan et al., 2012; Pilton et al., 2016; Sheinbaum et al., 2014; Vranceanu et al., 2007). Multivariate models which address the relationship between trauma and psychosis are complex and built on the use of a range of variables which can in their design incorporate risk factors. Integrity of results must be balanced with the need for parsimony in order to make models workable and understandable. However, when looking at the pathways to psychosis, which has a multifactorial aetiology (Broome et al., 2005), it is vital that the goal of parsimony does not lead to the omission of elements which may distort the outcome. The majority of the mediation studies in the review were completed since 2010 which illustrates that using mediation to explore potential mechanisms underlying this relationship is a recent development. It may well have been the case that uncovering effects was more important than a design which incorporated a wide range of covariates. Now that this work is gaining momentum, it is important that the

incorporation of a relevant list of covariates is addressed to make mediation studies as robust as possible.

Clinical Implications

A central function of any study which seeks to draw out the reasons for mental illness must be to aid the development of more effective clinical interventions. The study of social factors as mediators offers rich findings to progress this particular area. Findings from this study apply at the level of therapy for the individual, but also at the level of society. If social factors are a contributor to a clinical level mental disorder, then surely this is the level at which prevention should be addressed with a progression to the best ways to identify those at risk before the onset of disorder to clinical tools once a person has progressed to that level of need.

Society Level Interventions

At the level of society, again and again studies are lending support to the social factors which influence the development of a disorder which represents one of the most serious in terms of the cost to society, to families and to individuals (Read et al., 2004). Social and health policies are of relevance at this level. This is clearly a very high level at which to apply interventions and with that comes high cost. It is therefore imperative that understanding of who should be targeted is applied. It is also worthy of note that although findings in relation to the social factors in the present study might best be described as modest, this is reflective of the complex and myriad issue under study (Perona-Gercelan et al., 2012; Sheinbaum et al., 2014; Wickham et al., 2014) and the cost of the effects of trauma and social defeat might

be better viewed as the cost to society and the cost to families and the cost to individuals.

In terms of the model driving this thesis (Figure 5.1), and in light of the immense amount of literature reviewed which points to trauma in childhood as a starting point for trajectories with many and varied negative outcomes, childhood is clearly the most effective point for the targeting of interventions at a public health level. Varese et al., (2012), conducted a meta-analysis which concluded that if the six types of child adversity included in the 2012 study (sexual abuse, physical abuse, emotional/psychological abuse, neglect, parental death, and bullying) were to disappear, a third of new psychosis cases would be avoided. Campaigns at this level have already targeted children and young people in cases such as obesity (Ebbling, Pawlak, & Ludwig, 2002) and young people's mental health (Patel, Flisher, Hetrick, & McGorry, 2007).

The World Health Organisation (WHO), devoted a chapter of the 2002 report on violence and health, to violence against children, and reviewed a number of ways in which this issue can be addressed at the public health level. The first of these was using family support approaches which may be training parents or providing family support. Home visitation programmes bring resources to the family and can be used to enhance parenting skills, raise parents' ability to cope and provide emotional support for parents. Intensive family preservation services are aimed at families in which abuse or neglect has already occurred and works to stop these families being separated and children being placed in care. After family support approaches, health service approaches are discussed. These include screening being performed by health

care professionals as well as training for these workers to detect and report on early signs of abuse. Therapeutic approaches are also discussed in the context of these public health policies. One successful programme which is relevant to this model is in the teaching of social skills to children who are identified as being withdrawn (Fantuzzo et al., 1988). These were maltreated school children who were placed in playgroups with children who were functioning at a higher social level. The children with the higher social functioning were taught to act as role models and encourage the more withdrawn children to participate, for example by offering them a toy. Improvements were seen during the study. Other therapies can be targeted specifically at children who have experienced sexual abuse, those who have witnessed interpersonal violence and adults who have been abused as children.

Other successful public health campaigns have been implemented at the community level in a number of countries including Ireland (MacIntyre & Carr, 1999), The Netherlands (Hoefnagels & Baartman, 1997; Hoefnagels & Mudde, 2000) and Zimbabwe (World Health Organisation, 1999). Schools programmes are one way in which to apply interventions. The Stay Safe intervention was one of the most widely implemented programmes in a number of countries and was aimed at preventing child sexual abuse. It was evaluated in Ireland and was seen to show success after the implementation and also at a three month follow up (MacIntyre & Carr, 1999). The programme was in place in almost all schools in Ireland. It taught children to recognise threatening situations and taught them how to protect themselves from abuse, as well as how to tell a safe adult if they were asked to do something that made them feel uncomfortable. It used the concepts that children owned their own bodies and were allowed to control access to it and that there were different types of

physical contact. The programme was evaluated by measuring changes in children's safety knowledge and skills and by measuring changes in children's self-esteem. This was done using a sample of 339 children who had completed the intervention compared to 388 still on the waiting list. Improvements in both measures were statistically significant.

Another way in which the WHO report considered implementing programmes designed to prevent abuse of children was to use prevention and educational campaigns at a national level. These would have the aim of increasing awareness of the issue in the general population with the twofold aims of directly targeting abusers who may realise that what they are doing is wrong and seek help, or targeting victims or third parties to report abuse. The Netherlands implemented such a campaign which was designed to increase disclosure by targeting victims and teachers as they were likely to be a safe adult that children would see regularly (Hoefnagels & Mudde, 2000). This programme used a multimedia campaign of documentaries, short films, commercials, radio programmes, posters, stickers, booklets and newspaper articles and also provided regional training to teachers. Its effectiveness was measured in the increase in volume of calls to the national child line service.

Targeting interventions at this early stage is clearly the most desirable method. To address other groups which may benefit from being targeted at this public health level using this study, Table 5.3 shows that the migrant class is the only group for whom effects reach significance across all three social support factors. This group therefore will benefit from interventions aimed at the group level. These could be

interventions which offer support in terms of tangible practical aid, in terms of support groups to allow for engagement with others who may be experiencing similar problems, it might be access to counsellors for this group for advice, or it might be group level interventions such as teaching language skills. This might also be applied at a wider level with interventions as cultural awareness training for areas in which there are high levels of immigrants. As this study focused on childhood trauma and sought to plausibly place the roots of social defeat in the earlier stages of development also, it is natural to consider children and young people as another group which should be targeted in terms of both identifying those who are at risk and also through the development of skills. As the study is placing the development of experiences along the continuum of psychosis as the end result of the pathways addressed in the model, and as social support is seen to play a mediating role, programmes delivered into schools which focus on these skills might be one way to prevent experiences of traumas and social defeat from developing along the pathway to the symptom clusters.

The theory that intervening to prevent child abuse and mistreatment at a public health level, before it happens, is an ideal one. However, the reality is that there has been little work done on the effectiveness of such campaigns (World Health Organisation, 2002). In addition, the focus has been on accessing those who have been victims as opposed to preventing the abuse or maltreatment. The conclusion is reached that this issue is too complex and difficult to solve using this type of intervention. Once victims and perpetrators have been identified, attention can therefore be turned to interventions which are designed specifically to address the individual at the level of their specific needs.

Interventions at an Individual Level

Previous studies have mentioned time and time again the importance of developing trauma-based interventions and the importance of developing a full trauma history when planning therapeutic interventions (Pilton et al., 2016; Read et al., 2014; Sheinbaum et al., 2014; Sitko et al., 2014; van Nierop et al., 2014). The findings from this present mediation fully support that. Table 5.3 shows that the trauma classes all have significant findings for both genders in relation to each of the mediators. Effect sizes are, at an overall level, stronger than for the majority of social defeat classes. Findings have also offered strong support for the role of negative schemas. The creation of negative beliefs about the self, others and the world, can be targeted at the therapeutic level by suitable therapies such as cognitive behavioural therapy (Sperry & Widom, 2013). Therapies which can reduce or eliminate these negative beliefs.

Findings from this mediation also lend support for the targeting of specific types of support. Read et al. (2014, p. 74) assert that,

> 'individuals experiencing psychosis should be offered evidence-based psychological therapies designed to address the social causes of their difficulties'.

Chapter 4 of this thesis documented the use of CFA to show that the items used to measure social support lay across three factors. Advice was having people to talk to about issues and problems. Activities represented having people to perform everyday activities with, such as going to the movies. The practical factor was having people

to help with logistical issues such as watering plants should you go away from home for a while. Sperry and Widom (2013) also identified a number of factors of social support. Appraisal which sounds similar to advice is having someone to talk to about ones' difficulties. Belonging sounds similar to activities and was described as having people with whom one can do things. The third factor was self-esteem which was not similar to the third factor of practical, this was having people with whom one feels you compare favourably with. Cutrona and Russell (1990) propose that knowledge of different factors of support can lead to optimal matching in which types of social support are used to design better interventions with emotional support generally being the type of support most linked to positive health outcomes. The R^2 values in Table 5.3 show that in this study the lowest values for both genders are seen for the practical factor which supports this assertion that emotional factors such as advice, which is the strongest factor for females, are of more benefit for health issues. The strongest factor for males is the activities factor. Which brings this discussion to the topic of gender findings.

Gender findings overall are subtle and not dramatic in the model. The lack of any outstanding results does lend support to the Shevlin et al. (2015c) finding that gender does not moderate predictions of psychosis. They do become interesting when applied in this area of interventions. Previous literature shows that two of the areas which have been established as being affected by gender are course and outcome of illness (Abel, et al., 2010; Falkenburg & Tracy, 2014; van Os & Kapur, 2009) and response to treatment (Brady & McCain, 2004; Falkenburg & Tracey, 2014). Findings from this present study are of use if applied to these areas. Response to treatment contains gender differences for both psychological and pharmalogical

interventions (Falkenburg & Tracy, 2014). The latter are outside of the scope of this study and so will not be addressed.

As stated above, overall the social support factor of activities resulted in larger R^2 results for males while the advice factor was resulted in stronger results for females. This would lend support to prioritising different types of social support interventions by gender. To delve deeper into the gender findings identified in Table 5.3, they show that the mediating effects between the male physical abuse trauma group and all three social support factors are the strongest for males across the trauma classes and that they are also stronger than for females in the physical abuse class. In chapter 2, it was seen that physical abuse was the only childhood adversity class that was endorsed in greater percentages by males than by females. The mediation expands the understanding of this to show that these groups of males not only endorse physical abuse more than females or than other males, but the impact on having people they can get advice from when they are in trouble, on having people to help them out in a practical way when they need it and on having people to socialise with through everyday activities is stronger than for other males and it is stronger than for females who have the same kind of experiences. This adds more support for developing a full trauma history when performing clinical assessment as well as performing an assessment of social needs (Read et al., 2001; Read et al., 2014). Importantly interventions based on developing social skills will be of particular use to this group of males who have experienced physical abuse and decreased levels of social support. Gender differences do support that females tend to respond better to psychological interventions in the form of talking therapies than males, they tend to build better therapeutic alliances (Falkenburg & Tracy, 2014). Perhaps focussing on

the development of social skills will allow men to also build these important alliances and gain the same benefits from therapies of this kind. Tables 5.3 and 5.4 help identify a particular group of males who might, in particular, respond to this type of social support interventions. Table 5.3 shows that for males in the sexual abuse trauma class, the only social support factor that is significant in terms of mediating effects is the advice factor. This makes this group different than the males in the physical abuse class who showed significant mediating effects with all three social support factors. Perhaps this group of males in particular, a highly traumatised group, might benefit from interventions which allow them access to the provision of advice, particularly if preceded by interventions which help them develop their social skills to provide maximum possibility that they will engage.

The discussion around targeting specific types of support can be extended further by looking at the results for the b paths (Table 5.4). Looking at the relationships between the social support factors and the PLE symptom clusters, patterns do emerge. Both advice and activities have significant effects for both genders for the social/interpersonal symptom cluster. Again, the same two factors have significant effects for the disorganised cluster. From this, further support is given to the utility of emotional support over the provision of practical support and that social support has more effectiveness with the social/interpersonal and the disorganised symptom clusters.

Strengths and Limitations

This study has sought to answer the call that more work needs to be focussed on investigating the role of social factors in psychosis in the face of the emerging

realisation that the medical model does not provide the full answer in explaining the nature of psychosis (Read et al., 2009). Cantor-Graae (2007) pointed to the increasing evidence of the role of social factors in the development of psychotic experiences. Bentall and Fernyhough (2008) called for work to be done to look at the social factors which sit alongside the psychological processes which create the abnormal developmental trajectories resulting in psychotic experiences at a clinical level. In a 2010 paper, van Os, Kenis, and Rutten cited the work to date that supports again the suggestion that environmental factors play an important role in furthering our understanding of the multiple pathways that can lead to psychosis. At the heart of this thesis is the link between childhood trauma and PLEs. This is complemented by also looking at the role between social defeat and PLEs. The social factors of levels of social support and discrimination were selected to help explore the underlying mechanisms in these links.

The first empirical study addressing the bivariate link between childhood adversity and psychosis was documented in 1980 (Varese et al., 2012). However, Read, van Os, Morrison, and Ross (2005) asserted that until 2004 the studies done were of little value as they were correlational or used uncontrolled group comparisons but did not control for confounders. One study done in 2004 illustrates the nature of issues with the work done and the methodologies used. Spataro, Mullen, Burgess, Wells, and Moss (2004) conducted a prospective study in males and females on the impact of sexual abuse on mental health. It used 1612 documented cases and it compared rates of treatment with the general population. It found no significant differences between abused males or females and the general population in terms of likelihood of being treated for a disorder involving psychosis and concluded that the study did not

support any association between sexual abuse and psychosis. However, analysis by Read et al. (2005) identified the probable reasons for that based on the limitations as stated by the authors. There was a systematic bias inherent in the sample introduced by the presence of people in the general population sample who had suffered sexual abuse as children. The study only included the most severe forms of child sexual abuse. Finally, the study used data-matching which is known to miss cases. The study was compromised to the extent that not only did it not find any association between child sexual abuse and cases of psychosis but it did not either find an association between child sexual abuse and alcohol or drug related disorders, a link which was even at that point, well established (Briere, Woo, McRae, Foltz, & Sitzman, 1997; Mullen, Martin, Anderson, Romans, & Herbison, 1993). The study was in fact extended by a 2010 study (Cutajar et al., 2010). This used a larger sample, it followed up over a longer period and crucially, it used a different case control methodology. The methodology used meant that rates of disorders within the cases and the controls were established using identical methods. In this study, the link was established.

Even beyond this timeframe, methodological issues could be seen in bivariate studies. Sommer et al. (2010) performed an analysis on healthy individuals who experienced auditory hallucinations. This was a sample of 103 participants who experienced hallucinations frequently, matched with 60 controls who had never experienced hallucinations. Part of the study addressed the association between the individuals and childhood trauma. Childhood trauma was operationalised as a total score however with no breakdown of the different types of abuse or traumas that had occurred. Again, there was this issue of matching with control groups and the issues

that can bring. Lataster et al. (2006) addressed the relationship between trauma and the development of non-clinical delusional ideation and hallucinatory experiences. The trauma addressed however was restricted to bullying and unwanted sexual experiences. This represented a narrow focus and had no representation for the familial factors that had been seen to be important in work in this area.

It is clear that in terms of the bivariate link, this thesis has moved beyond those limitations. Six different adversities were used to identify groups of people having shared experiences in a sample of 34653 people. The adversities accounted not just for the most commonly addressed abuses of physical and sexual abuse. This study addresses sexual abuse as either molestation or where penetration was attempted or had occurred. It looked at neglect. It also looked at the home environment in terms of witnessing interpersonal violence against mum and of having a parent with mental health issues. The use of LCA allowed this present study to address poly-victimisation which has been established as of importance in the study of childhood traumas (Finkelhor et al., 2007; Finkelhor et al., 2009; Higgins & McCabe, 2001; Mash & Wolfe, 1991; Radford et al., 2011; Tricket & McBride-Chang, 1995). In terms of method, the use of covariates is a strength of the present study. The discussion section of this chapter covers this issue in detail, highlighting the difference between studies which use a comprehensive list of covariates (Murphy et al., 2013; Shevlin et al., 2015b) and those which do not (Murphy et al., 2015; Perona-Garcelan et al., 2012; Pilton et al., 2016; Sheinbaum et al., 2014; Vranceanu et al., 2007). In light of the impact of covariates on results in the current study, it is clear that as studies continue to develop in this area, use of covariates is essential to protect the integrity of results.

LCA was again used to effectively summarise the complex patterns in this large dataset to allow classes of people experiencing similar patterns of social defeat in the same way to be identified. No other study was able to be identified which used the actual elements of social defeat in the way this present study has. Social defeat was operationalised in line with the Selten and Cantor-Graae model (Selten & Cantor-Graae, 2005; Selten et al., 2013). Large amounts of empirical evidence exist to show the links between the elements making up the model and psychosis.

- IQ (Jones, Murray, Rodgers, & Marmot, 1994; Selten & Cantor-Graae, 2005);
- Migrant status (Bourque, van der Ven, & Malla, 2010; Kirkbride, Jones, Ullrich, & Coid, 2012; Morgan, Charalambides, Hutchinson, & Murray, 2010);
- drug use (Fergusson, Horwood, & Riddler, 2005; Kessler et al., 1997) and
- living in an urban environment (Frissen, Lieverse, Drukker, van Winkel, & Delespaul, 2015; Newbury et al., 2016).

Social defeat has been theorised about at great length. Empirical research which does exist tends to use affective response to the experience of social defeat as a proxy for being socially defeated (Valmaggia et al., 2015; van Nierop et al., 2014). These studies have been done using constructs such as entrapment which have their own tailored measures and which act as analogues to social defeat. They are not however social defeat itself. Cantor-Graae (2007) raises a concern about the use of social defeat, that retrospective reports of social defeat could be subject to recall bias. This

study however has used LCA to operationalise these elements of social defeat themselves. These are objective and are not subject to concerns about recall bias.

This thesis has brought these elements together and summarized the information in the form of groups of people with shared experiences, in a format which can then be used beyond the bivariate links established in chapter 4, to be part of the multivariate model. Social defeat as a unified single entity had remained largely untested until this point.

The bivariate link was therefore established using LCA to ensure effective operationalisation of the independent variables and having by using a tried and tested factorial model which complemented the variables that form the basis of the PLE measures. It was now time to address the mechanisms underlying that bivariate link. Like LCA, techniques like mediation and moderation have allowed the complexity of the research question to be addressed. To incorporate social factors in exploring this link is to complement work which has been done that looks at psychological factors while touching on the role of the environment. Murphy et al. (2013) use mediation to address the link between childhood sexual abuse and the development of psychosis. They use the psychological factor of using avoidance to do this, however they emphasise the close link of avoidance to social withdrawal. Many of the studies reviewed used the psychological factor of attachment to explore the link between trauma or social defeat and the development of psychosis (Pilton et al., 2016; Sheinbaum et al., 2014; Sitko et al., 2014). This thesis nicely presents social factors as a necessary extension and accompaniment to work addressing psychological mechanisms that can feasibly operate along the same pathways. In

reference to the use of mediation which is tied to temporal ordering, this study offered a plausible temporal ordering of variables in the model to allow causality to be addressed with perhaps a note of caution.

The study then expanded to add social isolation to look for moderating effects. Chapter 6 explored the wide range of literature which led to the belief that social isolation has an important role to play in this model. It then operationalised social isolation and applied it to the model in order to appraise its moderating influence.

An area which had seen inconsistency in findings was that of gender. Gender differences do play a role in psychosis in terms of prevalence and incidence rates, age of onset of illness, symptom profile and expression, the course of the condition and outcomes. The role of gender as a moderator in the development of psychosis and PLEs has been the subject of some controversy. Fisher et al. (2009) contended that gender is a moderator in the trauma psychosis relationship. This study found a statistically significant difference in endorsement of both child sexual abuse and child physical abuse between males and females who experience psychosis. Issues of methodology however must be addressed. The study used a sample of participants with psychosis and a control group with no psychosis. Limitations of the study acknowledged that in the sample, there were low rates of males with either psychosis or who endorsed either of the abuses. Shevlin et al. (2015) countered these issues by using a prison sample, and after controlling for covariates, found there was no significant difference in endorsement rates. The present study, as documented in chapter 2 showed that males endorsed physical abuse in higher rates than females did and that females endorsed both molestation and sexual abuse in higher rates than

males. The present study supports all previous research that there are real differences based on gender in endorsement rates of sexual abuse, with women endorsing in greater numbers (Falkenberg & Tracy, 2014). When it came to mediating effects for social support and discrimination, there were no overwhelming overall gender patterns for either males of females, there were some interesting, more subtle differences which were relevant in the area of clinical implications. In terms of the moderating effects which are addressed in chapter 6, there was an overwhelming pattern of more moderated patterns in the female data however this comes with a similar limitation to the Fisher et al. (2009) study. Social isolation as a moderator resulted in the groups of people who were most socially isolated, when interfaced with the groups of people who were most abused or most socially defeated, being very small which had an impact on results.

Despite this issue when it came to interpretation of the moderation results, one of the strengths of this study was that it used a large, population-based sample. Chapter 2 documents the methodological issues that have been associated with the study of trauma, in particular with relevance to estimating prevalence rates. Both Pereda, Guilera, Forns, and Gomez-Benito (2009), and Stoltenborgh, van Ijzendoorn, Euser, and Bakermans-Kranenburg (2011) conducted meta-analyses into childhood abuse and trauma. Both had as inclusion criteria that studies needed to have sufficient data to allow for satisfactory analysis and also that samples used should be non-clinical in nature where higher rates of abuse are likely to be present, as well as typically, more females. Two recent UK studies into trauma have reflected this and have both used general population samples (May-Chahal & Cawson, 2005; Radford, Corral, Bradley, & Fisher, 2013). As the present study was centred on PLEs, a general

population sample was also the most suitable for identifying experiences of psychosis before they reach a clinical level. The symptom clusters used to operationalise PLEs are all based on work that was done using general population-based samples (Ahmed et al., 2013; Fossati et al., 2003). To expand further, the study of social factors makes sense to be embedded in general population-based samples. With social defeat, again there is the use of LCA which necessitates a suitably sized sample. General population samples have been used in a number of studies of experiences of discrimination. Kessler, Mickelson, and Williams (1999) reported that 60.9% of respondents in a US general population sample perceived that they were discriminated against on a daily basis. The percentage who endorsed experiences of discrimination in a study by Janssen et al. (2003) was much lower at 11% of this sample from The Netherlands. This may be reflective of the question used to create discrimination measures. The Kessler et al. (1999) study used a measure which asked about perceived discrimination of any type whereas the Janssen et al. (2003) study asked about perceived discrimination in the context of race, gender, appearance and sexual orientation only. This present study asked about experiences in the past year only and also restricted them to the discrimination on the basis of race, gender, weight or sexual orientation.

For social support again, the benefits of the large population-based sample are linked to methodology in terms of the statistical techniques used and the nature of the question. CFA was used to confirm the presence of the three factors of social support. Again, the larger the sample size, the more integrity the results have. With a general population sample, the more likely the findings are to be representative of the entire population.

The study does not come without limitations. The study used cross-sectional data for mediation and has the issues associated with this. Longitudinal studies are considered ideal when causal references are to be drawn. In fact, several papers have stated that using cross-sectional data for mediation analysis will introduce substantial biased estimates, even in the presence of complete mediation so that even a strong mediator identified in cross-sectional data may not show effects in longitudinal analysis (Maxwell & Cole, 2007; Maxwell, Cole, & Mitchell, 2011). However, Wunsch, Russo, and Mouchart (2010) articulate the case for making causal references in conditions when, as in this thesis, structural modelling has been carefully constructed using cross-sectional data. This requires the combination of the nature of the research question, use of background knowledge and appropriate data, all incorporated in a fully testable, explanatory model. The NESARC dataset has many qualities which make it appropriate for use in this study, the large sample, the fact that it is population based, an appropriate social isolation indicator, detailed variables that map onto the social defeat model used and adequate coverage of all potential moderators and mediators. The way in which questions asked allow for levels to be explored in terms of PLE related experiences and experiences of social isolation. Any drawbacks from the fact that the data is not longitudinal were addressed in the careful construction and testing of the model at each phase. An argument for plausible temporal ordering is given in the temporal ordering section of the introduction to this chapter.

In summary, the predictions of this chapter have been met. Partial mediation did occur between trauma and the PLE symptom clusters in the presence of the mediators. Mediation also occurred between social defeat classes and the PLE

symptom clusters and this involved full mediation for some paths. Social support and discrimination have shown that they are of use in the increasing study of the role of the myriad of social factors that contribute to the aetiology of psychosis. The value of the model is in helping to explore the theoretical, methodological and clinical implications of social factors. In terms of theory, the model findings add weight to the role of cognitive distortions, the role of stress and has common elements with the loneliness loop. In terms of method, the model findings have shown unequivocally the importance of including covariates in mediation models as work in this area gathers pace. In terms of clinical implications, the model findings advocate interventions at both the level of society and the level of the individual. Importantly, the model shows that although there are subtle gender differences, they are not dramatic and have most impact at the level of clinical intervention design and targeting. The next and final step in this research was to explore the role of social isolation on the model. Does social isolation moderate the relationships that have been examined so far?

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Chapter 6

The Moderating Role of Loneliness

Introduction

Social factors have been a central focus of this study. Chapter 2 addressed childhood adversity as a public health problem that exists globally and in all cultures (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002; Pereda, Guilera, Forns & Gomez-Benito, 2009). Chapter 3 addressed how experiencing these traumas in childhood is associated with the development of experiences along the continuum of psychosis (Ashcroft, Kingdon, & Chadwick, 2012; Bendall, Jackson, Hulbert, & McGorry, 2008; Braehler et al., 2013; Gallagher & Jones, 2013; Johnstone, 2009; Read, Perry, Moskowitz, & Connolly, 2001). Chapter 3 also showed that the experiences of trauma in this study were significantly associated with having PLEs. PLEs in this study are grouped according to the symptom clusters of cognitive/perceptual, social/interpersonal and disorganised. Chapter 4 specifically addressed the development of variables centred on social theory, building toward the development of the model at the centre of this study. Social defeat was developed as a second independent variable. Chapter 4 showed that experiences of social defeat in this study were also significantly associated with experiencing PLEs. Social support and discrimination were constructed as mediators. Chapter 5 saw these and covariates brought together to form a latent variable model framework which allowed testing of pathways from the experience of childhood trauma and social defeat to the development of PLEs. The model was tested and showed that social support and discrimination did have a mediating effect on the relationship between both childhood trauma and social defeat and the experience of PLEs. The current chapter

expands to address the role of loneliness. It specifically tests for the moderating effects of loneliness on the existing model.

> ‘Loneliness is a situation experienced by the individual as one where there is an unpleasant or inadmissible lack of certain relationships. This includes situations in which the number of existing relationships is smaller than is considered desirable or admissible, as well as situations where the intimacy one wishes for has not been realized. Thus, loneliness is seen to involve the manner in which the person perceives, experiences, and evaluates his or her isolation and lack of communication with other people’ (de Jong, 1988, p. 73).

This introduction firstly addresses the broad concept of social connectedness. It then looks at different indicators of not being connected, of being socially isolated. It explores the concepts of belongingness, loneliness, social withdrawal, alienation, social avoidance, solitude and social support. These concepts are often used interchangeably and they can be hard to separate. They do however have a common ingredient at their core. Which is that the effect of loneliness, of exclusion, of withdrawal, of whichever indicator of social isolation is used, is determined by an individual’s level of distress at this lack of being connected to other people. This element of distress is of central importance in this study. This introduction then looks at loneliness in terms of its relationship to health and specifically mental health. It addresses the link to non-psychotic disorders and to psychotic disorders. It looks at loneliness in terms of whether it is a cause of or an outcome of psychosis or indeed both. The introduction then looks at common themes that are shared by

indicators of loneliness. Finally, it looks at the issue of loneliness as a moderator by addressing a literature review of such studies. It documents common themes in this particular set of literature in relation to the overarching loneliness literature and discusses points of interest and gaps found in the literature. Predictions for the chapter are then stated.

On Becoming Disconnected

A wide literature exists on the topic of social connectedness. Social connectedness describes a state in which an individual has connections to society, to other people. Bowlby (1988), House, Landis, and Umberson, (1988) and Cacioppo et al., (2000), as well as a host of others speak of the fact that humans are social animals. They have a need for contact with other humans. Contact, being nurtured, and affiliation are central to normal development and a happy life. Baumeister and Leary (1995) discuss this need as being embodied in the belonging hypothesis. They look to John Donne's classic quote that, 'No [person] is an island'. They talk of Maslow's Hierarchy of Needs (Maslow, 1968) and the mid-way placement of love and belonging in this hierarchy. Less important than food and shelter but more necessary than esteem and self-actualisation. They also discuss Bowlby's attachment theory (1969, 1973) in which attachment is primarily with a main caregiver and then replicated in adult relationships. Any sense of not belonging, of becoming disconnected or socially isolated will result in an aversive reaction to its loss.

Loneliness

Weiss (1973, 1974), Baumeister and Leary (1995) and Cacioppo et al. (2000), hypothesise that this aversive response to a loss of connection is a feeling of

loneliness which drives the individual to seek out fulfilment of this need. Weiss (1973, 1974) theorised that there are six basic roles that people seek to have met in their relationships with others:

- attachment, provided by relationships in which the person receives a sense of safety and security;
- social integration, provided by a network of relationships in which individuals share interests and concerns;
- opportunity for nurturance, derived from relationships in which the person feels responsible for the well-being of another;
- reassurance of worth, provided by relationships in which the person's skills and abilities are acknowledged;
- reliable alliance, derived from relationships in which the person can count on assistance under any circumstances;
- guidance, provided by relationships with trustworthy and authoritative individuals who can provide advice and assistance.

Weiss' (1973) typology of loneliness was based on a recognition of the differences between social and emotional loneliness. Social and emotional loneliness are complementary but not interchangeable. Social loneliness is characterised by not being part of a group or groups, by not having extensive networks of people to whom a person belongs or is affiliated with, by the feeling of not having enough connections. It is associated with a sense of non-belonging, aimlessness and boredom. 'Social loneliness is about a lack of social networks' (Qualter, 2003, p.11). Emotional loneliness on the other hand is concerned with the quality as opposed to

the quantity of connections. This is a type of loneliness which indicates a lack of intimacy in the relationships a person does have. It is associated with a sense of emptiness and anxiety. ‘Emotional loneliness is about a lack of attachment and this can be either felt or real’ (Qualter, 2003, p.11).

Heinrich and Gullone (2006) further assert that a person cannot switch people between their roles to meet needs that may be in deficit. A person, for example, who provides guidance will not also provide an opportunity to nurture another. One of these could be a teacher or confidant while the other is more likely to be a child or romantic partner. In addition, a person can have many connections and so is not experiencing social loneliness, but may feel they do lack anyone with whom they can share and unburden themselves. Social contact alone will not provide the intimacy needed for emotional connection, there is a need for quality as well as quantity (Weiss, 1973, 1974). Conversely a person may have few connections, may seem objectively to be isolated, but does not feel lonely, there is no subjective evaluation of loneliness. At the fundamental core of loneliness, possibly its most defining feature, is that is contains the element of distress (Hawkley & Cacioppo, 2010; Hawkley, Hughes & Waite, 2008; Peplau & Perlman, 1982; Pinquart & Sorenson, 2001). It is undesired. It has been described by Weiss (1973, p.15) as, ‘a gnawing chronic disease without redeeming features’.

Baumeister and Leary (1995) discuss the difference between the concepts of ‘needs’ and ‘wants’ in relation to loneliness. A ‘want’ is a desire, something which if not provided will lead to temporary distress and may affect a person’s mood in the short term. Loneliness however is related to a basic human ‘need’ to belong. In the case of

a ‘need’ this is a necessity, and the lack of it will have pathological consequences. As a fundamental ‘need’, the lack of it will drive thoughts, emotions and behaviours towards others. Baumeister and Tice (1990) assert that the feeling of loneliness as a reaction to loss of that fundamental ‘need’ to belong, will prompt a cognitive reassessment of current situations and events, as a driver to protect that need. Schnittger, Wherton, Prendergast, and Lawlor (2012) discuss that because of these core differences, the two types of loneliness, social and emotional have different sets of risk factors with some that overlap. Emotional loneliness is subject to risk factors such as being widowed, becoming separated or divorced, living in a rural setting or caring for a spouse or relative. Living in a rural setting is also a risk factor for social loneliness along with being older, falling into poor health and having a lack of contact with friends.

The work of Cacioppo on loneliness is extensive. Cacioppo explores concepts from the reasons for loneliness from an evolutionary perspective (Cacioppo et al., 2006a), to the underlying mechanisms which then link loneliness to health issues (Cacioppo & Hawkley, 2003; Cacioppo et al., 2002b). The work of Cacioppo addresses the effects of loneliness at the level of cognitions (Cacioppo & Hawkley, 2009) as well as issues on ideas such as how it can impact sleep (Cacioppo et al., 2002a). Cacioppo’s work addresses health links to specific conditions such as depression and anxiety (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006b). Cacioppo has also framed loneliness within a number of theories which include an enduring concept seen throughout this review, that of the loneliness loop (Cacioppo & Hawkley, 2009; Hawkley & Cacioppo, 2010) which is expanded in the section of this introduction on social isolation and mental health.

Prevalence of Loneliness

> 'Loneliness is a universal experience that does not respect the boundaries of age, gender, race, marital or socio-economic status' (Rokach & Sha'ked, 2013, p.89).

The experience of loneliness is widespread. Loneliness, like many of the indicators of social isolation, has been found to be a stable trait which, if it begins in early childhood will carry through into adulthood (Bartels, Cacioppo, Hudziak, & Boomsa, 2008; Hawkley & Cacioppo, 2007). The loneliest groups with respect to lifespan are reported as being children and young people and older adults. This reflects both the stability of the trait and especially vulnerable sections of the population. If a child misses out on social interactions and learning as a child, the impact of this solid base in social skills will be felt throughout the lifespan (Asendorpf, 1990) with particular risk at times of vulnerability. Social skills which are learned in childhood include communication, conflict management and resolution, reciprocity, friendship and normative behaviours (Boivin, Hymel, & Bukowski, 1995). Outside of the old and the young, loneliness can affect people at any time, with some groups being more susceptible such those who are disabled and those who live in a rural setting (Meltzer et al., 2013). Up to 80% of those under 18 years old and 40% of those over 65, report being lonely at least some of the time (Berguno, Leroux, McAinsh, & Shaikh, 2004; Pinquart & Sorensen, 2001; Weeks, 1994). Hawkley and Cacioppo (2010) report that for 15-30% of the population loneliness becomes chronic.

Why Does Loneliness Happen?

The reasons that humans react adversely to being disconnected, the reasons they are socially driven creatures may be, as previously stated, evolutionary (Baumeister & Leary, 1995; Cacioppo & Hawkley, 2003; Cacioppo & Hawkley, 2009). Having contact with other humans had reproductive and survival benefits. The sharing of resources such as food, mates and caring for children could happen through being socially connected (Hawkley & Cacioppo, 2010; Wilson, 2007). Although humans may no longer need the same types of resources for survival as early man, there is still much to be gained for contemporary man by being connected. Hawkley, Browne, and Cacioppo (2005) affirm that the survival of the human species depends in fact, on this social ability to connect, communicate and work together with other humans. In these modern times, things to be gained by being connected, include the provision of information for development and advice which may be needed, help in a major crisis and a normative influence on health behaviours (McPherson, Smith-Lovin, & Brashears, 2006). Cacioppo and Hawkley (2003) echo this theory and point to the benefits of being socially connected in terms of health behaviours. The exposure to stronger normative pressure from friends and family is discussed as being important for exhibiting more positive health behaviours and it is important in accessing healthcare when there are signs that there is a problem. These links to health behaviours are discussed in depth later in this introduction when mechanisms linking social isolation and health are explored.

The Subject of Social Withdrawal

So, if the need to be connected is inherent in humans, why would an individual withdraw? Social withdrawal reflects loneliness as it is also a stable trait which

begins in childhood and, without intervention, tends to worsen going into adulthood (Rubin, 1993). It becomes very clear early in any review of the literature that the level of inter connectedness between these concepts is high. They have overlaps but also subtle and important differences. In terms of attachment theory, withdrawal is linked to an insecure ambivalent attachment style. This again raises the theme of conditions in childhood creating or cementing vulnerabilities which persist through the lifespan. The opinion of which parenting style is linked to social withdrawal has undergone a major shift in the literature. Initially social withdrawal was linked to an authoritarian parenting style. That has however been rejected to refocus on the parent who is overprotective and intrusive. This results in the inhibition of the development of problem solving and coping strategies in children who are shy and inhibited creating a fearful reaction to the anticipation of social interaction. The fearful reaction which underpins social withdrawal in infancy and toddlerhood is believed to be linked to excitability of the amygdala (Rubin & Coplan, 2004), which influences the hypothalamic pituitary adrenal (HPA). This identifies another common theme which runs through the literature reviewed for this thesis. As previous chapters have covered, the role of the HPA is central to this study. Changes to the HPA axis are central to the theory that links childhood trauma and adversity to the development of PLEs covered in chapter 3. Again, in chapter 4, changes to the function of the HPA axis are implicated in chronic experiences of social defeat and to experiences of discrimination.

Prior to the 1980s research on social interactions in childhood placed its emphasis on the child who was noticed. The child who displayed externalising behaviours or ‘under control’ psychological issues while socially interacting outside of the home

(Mash & Barkley, 2003). These children were salient as they caused disruption in classrooms which were the main context in which children's social interactions were studied. This however was to the detriment of the quiet child who played alone and worked quietly alone at their desk. Quietly failing to develop social and cognitive skills that result from peer interaction. Quietly starting along a trajectory which put them at increased risk of a range of negative outcomes across their lifespan (Rubin & Coplan, 2004). Little wonder that Galanaki and Vassilopoulou (2007, p.461) refer to these children as 'invisible children'. These negative outcomes include anxiety, depression, low self-worth, peer rejection, school refusal and social isolation. Isolated children can be hard to identify in part because they may not complain due to the stigma that comes with loneliness, they may actively deny their lonely state and try to cover it (Galanaki & Vassilopoulou, 2007). Stigma is another recurring theme in an exploration of the isolation literature (Fromm-Reichmann, 1990; Galanaki & Vassilopoulou, 2007; Sullivan, 1953; Weiss, 1973). It is not restricted to children and is often a barrier in conducting research in the area. It is embodied by, 'the human tendency to avoid thinking about loneliness and the defensive attitude toward admitting the experience' (Galanaki & Vassilopoulou, 2007, p.462).

Isolation in children can be categorised into two types. (Rubin, 1982). Active isolation occurs when peers do not want to play with a child. This may happen as a result of a child exhibiting those externalising behaviours already discussed, like aggression which is responded to by peers with exclusion of the child. The child becomes alienated.

Alienation

Alienation is a concept rooted in sociology (Dean, 1961; Seeman, 1959) and which has a long history of being studied. Both Dean (1961) and Seeman (1959) describe it as having several meanings and as being closely related to Durkheim's concept of 'anomie' (Durkheim, 1951). Anomie describes a theory based on the breakdown of normal societal rules. Dean (1961) reports social isolation as being one definition of alienation along with powerlessness and normlessness. Seeman (1959) also included meaninglessness and self-estrangement as definitions of alienation. Alienation reflects an undesirable state. It presents a view of an unattached individual who has been rejected by their peers. Alienation suggests a high degree of separation and a low degree of engagement. The most extreme form of peer rejection, associated with the highest levels of loneliness is victimisation (Galanki & Vassilopoulou, 2007). Rejection by peers is a state which is very salient, possibly as children are so aware of these consequence, the group exclusion, negative behaviour from peers, the accumulation of negative information from a group of many peers and usually for a long time (Galanki & Vassilopoulou, 2007). This will then have an impact on trust and feelings of security, which in turn will increase withdrawal and reinforce loneliness. The first indications of a loneliness loop (Cacioppo & Hawkley, 2009; Hawkley & Cacioppo, 2010).

The second kind of isolation in children, is passive rather than active withdrawal where the child isolates themselves from their peer group. This happens as a result of consistent solitary behaviour while in the presence of peers. Passive withdrawal can be further subdivided into anxious withdrawal and non-fearful withdrawal. Anxious

withdrawal occurs when a child is fearful of social interactions (Gazelle & Ladd, 2003) and begins to avoid them.

Avoidance

Developmentally, Asendorpf (1990) posits that each child will experience an avoid-approach conflict as they learn to interact socially. Avoidance is characterised by behaviours such as gaze aversion, the direct opposite of approach behaviours such as smiling. Some children may get caught in this conflict. They have a desire to approach but their fear means that the motivation to avoid is stronger. Non-fearful isolation occurs when a child has no strong desire to play with others even though they are not averse to peer interaction (Coplan, Prakash, O'Neil, & Armer, 2004). This type of social disinterest or unsociability usually proceeds into adulthood as solitropic orientation (Leary, Herbst, & McCrary, 2003). This reflects a need for solitude.

Solitude

Solitude differs from loneliness as it can be sought out and desired by an individual and does not necessarily result in loneliness (Hawkley & Cacioppo, 2010). Tillich (1959) asserted that solitude reflects the glory of being alone while loneliness reflects the pain. Qualter (2003, p.11) asserts that, ‘the number of friends you have is not synonymous with how lonely you feel’. Again, there is this subjective element to an assessment of how someone feels. If an individual has objectively few friends but they are not distressed by that then they are not subjectively lonely.

On Becoming Older

For the second high-risk group, older adults, a range of issues can lead to loneliness increasing even for those who may not have been previously isolated. These can include changes in work and family roles (Wenger & Burholt, 2004), living alone (Berkman, 2000), living in unsafe neighbourhoods (Ross & Jang, 2000), and being affected by age related illness (Havens & Hall, 2001). There are certain health issues which increase within this group that can affect social relationships as they interfere with the ability to maintain them. These include issues such as hearing loss, impaired vision (Heine, Erber, Osbon, & Browning, 2002; Nicholson, 2012), or urinary incontinence (Fultz & Herzog, 2001). The effects of becoming isolated for older adults have been reported as increasing negative health behaviours such as drinking (Hanson, 1994), smoking and leading a sedentary lifestyle (Eng, Rimm, Fitzmaurice, & Kawachi, 2002), poor nutrition (Locher et al., 2005) and cognitive decline (Béland, Zunzunegui, Alvarado, Otero, & del Ser, 2005). From a positive perspective, being socially connected for this age group can lead to a range of benefits such as encouragement to adhere to medical regimes (Berkman, 2000), protection against dementia (Fratiglioni, Paillard-Borg, & Winblad, 2004) and even mortality (Giles, Glonek, Luszcz, & Andrews, 2005).

Social Support

Social support has been described as the antithesis of loneliness (Victor, Scambler, Bond, & Bowling, 2000). It is the response to the human requirement for connection. Chapter 4 addressed social support in greater detail as one of the mediators for the model upon which this thesis is based. Social support is a form of social capital and it describes the resources provided by the network of relationships around an

individual (Heaney & Isreal, 2008). It allows for the development of self-esteem and provides buffering against the effects of stressors and trauma (Brugha, 2010; Gayer-Anderson & Morgan, 2013). Social support provides its benefits in terms of quality rather than quantity. Even the presence of one strong, intimate relationship has been shown to be an important predictor of good health (Michael, Colditz, Coakley, & Kawachi, 1999). Again, with social support there is this issue of the central role of perception. The value of social support is dependent on how the person views the support offered to them. Although support offered may be intended to be helpful, it may not be experienced as such. It is this perception rather than the behaviours during the interactions that link social support to health and wellbeing outcomes (Wethington & Kessler, 1986).

On Loneliness as Part of the Human Condition

What becomes clear on addressing the literature on social isolation is that to a certain degree, being lonely is part of the human condition (Heinrich & Gullone, 2006). Young (1982) describes a number of different types of lonely states. Transient loneliness is brief and occasional. This is loneliness which is experienced from time to time by most people. This loneliness arises from environmental or situational factors (Galanaki & Vassilopoulou, 2007), and is referred to as state loneliness (Jones, 1987). Those who experience state loneliness tend to make internal and situational attributions for the reasons for their lonely state and they prefer to adopt more active coping skills (Shaver, Furman, & Buhrmester, 1985). Situational loneliness can happen to those who have previously had satisfying relationships, who have developed social skills in childhood and enjoyed satisfying social and emotional relationships. Perhaps due to one of the many risk factors previously

mentioned, loss of a spouse, moving to a rural setting, loss of a job, they now find themselves in light of a crisis, with disrupted relationships. This type of loneliness can begin as state loneliness but has the potential to become long term. This is where real issue is. When loneliness becomes chronic, or trait loneliness. Trait loneliness is an enduring part of a person's personality and behaviour patterns (Galanaki & Vassilopoulou, 2007). In this case, people tend to make external, uncontrollable and stable attributions for the reasons for their loneliness and coping skills become more passive (Shaver et al., 1985). When there has been disruption and dissatisfaction in relationships with others which last for a long time then the risk of health consequences become possible.

Loneliness and Psychopathology

Hawkley and Cacioppo (2010) report that when perceived social isolation becomes chronic and is associated with that element of distress, it has potential consequences for cognition, emotion, behaviour and health. Anecdotal accounts of what happens when people are isolated to an extreme level are a vivid way of illustrating what that experience is like whether it is voluntary or not. Accounts of being held in solitary confinement for two years as a prisoner of war are recounted by US senator John McCain (Bond, 2014, para.25),

> 'It's an awful thing solitary. It crushes your spirit and weakens your resistance more effectively than any other form of mistreatment. The onset of despair is immediate, and it is a formidable foe'.

The effects were seen to be potentially even more devastating for Sarah Shourd who was totally unprepared for the experience of being taken prisoner when she wandered onto the Iran – Iraqi border while hiking with friends. They were accused of being spies and Sarah sent 10,000 hours in solitary confinement with little human contact.

> ‘At one point I heard someone screaming, and it wasn’t until I felt the hands of one of the friendlier guards on my face, that I realised the screams were my own’ (Bond, 2014, para. 3).

The full accounts of both people describe the experiences of despair, anxiety, high levels of emotion, and both visual and auditory hallucinations. This experience of hallucinations is also present in accounts from those who voluntarily entered situations which would virtually guarantee total isolation. These include solo explorers, mountaineers, transatlantic rowers. Maurizio Montalbini was a sociologist and caving enthusiast who spend 366 days in an underground cavern in Italy. The space was designed by NASA to simulate space missions. One of the strongest effects was the change in the sleep-wake cycle which was so strong that Montalbini was convinced he had spent only 219 days in the isolated space, having shifted to a pattern of 36 hours activity and 12 hours sleep. Again, he recounted experiences of hallucinations which are echoed in the testimony of Alan Kay who spent 56 days exploring the Canadian wilderness (Diab, 2016) as part of a competition run by the History channel,

> ‘When I heard seagulls, they sounded to me like my children when they are discontent. When I heard ducks, they sounded like old men arguing with

> each other. You start to see human characteristics superimposed on the vocalisations of these animals' (para. 11).

These are of course extreme examples under particular conditions. They do however illustrate the power of being isolated which occurs at different levels along a continuum. Several potential mechanisms have been proposed to explain this link between feeling socially isolated and poor health outcomes. The most commonly reviewed of these are,

- health behaviours,
- stress,
- repair and maintenance.

Cacioppo and Hawkley (2003) examined evidence for each of these and found that both stress and repair and maintenance had validity while studies involving the link to health behaviours had more conflicting outcomes.

The Link with Health Behaviours

The link between loneliness, health behaviours and health is encapsulated by the social control hypothesis (Umberson, 1987). Social control theory asserts that people who are more socially connected will feel obligations to, and are influenced by more normative pressures from that social network. This leads them to exhibit more healthy behaviours and to access health care when needed (Cacioppo & Hawkley, 2003; McPherson, Smith-Lovin, & Brashears, 2006). Cohen (2002) also highlights this idea that more social ties means more access to information and

advice. Not unlike the role of the informational factor identified by House (1981) and comparable to the advice factor identified in the factor analysis of social support in chapter 5 of this document. However, in two studies documented in Cacioppo et al. (2002a) this was found not to be the case. The studies used two of the groups more at risk of social isolation, a group of young adults and a group of older adults. The groups were surveyed in terms of loneliness and health behaviours. In both, people who scored higher on the UCLA loneliness scale were found to have comparable habits in terms of exercise, tobacco use, caffeine use, medical compliance, use of seat belts and in the case of young adults, used slightly less alcohol. The UCLA Loneliness scale (Russell, Peplau, & Cutrona, 1980) will be described here as it is referred to throughout this chapter. The scale contains twenty items. None of the items refer specifically to loneliness thereby reducing as much as possible bias in answers due to stigma around being lonely. Instead it measures trait or general feelings of social isolation and dissatisfaction with one's social interactions. Ten of the items are worded positively and ten are worded negatively. Participants are asked to respond against a four-point Likert scale.

Findings in this area linking loneliness and health behaviours have been conflicting as can be seen in other studies reported on by Berkman and Glass (2000). The Almeda county study found that those who were more socially integrated were less likely to report a range of health-risk behaviours. A range of longitudinal studies on the Framingham offspring cohort also found that being socially connected was associated with positive health behaviours. These included smoking cessation (Christakis & Fowler, 2008) and abstaining from alcohol (Rosenquist, Murabito, Fowler, & Christakis, 2010). Again, other studies show that those who are socially

isolated show a decrease in physical activity over time (Hawkley, Thisted, & Cacioppo, 2009) which may be part of the reason that being socially isolated is a risk factor for obesity (Lauder, Mummery, Jones, & Caperchione, 2006). They are also shown to have a greater risk of self-medicating with alcohol (Akerlind & Hornquist, 1992). Cacioppo, Hawkley, Norman, and Berston (2011) hold the position that the social control hypothesis offers part of the link but is insufficient in explaining the link in full between social isolation and health issues. It does not explain the full impact of social isolation on humans (Hawkley et al., 2009; Seeman, 2000), or the physiological effects of isolation seen in animal studies. These range from the observation of the stress response in rats (Dronjak, Gavrilović, Filipović, & Radica, 2004) to rises in cortisol seen in squirrels (Lyons, Ha, & Levine, 1995).

The Link with Stress

Stress is also studied by Cacioppo and Hawkley (2003) and it is linked to health in several ways. Increased stress can produce a range of unfavourable responses such as obscuring symptom profiles, increasing delays in accessing help, decreasing medical compliance, increasing the self-medication of stress symptoms using tobacco, alcohol and drugs, and diminishing healthy behaviours such as eating and sleeping well (Institute of Medicine, 2001). Cacioppo and Hawkley (2003) review three theories on why stress is linked to loneliness. The first proposed theory links to attachment theory as previously discussed and is that stress is created through insecure attachment and results in increased sensitisation of the HPA axis. Cacioppo and Hawkley (2003) in reviewing theories around stress and social isolation again link events in childhood to more frequent activation of the HPA axis, a distortion in the sensitivity of the stress response. The second theory is that the loneliness itself is

the stressor that results in the over sensitisation of the HPA axis and the disproportionate activation of the stress response. The potency of the emotions felt when a person perceives themselves to lonely, to not belong, to be excluded, led to negative effect and feelings of low self-worth, so strong is the need to belong. The third theory is that of stress-buffering. The stressors come along, they manifest in several ways and what is important is the resources we have to be resilient against them. A central resource at the centre of the stress-buffering response is other people. People who can offer advice, assistance, support, comfort and relief (Cohen & Wills, 1985). If an individual does not have that resource, the HPA axis will be activated and stress is the result with all its negative associations.

Perception

Again, the recurring theme of perception is strong in the reviews of theories linking loneliness, stress and health. In terms of everyday stressors an interesting study by Hawkley, Burleson, Berntson, and Cacioppo (2003), showed that participants faced similar stressors as they went about their daily life. These were ordinary issues such as traffic congestion, kids being sick, technology failures and interpersonal conflict. Participants were beeped randomly during the day and asked to record what they were doing and how they felt about it. Participants were categorised as being top, middle or bottom ranking on the UCLA loneliness scale. The participants all faced similar numbers of every stressors, what was different was how they felt about them. Those who felt the most socially isolated felt the stressor to be more severe. An important aspect of this study in relation to the stress buffering hypothesis was that it did not matter if others were present when the stressors occurred. The study

suggested that the difference may lie in the differences in coping skills in response to the stressors.

Coping Mechanisms

Coping mechanisms can be categorised as being active or passive. Active coping skills tended to be displayed by those who did not view themselves as lonely. Passive coping skills were linked to those who viewed themselves as more socially isolated. Active coping skills centre on problem solving while passive coping skills centre on withdrawing from the source of stress and disengaging. Heinrich and Gullone (2006) illustrate the difference in actions that will be used by those who adopt active versus passive coping skills. In response to feelings of loneliness, those who adopt active coping skills might decide to study, work, write, listen to music, exercise, take up a new hobby, go to the movies. They might call a friend or go and visit someone. Those with passive coping skills are more likely to respond to those same feelings of loneliness by crying, sleeping, ruminating over how they feel, over eating or self-medicating with drugs or alcohol.

The Link with Repair and Maintenance

The third mechanism proposed to look at the link between loneliness and health is repair and maintenance. Sleep deprivation has been linked to physical health issues such as compromised cardiovascular functioning, inflammation, metabolic risk factors (Mullington, Haack, Toth, Serrador, & Meier-Ewert, 2009), hypertension (Gangwisch et al., 2006), incident coronary artery calcification (Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002) and mortality (Hawkley & Cacioppo, 2010). In addition to these, sleep is related to restoration and to countering the effects of stress.

Stress will affect several of the bodies processes designed to repair and maintain homeostatic function. The processes involved are metabolic, hormonal and neural regulation. Cacioppo et al. (2002a) highlighted this issue using a sleep study of a group of young adults. Those who measured higher in loneliness using the UCLA scale had less efficient sleep, and wake time after sleep onset was higher for them than for those lower in loneliness. This was although the total sleep time did not differ across the groups who were low, medium or high in terms of social isolation. The participants were also asked to self-report about their sleep experiences using the Pittsburgh Sleep Quality Inventory (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Those higher in loneliness reported poorer quality sleep, longer sleep latency, longer perceived sleep duration and greater daytime dysfunction due to sleepiness, than the more connected participants.

Loneliness and Wellbeing

Loneliness, as touched on continuously during this introduction, has been linked to wellbeing (Cacioppo & Hawkley, 2003; Cacioppo et al., 2002b; Hawkley & Cacioppo, 2003; Shankar, McMunn, Banks, & Steptoe, 2011). Adults who perceive themselves to be lonely show increases in anxiety, low mood, and feelings of dejection hostility, fear and perceived stress. In conjunction with that, these individuals report a decrease in optimism, happiness and life satisfaction (Cacioppo & Hawkley, 2003).

Loneliness and Physical health

Physical health issues which have been studied in the context of proposed links to social isolation include heart conditions, stroke, cancer and diabetes (Cacioppo &

Hawkley, 2003) and immune functioning (Hawkley & Cacioppo, 2010). Adults who feel they are lonely are more likely to be hospitalised (Hastings et al., 2008), more likely to have issues related to blood pressure (Cacioppo & Hawkley, 2003; Grant, Hamer, & Steptoe, 2009) and being lonely is linked to increased risk of mortality (Berkman et al., 2004; Holt-Lunstad, Smith, & Layton, 2010; Patterson & Veenstra, 2010; Shiovitz-Ezra & Ayalon, 2010).

Loneliness and Mental Health

Loneliness has been linked to mental health in both non-psychotic and psychotic mental disorders. 'Loneliness is a significant, multi-faceted phenomenon which has significant implications for mental health' (Heinrich & Gullone, 2006, P.704). Cacioppo and Hawkley (2009) as well as Hawkley and Cacioppo (2010) suggest the loneliness loop to explain this link between loneliness and mental health issues. The loneliness loop is a self- reinforcing cycle which is triggered by feeling unsafe because of social isolation which is unwanted and perceived as negative. It creates a reaction of hypervigilance as the individual constantly assesses their environment for threats. This in turn creates a cognitive bias compared to individuals who are not socially isolated and not threat sensitive. Because of this bias the world is seen as a more threatening place with expectations of negative social interactions and with salience given to negative events. This then impacts the behaviour of the socially isolated person as they create even more distance from those around them. This negative loop is accompanied by feelings such as hostility, pessimism and anxiety which all create stress. The loneliness loop and its ties to hypervigilance to threat are of interest in this study in other aspects. Hypervigilance to threat is one of the main diagnostic symptom clusters for post-traumatic stress disorder (PTSD) and has been

linked to the possible emergence of psychotic symptoms (Mueser, Rosenberg, Goodman, & Trumbetta, 2002). Childhood trauma is one potential pathway to the development of PTSD and leads to feelings of not being safe. Compounded by further negative experiences in terms of social factors, and further compounded by the effects of loneliness, it is feasible that this loop could be in operation in the model presented in this thesis.

Loneliness and Non-Psychotic Disorders

A range of non-psychotic disorders have been studied in relation to loneliness. Meltzer at al. (2013) in a study using the third Adult Psychiatric Morbidity Survey (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009), found that loneliness was related to six common mental health disorders – generalised anxiety disorder, depression, obsessive-compulsive disorder, phobia, panic disorder and mixed anxiety and depressive disorder with the strongest odds ratios being reported for depression, phobia and obsessive-compulsive disorder. The study also showed that there was a strong possibility of co-occurring disorders. Heinrich and Gullone (2006) mainly focused on adolescents in a review of the literature on loneliness and psychopathology, although it also reports on some of the literature between loneliness and depression in adults (Anderson & Arnoult, 1985; Jackson & Cochran, 1991; Nolen-Hoeksema & Ahrens, 2002). Lasgaard et al. (2011) also focused on adolescents and the impact of loneliness in terms of psychopathology. This study used a Danish national study of high school students with an average age of 17.11 (SD = 1.11) years and looked at associations with depression, anxiety, social phobia and suicidal ideation. The study subdivided loneliness into peer-related loneliness, family-related loneliness and romantic loneliness. All three measures significantly

predicted all four psychopathologies with some differences in strength of effect size. For example, family-related loneliness was a stronger predictor than peer-related loneliness of suicidal ideation. It is interesting to note that different kinds of loneliness, like different levels of loneliness can predict different outcomes in terms of effect size.

This link with depression is commonly researched in the literature (Cacioppo et al., 2006b; Heritage, Wilkinson, Grimaud, & Pickett, 2008; Meltzer et al., 2013). Heinrich and Gullone (2006) also report the link with anxiety (Mijuskovic, 1986) and in particular social anxiety (Anderson & Harvey, 1988). Again, this link with anxiety is reported often in the literature (Hawkley & Cacioppo, 2010; Shevlin, McElroy, & Murphy, 2015a). Other psychopathologies studied in terms of social isolation include personality disorders, obsessive compulsive disorder, phobia, panic disorder and PTSD (Cacioppo et al., 2006b; Lasgaard, Goossens, Bramsen, Trillingsgaard, & Elkit, 2011; Meltzer et al., 2013; Solomon, Waysman, & Mikulineer, 1990).

Loneliness and Psychotic Disorders

Turning towards psychotic illnesses, there is evidence in the literature to show that loneliness comes as a result of the development of psychotic symptoms (Alptekin et al., 2005; Favrod, Grassat, Spreng, Grossenbacher, & Hode, 2004; Roth, Flashman, Saykin, McAllister, & Vidaver, 2004). However more recently interest has turned to identifying if loneliness may exist before and contribute to the onset of psychotic experiences (Hafner, Loffler, Maurer, Hambrecht, & an der Hieden, 1999; Hoffman, Varanko, Gilmore, & Mishara, 2008; Kwapil, 1998; Tan & Ang, 2001; van Os,

Driessen, Gunther, & Delespaul, 2000). Theories such as the social deafferentation hypothesis have begun to challenge the assumption that loneliness comes only after the onset of symptoms and address it beyond even as a risk factor, to being a core condition for the creation of psychotic symptomology (Hoffman, 2007).

This theory links feelings of loneliness and the development of psychotic symptoms. It states that the same process which leads to patient experiences of having sensations in limbs that have been removed, works on the social brain. The social brain, in the absence of meaningful social connection will reorganise to produce social meaning, relevant to the person. In the case of psychotic symptoms, the social meaning will be in the form of hallucinations or delusions which fill the void left by the removal of social interactions. The observation that social isolation can precede onset of symptoms is a core observation of this hypothesis. Kwapil (1998), van Os et al., (2000), Tan and Ang (2001), Hafner et al. (1999) and Hoffman et al. (2008), all found evidence that social isolation can predict the development of psychosis as opposed to being created as a result of psychotic symptoms. Also linking psychosis to this socially based theory is the observation that hallucinations and delusions tend to produce content which has social meaning to the person (Hoffman, Oates, Hafner, Hustig, & McGlashan, 1994; Leudar, Thomas, McNally, & Glinski, 1997; Nayani & David, 1996). The anecdotal evidence explored previously in this chapter certainly provides support for this hypothesis. Hallucinations were reported in all accounts, hallucinations that were most definitely as a result of the isolation endured by individuals such as Sarah Shourd (Bond, 2014), or Alan Kay (Diab, 2016) as opposed to happening before the isolation. Alan Kay specifically describes his

hallucinations as being socially meaningful to him when he recounts how seagulls were to him the sound of his children.

Phase *5*

Phase 5 of this study asks if loneliness moderates the relationships explored in the model in phases 1 – 4. This section addresses studies which look at this question over a range of different topics. The studies are divided initially in terms of the nature of health relationship at the centre of the study, physical, psychological or specifically, psychosis. They are then further divided by the type of sample which was used in the study. The studies are explored in terms of a number of criteria which are relevant to phase 5 of the thesis.

- The relationship being explored.
- Sample type and size – was a general population study used, was a high-risk sample used, was a control group used?
- The measure of loneliness that was used in the study.
- The theory that was central to the paper in terms of loneliness.
- Was moderation found?
- Did the study assess the role of gender?
- Clinical implications which were addressed.

Physical Health

Experimental Study

The first study in this review addressed physical health. It looked at the relationship between oxytocin and cardiac autonomic control in humans and whether or not this

relationship was moderated by loneliness (Norman et al., 2011a). This study used an experimental design of healthy, university aged participants which was made up of 20 males and 20 females. The measure of loneliness used was the UCLA loneliness scale. The theory central to this experiment is interestingly tied to several of the central themes of this thesis. That of the role of social support, and the role of stress. Oxytocin is a hormone and neurotransmitter that is released during social interaction and contact (Grewen, Girdler, Amico, & Light, 2005). It has receptors in the parts of the brain that are associated with social interaction, emotional processing and response to stress (Loup, Tribollet, Dubois-Dauphin, & Dreifuss, 1991). It is implicated in a range of social processes and is believed to promote encoding of social memories (Guastella, Carson, Dadds, Mitchell, & Cox, 2009), facilitate positive communication (Gouin et al. 2010), reduce psychological arousal to social threat (Norman et al., 2011b) and to interact with social support to decrease physiological reaction to threat (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003). The study points to work done with rodents (Grippo, Lamb, Carter, & Porges, 2007) to show that social isolation may also influence control of the heart. Socially isolated rats display increased cardiac control which has been seen to play a mediating role in the interplay between chronic stress and health outcomes in primates (Manuck, Kaplan, Adams, & Clarkson, 1988) as well as being a risk factor for increased mortality in humans (Airaksinen, 1999). This study specifically discusses how early life adverse experiences modify the oxytocin response to social stress (Meinlschmidt & Heim, 2007). This study looked at how loneliness affected reactivity to oxytocin and found that higher levels of loneliness were associated with decreased reactivity to oxytocin. The study found that there were no gender

differences. It did not report on clinical implications as it was a study focused on physical as opposed to psychological interventions.

Convenience Sample

The second study which addressed the moderating role of loneliness to a physical health issue used a university sample (Doane & Thurston, 2014). In this case the relationship being studied was between daily stress levels and sleep quality. In the previous section on the links between social isolation and wellbeing, one of the underlying mechanisms was of course this link to repair and maintenance. Sleep is related to restoration and allows the body to counter the effects of stress, another recurring theme in this thesis and another link between social isolation and health. In this study 78 participants were recruited as part of a longitudinal study of transition from second level to third level education at a large US university. They were contacted through the psychology department. They were aged 17-18 years (M = 18.05, SD = .41) and were mostly female. The revised UCLA loneliness scale was used to measure loneliness. Participants were asked to keep daily reports of stressful experiences and the effect they had on them. They were asked to record experiences at five points throughout the day. Sleep measurement was done using an actigraph which was a central element of the study as it created an objective measurement of sleep. The central theory driving the study was around the evidence that adolescents do not get enough sleep (National Sleep Foundation, 2011), and that this has been linked to poor health outcomes in terms of obesity (Gupta, Mueller, Chan, & Meininger, 2002), risk for suicide (Liu, 2004), anxiety and depression (Alfano, Zakem, Costa, Taylor, & Weems, 2009), reduced academic performance (Wolfson &

Carskadon, 2003), increased stress levels and negative mood (Lund, Reider, Whiting, & Prichard, 2010).

This study wanted to explore the influence of stress on sleep and also wanted to see if those who were more lonely were different in this respect to those who were less lonely. The study found that they were different. They were not however different in the number of or the nature of stressor that they experienced throughout the day. Interestingly, and in conflict with other research in this area (Hawkley et al., 2003), those who reported being more lonely did not report events as being more stressful than those who were not lonely. They did however experience shorter sleep durations and sleep latencies after stressful days compared to those who were not lonely. This led the authors to conclude that the difference may be in the coping strategies that were employed by the lonely versus the non-lonely and how they then impact on sleep patterns. Again, we see a link back to the mechanisms proposed for the link between social isolation and health. The section on the link with stress has covered the role of coping mechanisms which feature repeatedly in this literature. No gender differences were reported, the sample was mostly female so did not lend itself to a study of gender differences. Clinical implications were centred on the use of both stress management techniques and effective sleep strategies, and in the usefulness of targeting lonely populations with both.

General Population

The last of the studies in this section which address physical issues when addressing the moderating role of loneliness looks again at sleep disturbance. This study focused on loneliness moderating the relationship between sleep disturbance and risk

of inflammation (Cho, Seeman, Kiefe, Lauderdale, & Irwin, 2015). This study used a population based, longitudinal study of 2962 participants. The participants were aged between 18 and 30 at inception of the study. The measurement of loneliness was a twelve-item composite questionnaire which used four ratings of emotional support, four of negative support and four of loneliness. The theory behind the study was based on solid evidence that there is a relationship between sleep disturbance and inflammation (Irwin et al., 2004) but studies had concentrated on clinical populations or cross-sectional studies. The study wished to address the large literature linking loneliness and physical health to see if it influenced this particular issue. They found that loneliness did moderate the relationship. Sleep disturbance was associated with heightened systemic inflammation in the general population over a five year follow up period and this was stronger in those who reported higher ratings of loneliness. The aspect of social isolation which was having the effect was subjective rather than objective. The size of an individual's social network did not moderate the outcome, only the subjective reporting of feeling lonely. Gender findings were not reported. Clinical interventions were again based on physical outcomes and were around the teaching of effective sleep techniques in those who feel socially isolated.

Psychological Health

The next section of this review moves into studies which address psychological as opposed to physical issues. Again, they are broken down for review purposes by the type of sample which was used. There are two aspects which are striking in the studies identified which look at psychological processes. The first is that many of them use university samples and the second is that none of them use general population samples.

Convenience Samples

The first study in this section looks at the role of loneliness as a moderator between trauma and posttraumatic growth (Zeligman, Bialo, Brack, & Kearney, 2017). Trauma was not restricted to childhood and addressed the number of trauma symptoms a participant was experiencing and how often they were being reported. Posttraumatic growth is the phenomenon of the aftermath of trauma leading to a healing process which culminates in positive psychological changes and effects (Bush, Skopp, McCann, & Luxton, 2011). The sample in this case was 362 undergraduate students, aged 18 to 57 years (M = 23.73, SD = 5.37). They were recruited in an urban university. The measure of loneliness was again the UCLA. The theory was centred on the hypothesis that loneliness could be a barrier to posttraumatic growth as people strive to make meaning from the adverse events that happen to them due to the impact it has on access to support and resources. The study found that loneliness did moderate the relationship and that experiences of posttraumatic growth were tied to experiences of loneliness. Gender findings were reported and were that there was no influence of gender on this relationship. Clinical implications were reported as the need to assess ratings of loneliness in the process of applying therapeutic interventions as it could be a factor in stopping a person from healing from trauma. Once assessed, issues around loneliness can be addressed as part of the counselling process. Other clinical implications were that social support networks and how to build them could be a relevant part of counselling, as well as work on building resilience.

The next study also used a university sample to look at the moderating role of loneliness between problems in relationships with peers and psychological distress (Shafiq & Malik, 2017). The sample was 205 university students aged between 20 and 35 years old (M = 23.02, SD = 2.30). The gender breakdown was 153 males and 152 females. A different scale was used in this study, the de Jong Gierveld scale (de Jong-Gierveld & Kamphuls, 1985) which breaks the measurement of loneliness into its constituent elements of social and emotional loneliness. The scale consists of six negative items and five positive. The negative items relate to emotional isolation and the positive to social isolation. Responses are on a 5-point Likert scale and the scale is designed to measure gradients of isolation. The central theory is based on the creation of a reinforcing loop which sees emotional isolation player a greater role in psychological distress than social isolation. Isolation intensifies already existing feelings of distress, feelings that people do not care. This has an adverse effect on psychological and emotional health which in turn leads to even further isolation and the loop continues and intensifies. It was found that emotional isolation did moderate the relationship between peer relational problems and psychological distress. Gender differences were seen in the variables that comprised the study in terms of emotional isolation, loneliness, peer relations, depression, anxiety and stress. There were no significant gender differences reported in terms of social isolation and gender findings were not addressed in terms of the moderation. Clinical implications were centred on addressing the emotional distress that is a constituent part of isolation.

The next study also used a university sample to address the moderating effect of loneliness on the link between social problem solving and suicidal behaviours (Hirsch, Chang, & Jeglic, 2012). This was again a US study, it used 385 university

volunteers and the sample was 69% female. The sample had a mean age of 19.61 years (SD = 3.12). Loneliness was again measured using the UCLA loneliness scale. The theory at the core of this study raises some recurring themes again from the literature. The role of stress, particularly if there are multiple stressors or stress is chronic. The personal interpretation of events and how stressful they feel to the individual. The coping mechanisms which are employed to deal with stressors. Subjective loneliness is again the focus of this study, how the person feels about the status of their relationships with others. How experiencing subjective loneliness may lead to the adoption of avoidant coping behaviours. In this paper the skill of social problem solving is highlighted. These are a set of goal-directed skills related to thoughts, emotions and behaviours which allow a person to deal with interpersonal conflicts, occupational issues and subjective personal challenges (D'Zurilla & Nezu, 1982). Effective social problem-solving skills will result in an individual applying proactive strategies such as problem definition, generation of a range of responses and decision making (D'Zurilla, Nezu, & Maydeu-Olivares, 2002). In this study the moderating role of subjective loneliness was combined with the moderating role of stress. It was theorised that the combination of these would influence the person's ability to problem solve and if they could not do so, feelings of hopelessness would be one result which is linked to suicidal thoughts along with stressful events and lack of perceived social support (Flannery, Singer, & Wester, 2001). Again, the role of perception is worth highlighting as a recurring theme in the literature on loneliness. Importantly the study points to a person's inability to garner and benefit from social support even when it is offered. The study found that there were moderating effects and that those who were higher in levels of subjective loneliness were less confident in their problem-solving abilities. Life stress did not moderate the association in the

same way. Findings were not reported by gender in this study. Clinical implications again called for screening and targeting lonely people, the use of cognitive restructuring and utilising both social problem solving and social skills training.

The final study using a university sample was again at a university in the US and used 383 students enrolled in a psychology degree course. The sample was aged 18 to 30 years old (M = 19.65, SD = 1.25). There were 117 males and 266 females. The relationship under study was between levels of perfectionism and depressive and anxious symptoms (Chang, Sanna, Chang, & Bodem, 2008). The theory behind the study again used some recurring themes from the loneliness literature. The sense of a loop which perpetuated negative beliefs was at the core. Those high in perfectionism are already experiencing a negative cycle of beliefs that what they accomplish is not good enough. If a person lacks social interactions, there are no opportunities for an alternative viewpoint to be presented. They will therefore maintain unrealistic expectations of themselves. This can lead to distress, disappointment and feelings of low mood. In addition to this, the view of the lonely person again emerges. When a person reacts to their sense of isolation with passive coping mechanisms such as avoidance and a self-critical rumination process (Nolen-Hoeksema, 2000), it can lead to others perceiving them in a way which does not invite social interactions. This then reinforces the belief that the world is a negative and unwelcoming place and that people are untrustworthy (Jones, Rose, & Russell, 1990), which maintains and perpetuates the cycle of loneliness and withdrawal. Findings were that in the relationship between perfectionism and both anxious and depressive symptoms, higher levels of loneliness did lead to higher levels of symptoms. Clinical implications again called for screening for high levels of subjective social isolation

and targeting these individuals with techniques such as cognitive restructuring and social problem-solving skills.

All Female Sample

The next study used a sample of 95 community mothers to address the moderating role of loneliness in the relationship between stress and risk of child physical abuse (Tucker & Rodriguez, 2014). The mothers were aged between 23 and 51 years old (M = 37.89, SD = 6.88). In this study the measure used was the de Jong Gierveld loneliness scale and it was social isolation which was addressed in this study as opposed to emotional isolation. The theory behind the study is centred on the psychosocial factors that can interact with personal characteristics to push the parent into physical abuse of a child. The role of stress is the independent variable and along with social isolation, family dysfunction is also addressed in the study as a second moderator. Feeling disconnected from supportive resources has been linked as a feature that separates abusive from non-abusive parents (Gracia & Musitu, 1994, 2003). Again, the link is about receiving feedback and advice, in this case about child rearing practices and also having support and help to cope with stress. Social isolation was found to moderate the stress-abuse relationship in this study. Findings were not reported by gender as this was an all-female sample. Clinical implications were aimed at risk assessment for those families were abuse may occur.

Clinical Sample

The final study in this section looked at loneliness as a moderator in the relationship between depression and pain. The sample was a group of 312 Chinese elderly patients who were all suffering terminal illness (Chan, Kwan, Chi, & Chong, 2014).

The measure of loneliness was a single item asking if the participant felt lonely and they answered yes or no. The theory was that loneliness would moderate the relationship by preventing people who did not have support of friends or family, or who had difficulty interacting with their family, from reporting the actual levels of pain they were in. Loneliness was found to moderate the relationship. Findings were not reported by gender. Clinical implications were centred on pain management in palliative care settings.

Psychotic Experiences

The fact that there is only one study identified in this grouping indicates the lack of study in the area in respect to the moderating role of loneliness. Given that loneliness has been found to moderate a wide range of physical and psychological issues and given the large literature on loneliness and depression, it is perhaps surprisingly that it has not been applied to a greater extent in this area. The final study in this review section has also been reviewed in the mediation review of chapter 5 of this thesis. This was a study which specifically looked at the moderating role of loneliness in the relationship between childhood adversity and psychotic experiences (Murphy, Murphy, & Shevlin, 2015). The study also looks at the mediating effects of negative evaluation of self and others and peer victimisation, as mediators in this relationship. It uses a sample of 785 post primary school children from Northern Ireland. The mean age of the sample is 16.20 years (SD = 1.06). The gender breakdown of the sample is 345 males and 440 females. The theory behind the study again looks at this notion of hypervigilance to social threat where loneliness is maintained by biases in cognition when processing social information which reflect negative and dysfunctional perceptions of social relationships (Cacioppo & Hawkley, 2009). This

leads to further and further social withdrawal with more and more far reaching consequences in terms of social interactions resulting in this loneliness loop which has been mentioned in a number of the studies that have been reviewed. The findings were that loneliness did play a moderating role in the model. Findings were not discussed by gender. Clinical implications were that interventions centred on loneliness should be implemented as early in the life span as possible. That these negative and faulty cognitions should be targeted for lonely people and that the teaching of social skills can help to break this loop of loneliness.

Summary of the Literature

There are several common themes which emerge from a review of the literature on indicators of social isolation and the impact of being lonely. The indicators of social isolation are heavily inter-connected and hard to separate with many shared characteristics. Being connected is healthy and is the desired state of humans. Events in childhood can create problems in social development and these have the potential to create a stable negative trait or trajectory unless an intervention occurs. Events in adulthood particularly in older adulthood can lead to breaks in social contact. Children and older adults are the most commonly identified risk groups however breaks in social contact and the resulting negative reaction to that can happen at any time to any person. Being disconnected will result in an emotional reaction. A feeling of loneliness will result, the role of which is to prompt the desire for reconnection. The chronicity of isolation creates the most severe impact. The role of the HPA axis is seen again in theories of why being disconnected is harmful. Lack of connection is linked to wellbeing in terms of general wellbeing, in terms of physical

health, in terms of mental health. Mental disorders which result are both non-psychotic and psychotic in nature.

The review of moderation studies highlights several themes which occur across the various studies. The role of perception continues to be mentioned repeatedly. It is at the heart of what is termed subjective social isolation and is at the core of the difference between solitude and loneliness. The quantity of relationships is less important in the understanding of loneliness than the subjective perception of the individual about the relationships they have. There are levels of loneliness that do not carry an element of distress, that are relatively benign in comparison.

This theme of distress is another recurring theme. If a person feels distress in relation to their social relationships, then it can be seen that stress is a natural accompaniment to those feelings. Linked to this and covered in a number of the studies in this review, have been the coping styles that are employed to deal with the distress that comes from believing that social relationships lack the quality desired. The studies report that passive, rather than active coping strategies are more likely to be employed by those who are lonely with a main role given to the strategy of avoidance. Other strategies may be to overeat, to ruminate or to use alcohol or drugs. Employing such passive strategies, coupled with the negative cognitions that are in place, lead to social behaviours that may make others more likely to avoid them. This leads to the establishment and maintenance of the loneliness loop.

A final recurring theme is the importance of clinical interventions that work at a number of levels. That work at the level of cognitive restructuring. That can impact

on how a person feels about being alone, how they interpret that. Also targeting the coping strategies that people use to deal with their distress. The teaching of social skills, active problem solving which can be applied to counteract the loneliness experience and to interrupt that loop of loneliness.

From the review of the literature on loneliness and on the studies of the moderating effects of loneliness in particular, it can be seen that the question of the moderating role of loneliness is an interesting and useful one to apply to the current study. Given the nature of the variables that have been used in the study and the intense focus on social factors which has been the focus throughout, testing for moderation by loneliness is an appropriate extension. The set of issues used in this study: experiences of childhood trauma; experiences of social defeat; the mediating effects of social support; the mediating effects of discrimination; all link with the recurring themes that have been discussed in the theories and studies of loneliness. The lack of studies using a large community sample means that this study will address a gap in the literature. It also addresses the gap of applying the question of loneliness in the area of the links between childhood trauma and psychotic experiences. A very important aspect of this study in relation to the literature on social isolation is the fact that it offers an operationalisation of levels of distress in relation to loneliness. Unlike many of the measurements used in existing moderation studies, it goes further than identifying those who are lonely and those who are not, it identifies those who are not lonely, those who are lonely and those who are distressed by their loneliness.

A number of predictions were made with the addition of social isolation as a moderator to the model. The first prediction was that by adding social isolation to the model, the model would be improved and this would be evidenced by the resultant fit indices and the resultant R^2 values. The second prediction was connected to the importance of being able to identify those who were distressed by their lonely feelings. Loneliness would be seen to exist in the sample on a continuum. There would be a baseline of people who are not lonely and these would be the majority in each grouping addressed. There would then be a level of people who were lonely and these would be a considerably smaller group of people. The smallest group however would be those who felt distressed by their loneliness. The third prediction was that social isolation would be found to have a moderating effect in terms of these groups of people. Further, that there would be a dose response to the effects of feeling lonely which would be seen over the levels of loneliness measured. Those at the baseline level would show the least effects from the mediators in the study, those at the next level, who are lonely but not reporting distress would show higher levels but possibly not remarkably higher and finally, those at the highest levels of loneliness, those distressed by their lonely feelings, would show the strongest effects.

Method

Sample and Procedures

Analysis was conducted on the first and second waves of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant, Dawson, & Hasin, 2004), as described in chapters 1 to 4. The fields used in this phase of the study are described in the analytical plan below.

Analytical Plan and Variables

Figures 6.1 and 6.2 show the statistical models for the current study. Figure 6.1 shows the statistical model for males. Figure 6.2 shows the statistical model for females. For this chapter, the final phase of the analysis was completed. Loneliness was added to the model as a moderator. Loneliness was derived from two questions in section 10 of wave 2 of the NESARC dataset.

- W2S10Q1A1

This question asked

'Have you had lots of friends that you are very close to?' and could be responded to with 1. Yes or 2. No.

A follow up question was then asked if the answer to W2S10Q1A1 was 2. No.

- W2S10Q1B1

This question asked 'Did this ever trouble you or cause problems at work or school, or with your family or other people, and could be responded to with 1. Yes or 2. No.

The loneliness variable was constructed from the replies to both questions. If the participant responded that they had lots of friends that they were close to, loneliness was coded as 0, and labelled 'Not Lonely'. If the participant replied that they had not had lots of friends but it had not caused a problem, loneliness was coded as 1, and labelled 'Lonely'. If the participant responded that they had not had lots of friends and it had caused problems, loneliness was coded as 2, and labelled 'Lonely and Distressed'. Descriptive statistics were run for the lonely data. Six models were

created in Mplus which expanded the previous mediation model to test if the models were moderated by loneliness.

The models were run as listed in Table 6.1 and Table 6.2. Chapter 5 showed that the best fitting model was the one which included direct and indirect effects. These models were run again for males and females with the inclusion of the covariates, income, lifetime diagnosis of depression, and lifetime diagnosis of anxiety. For the moderation, the covariates of age and marital status were removed. Marital status was removed as it is used as a proxy for social isolation and was at risk of distorting the results. The models were specified and estimated using Mplus 7 based on maximum likelihood estimation. The adequacy of each model was assessed using the Akaike Information Criterion (AIC) (Akaike, 1987), the Bayesian Information Criterion (BIC) (Schwartz, 1978), and the sample size adjusted Bayesian Information Criterion (ssa-BIC) (Schwartz, 1978) with lower values indicating better model fit.

Figure 6. 1 Statistical Model for Males

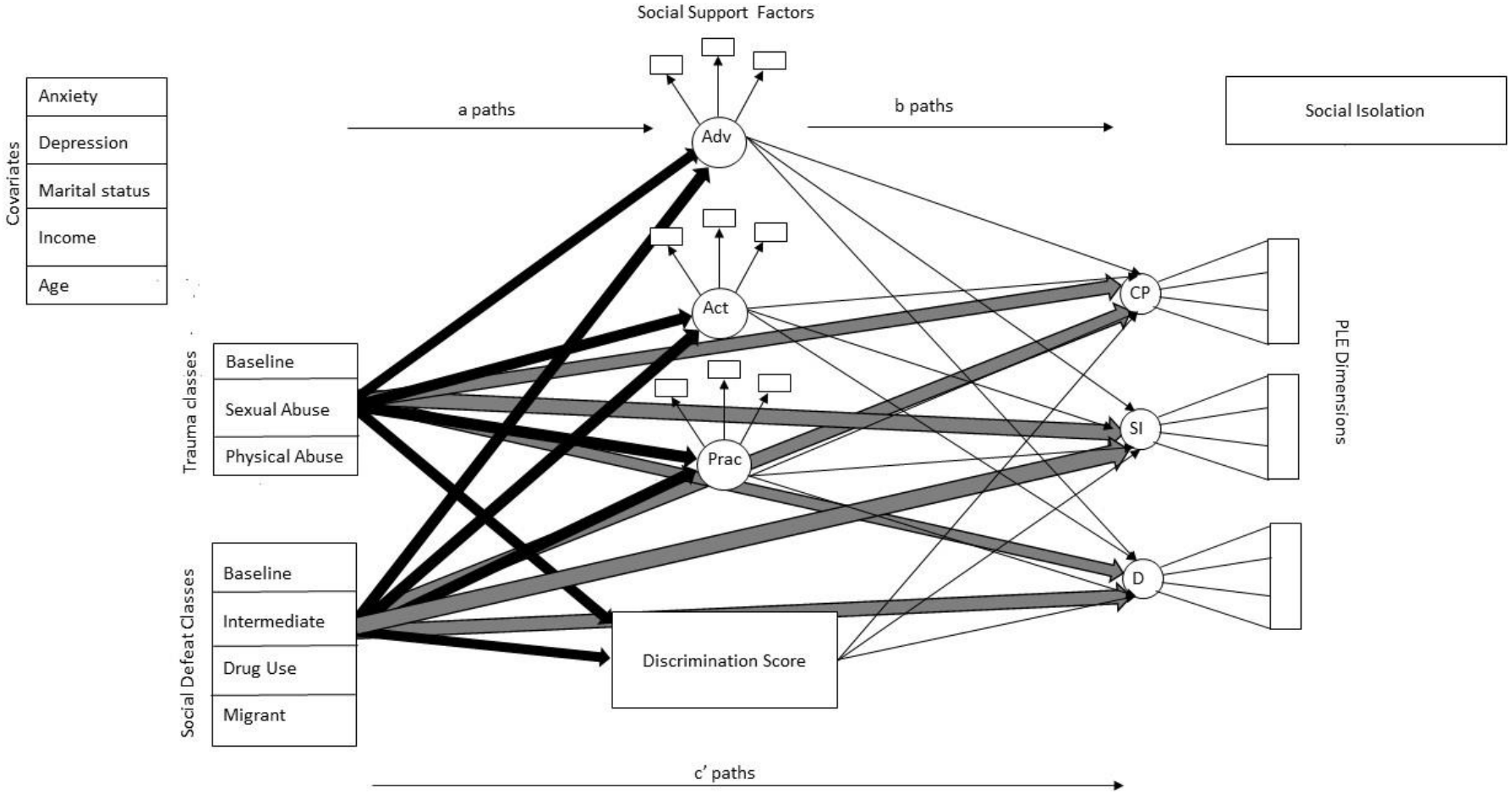
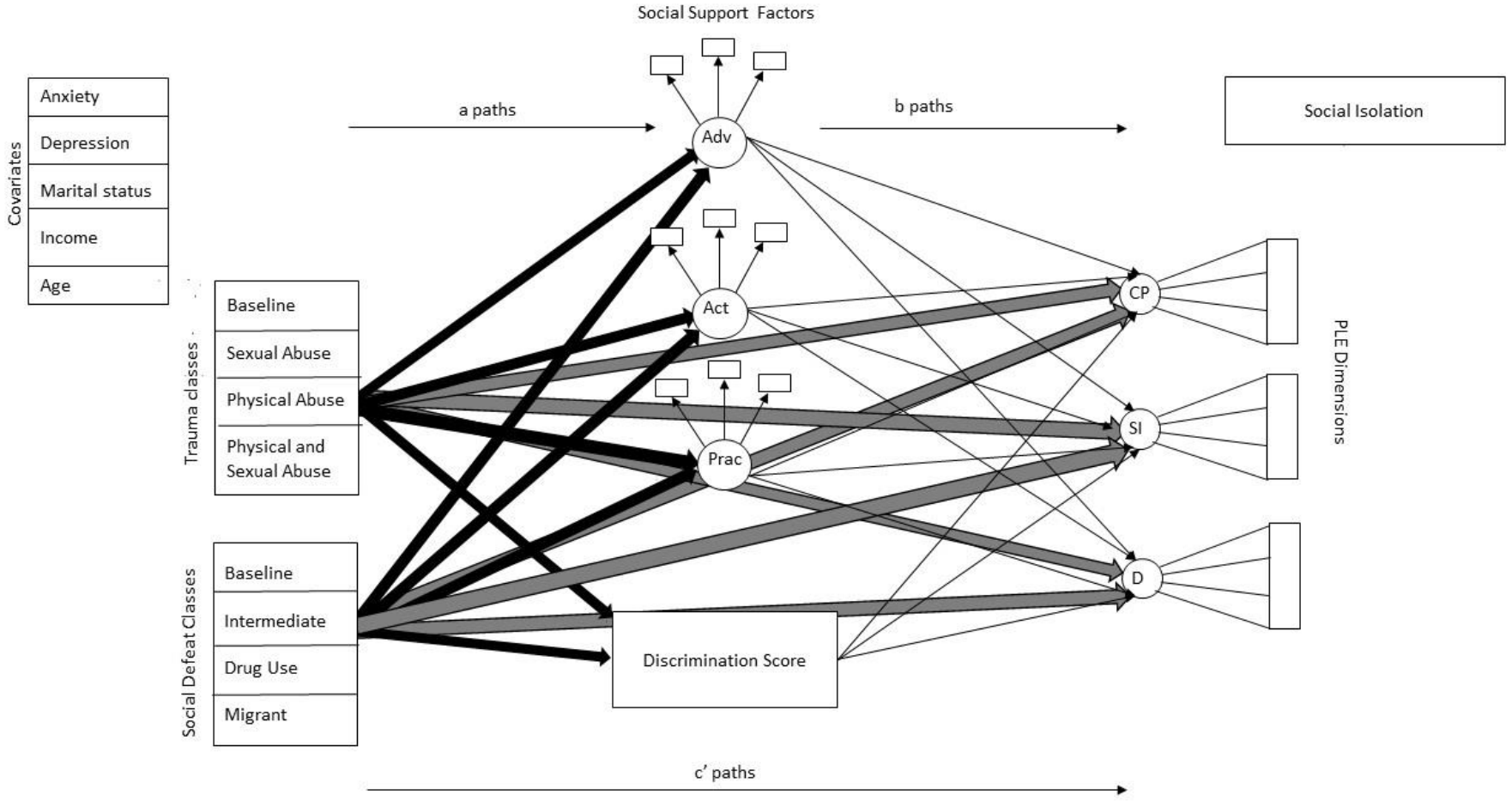


Figure 6. 2 Statistical Model for Females



Results

The results section begins by describing the endorsement rates for each of the loneliness categories. It then addresses moderation results. Overall model fit for males and then for females is discussed. Results for a paths are then described by gender, followed by b paths then c' paths in the context of the moderating effects of loneliness. Each path section description looks first at variance explained by the path and then at effect estimates between variables. The results section then moves on to an overall summary which describes relationships of interest when addressing the paths from a unified view in terms of the moderating effects of loneliness. Mediation effects will not be addressed in this chapter.

Table 6.1 reports counts and weighted percentages by gender for the social isolation levels. Endorsement is shown to be on a continuum with most people belonging to the 'Not Lonely' category, followed by the 'Lonely' category section in each category. The smallest percentage of respondents for each gender was for the 'Lonely and Distressed' category.

Table 6.1 Female and Male Frequencies and Weighted Percentages of Endorsement of Loneliness levels.

	Male Count (%)	Female Count (%)	Total Count (%)
Not Lonely	10509 (73.6)	14424 (73.9)	24933 (73.6)
Lonely	3804 (25.3)	5263 (24.6)	9067 (25.2)
Lonely and Distressed	172 (1.1)	279 (1.5)	451 (1.2)

The percentage for each gender were practically identical for the 'Not Lonely' category. There were only very small differences in the percentage endorsing the

'Lonely and Distressed' category. Patterns of loneliness are very similar across gender in the sample. This is reflected in the chi-square result, $\chi^2(2, N = 34451) = 2.967, p = .227$.

Model fit results are documented in Table 6.2. Fit indices shown are for the direct and indirect model only as this was determined in chapter 5 to be the best fitting model for each gender. Fit indices are shown adjusted and not adjusted for covariates. Tables 6.3, 6.4, and 6.5 show the results for males and females using this model. Table 6.3 shows the adjusted and unadjusted estimates for a paths, from the independent variables to the mediators for each of the loneliness groups. Table 6.4 shows the same for b paths, from the mediators to the dependent variable for each of the loneliness groups. Table 6.5 shows the results for c' paths, from the independent to the dependent variables for each of the loneliness groups. All relationships in Tables 6.3, 6.4 and 6.5 are described in the presence of mediators and covariates with the unadjusted results shown in parenthesis. Table 6.3 shows a path results for males and females in terms of variance explained by each path and the estimates for each relationship in the path by loneliness group. Table 6.4 shows the same for the b paths and Table 6.5 shows the same for the c' paths by loneliness group. These results document the output by gender, by loneliness group, by path and by variable relationship.

Males a Paths

The a paths describe the relationships between the independent variables and the mediating variables in the presence of loneliness as a moderator. For this model that means the paths from the social defeat and childhood trauma classes to the social

Table 6.2 Fit Indices for Moderation Models.

Model	Loglikelihood	#Free Parameters	AIC	BIC	ssa-BIC
Female					
Direct and indirect	-135389.199	231	271240.399	273065.422	272331.315
Direct and indirect + covariates	-134177.996	294	268943.992	271266.749	270332.430
Male					
Direct and indirect	-80468.595	210	161357.189	162907.290	162239.934
Direct and indirect + covariates	-79704.000	273	159953.999	161969.130	161101.568

support factors and discrimination score. Each path for males reached significance in terms of the variance explained by the path after moderating for loneliness. The moderating effect was seen in the variance explained values for both the practical factor of social support and for discrimination. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

For males in terms of the moderating effects of loneliness, this was seen in the physical abuse trauma class and on the sexual abuse trauma class. For males in the physical abuse trauma class there was a moderating effect with the social support activities factor and with discrimination. This moderating effect of loneliness

remained present when the covariates were controlled for. Controlling for the covariates reduced the effects seen.

Females a Paths

Each path for females reached significance in terms of the variance explained by the path after moderating for loneliness. The moderating effect was seen in the variance explained values for all the factors of social support but only in the unadjusted discrimination results. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

For females moderated effects were present in more pathways than for males. Unlike males, females showed moderated effects for some social defeat as well as trauma pathways. The moderated effects were present in pathways of the drug use social defeat class of females. For pathways from females in the drug use class to both the advice and activities factors of social support, moderation was present in both the adjusted and unadjusted models. For the advice factor, controlling for covariates slightly reduced the effect size while for the activities factor, effect sizes were increased and for those in the lonely category they became significant which they hadn't been before the covariates were controlled for. For females the pathways from the trauma classes to the mediators showed the most moderated effects. For females in the trauma class of physical abuse, each pathway to each mediator was moderated by loneliness group. Increases in loneliness led to increases in effect size for social support advice, social support activities, social support practical and for discrimination. For the pathway to discrimination, the moderating effect was only

Table 6.3 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the IV – Mediators Pathways (a Paths) by Loneliness Groups

Pathway			Social Support Advice	Social Support Practical	Social Support Activities	Discrimination
Social Defeat Migrant						
	Female	Not Lonely	-.108* (-.120*)	-.091* (-.100*)	-.060* (-.069*)	.017 (.015)
		Lonely	-.076 (-.094*)	-.062* (-.072*)	-.032 (-.039*)	.006 (-.003)
		Lonely and Distressed	-.146 (-.159*)	-.126 (-.131*)	-.108 (-.114)	-.042 (-.044)
	Male	Not Lonely	-.075* (-.083*)	-.107* (-.116*)	-.041* (-.052*)	.044* (.046*)
		Lonely	-.041 (-.051)	-.038 (-.048*)	-.020 (-.027)	.053* (.055*)
		Lonely and Distressed	.046 (.012)	-.013 (-.063)	-.027 (-.068)	-.078 (-.099)
Drug Use						
	Female	Not Lonely	.044* (.046*)	.004 (.005)	.008 (.005)	.041* (.056*)
		Lonely	.072* (.071*)	.022 (.016)	.038* (.024)	.047* (.063*)
		Lonely and Distressed	.074 (.076)	.011 (.007)	.042 (.039)	.045 (.061)
	Male	Not Lonely	.027* (.011)	-.009 (-.021)	-.005 (-.024)	.062* (.072*)
		Lonely	.040* (.033)	.014 (.003)	-.006 (-.021)	.021 (.031)
		Lonely and Distressed	.012 (.016)	.182 (.192)	.050 (.038)	.017 (.005)

Pathway			Social Support Advice	Social Support Practical	Social Support Activities	Discrimination
Intermediate						
	Female	Not Lonely	-.001 (.004)	-.020 (-.017)	-.002 (.001)	.040 (.043*)
		Lonely	.035* (.036*)	-.002 (-.003)	-.001 (-.004)	.014 (.018)
		Lonely and Distressed	.001 (.009)	.012 (.012)	.029 (.032)	.073 (.077)
	Male	Not Lonely	-.007 (-.010)	-.034* (-.035*)	-.006 (-.009)	.036* (.039*)
		Lonely	.035 (.031)	.007 (.001)	-.001 (-.008)	.002 (.006)
		Lonely and Distressed	-.061 –(.059)	-.005 (.001)	-.076 (-.064)	-.124 (-.126)
Trauma						
Physical Abuse						
	Female	Not Lonely	-.020 (-.032*)	-.019 (-.030*)	-.007 (-.021*)	.072* (.087*)
		Lonely	-.048* (-.057*)	-.051* (-.061*)	-.039* (-.053*)	.074* (.082*)
		Lonely and Distressed	-.145* (-.164*)	-.157* (-.202*)	-.120* (-.153*)	.135 (.144)
	Male	Not Lonely	-.051* (-.066*)	-.023 (-.035*)	-.031* (-.050*)	.060* (.067*)
		Lonely	-.049* (-.066*)	-.079* (-.100*)	-.038 (-.057*)	.062* (.073*)
		Lonely and Distressed	-.052 (-.076)	-.027 (-.056)	-.143 (-.190)	.171 (.146)
Sexual Abuse						
	Female	Not Lonely	.010 (.000)	-.013 (-.021)	-.001 (-.013)	.041* (.055*)
		Lonely	-.022 (-.038*)	-.019 (-.035)	.004 (-.018)	.063* (.073*)
		Lonely and Distressed	-.094 (-.110)	-.142 (-.170*)	-.120 (-.142)	.121 (.135)

Pathway			Social Support Advice	Social Support Practical	Social Support Activities	Discrimination
	Male	Not Lonely	-021 (-.035)	.008 (-.004)	.020 (.002)	.071* (.078*)
		Lonely	-.023 (-.039*)	-.050 (-.070*)	-.011 (-.029)	.118* (.128*)
		Lonely and Distressed	-.163* (-.159*)	.016 (.005)	-.077 (-.083)	.173 (.198*)
Sexual and Physical Abuse						
	Female	Not Lonely	-.020 (-.031*)	-.045* (-.055*)	-.010 (-.022*)	.047* (.058*)
		Lonely	-.063* (-.081*)	-.091* (-.108*)	-.029 (-.052*)	.066* (.076*)
		Lonely and Distressed	-.064 (-.097)	-.139 (-.194*)	-.049 (-.092)	.027 (.038)
R^2	Female	Not Lonely	.052* (.020*)	.037* (.014*)	.032* (.006*)	.034* (.019*)
		Lonely	.069* (.025*)	.046* (.020*)	.047* (.007*)	.031* (.022*)
		Lonely and Distressed	.096* (.071)	.153* (.104*)	.082* (.055*)	.058* (.049*)
	Male	Not Lonely	.038* (.013*)	.037* (.015*)	.048* (.006*)	.024* (.018*)
		Lonely	.036* (.010*)	.054* (.017*)	.039* (.005*)	.034* (.025*)
		Lonely and Distressed	.087* (.033*)	.195* (.051*)	.149* (.059*)	.143* (.073*)

present when covariates were controlled for. In each of these pathways again, controlling for covariates decreased effect sizes.

For females in the sexual abuse trauma class, moderating effects were reported along the pathway with social support practical, social support activities and discrimination. Controlling for covariates removed the moderating effect of loneliness between the sexual abuse trauma class of females and the activities factor. For social support practical and discrimination, the moderating effect remained. Again, for these two pathways, controlling for covariates reduced effect sizes. For females in the combined physical and sexual abuse class, loneliness had a moderating effect for the pathways with each of the social support factors but not with the discrimination mediator. Again, introduction of covariates reduced effects sizes and for several pathways it also removed significance.

Males b Paths

The b paths describe the relationships between the mediating variables and the dependent variables. For this model that is from the social support factors and discrimination scores to the PLE dimensions mean scores. Each path for males reached significance in terms of the variance explained by the path after moderating for social isolation. The moderating effect was seen in the variance explained values for the cognitive/perceptual and disorganised symptom clusters but not for the social/interpersonal symptom cluster. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

For males in terms of the moderating effects of loneliness, this was seen in only one category. For males, the pathway from the social support activities factor to the disorganised symptom cluster showed a moderating effect. Effect size increased with levels of loneliness and distress. For the 'Not Lonely' and 'Lonely' groups, controlling for covariates increased effect size while for the 'Lonely and Distressed' group, it reduced effect size.

Females b Paths

Each path for females reached significance in terms of the variance explained by the path after moderating for loneliness. The moderating effect was seen in the variance explained values for the social/interpersonal and disorganised symptom clusters but not for the cognitive/perceptual symptom cluster. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

Females again showed more results in terms of the moderating effects of loneliness than males. As with males, the pathway from discrimination to the PLE symptom clusters did not show any moderating effects. The moderating effects that were present along the b paths for females were within the pathway from the social support advice factor to the PLE symptom clusters. Moderating effects due to loneliness group were present between the advice factor and both the social/interpersonal symptom cluster and the disorganised symptom cluster. For the pathway to the social/interpersonal cluster, the moderating effect was only present when covariates were controlled for. All relationships on this pathway reached

significant levels. For the ‘Not Lonely’ and the ‘Lonely’ groups, the presence of covariates decreased the effect size while for the ‘Lonely and Distressed’ group, it increased the effect size. For the pathway from advice to the disorganised cluster, the moderating effect was present in both the presence and absence of controlling for covariates. For the ‘Not Lonely’ and the ‘Lonely’ groups, the presence of covariates decreased the effect size while for the ‘Lonely and Distressed’ group, it increased the effect size.

Males c’ Paths

The c’ paths describe the relationships between the independent variables and the dependent variables in the presence of both mediators and covariates. For this model that is from the social defeat and childhood trauma classes to the PLE dimensions mean scores. Each path for males reached significance in terms of the variance explained by the path after moderating for loneliness. The moderating effect was seen in the variance explained values for the cognitive/perceptual and disorganised symptom clusters but not for the social/interpersonal symptom cluster. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

For males, again there was only one pathway which showed a moderating effect as a result of loneliness. This was the c’ pathway from the social defeat drug use class to the disorganised PLE symptom cluster. This effect was present with covariates not controlled for and when covariates were controlled for. Controlling for covariates

Table 6.4 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the Mediators – DV Pathways (b Paths) by Loneliness Group

Pathway			Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
Social Support Advice	Female	Not Lonely	-.027 (.034)	-.124* (-.140*)	-.030 (-.039*)
		Lonely	-.008 (-.016)	-.127* (-.136*)	-.042* (-.054*)
		Lonely and Distressed	-.073 (-.054)	-.177* (-.163*)	-.140 (-.135)
	Male	Not Lonely	.016 (.006)	-.088* (-.100)	-.001 (-.012)
		Lonely	.023 (.020)	-.045 (-.045)	.017 (.016)
		Lonely and Distressed	-.304* (-.311)	-.237* (-.208)	-.066 -(.070)
Practical Support	Female	Not Lonely	-.029 (-.033*)	-.016 (-.024)	-.042* (-.046*)
		Lonely	.010 (.007)	.050* (.047*)	.036 (.033)
		Lonely and Distressed	-.029 (-.088)	-.111 (-.169*)	-.034 (-.054)
	Male	Not Lonely	-.012 (-.015)	-.022 (-.025)	-.023 (-.026)
		Lonely	-.029 (-.045)	.057 (.041)	.003 (-.014)
		Lonely and Distressed	.019 (.019)	-.078 (-.169)	.013 (-.044)
Activities	Female	Not Lonely	-.019 (-.029*)	-.091* (-.106*)	-.055* (-.064*)
		Lonely	-.010 (-.033)	-.107* (-.139*)	-.071* (-.095*)

Pathway			Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
		Lonely and Distressed	-.011 (-.024)	-.064 (-.081)	-.041 (-.046)
	Male	Not Lonely	-.053* (-.076*)	-.097* (-.122)	-.069* (-.094*)
		Lonely	-.037 (-.053*)	-.145* (-.161)	-.127* (-.147*)
		Lonely and Distressed	.138 (.081)	-.035 (-.089)	-.206 (-.179)
Discrimination	Female	Not Lonely	.124* (.141*)	.101* (.121*)	.122* (.135*)
		Lonely	.129* (.142*)	.091* (.110*)	.083* (.095*)
		Lonely and Distressed	.096 (.086)	.109 (.108)	.222* (.220*)
	Male	Not Lonely	.139* (.149*)	.115* (.127)	.114* (.126*)
		Lonely	.186 (.198*)	.106 (.121)	.103* (.117*)
		Lonely and Distressed	.004 (-.039)	.183* (.201)	.013 (.032)
R^2	Female	Not Lonely	.084* (.062*)	.128* (.091*)	.075* (.060*)
		Lonely	.084* (.055*)	.162* (.111*)	.097* (.064*)
		Lonely and Distressed	.142* (.090*)	.274* (.214*)	.193* (.186*)
	Male	Not Lonely	.084* (.058*)	.131* (.091*)	.098* (.018*)
		Lonely	.112* (.086*)	.124* (.078*)	.115* (.025*)
		Lonely and Distressed	.150* (.097*)	.359* (.239*)	.163* (.073*)

increased the effect size for those in the ‘Not Lonely’ and ‘Lonely’ groups while decreasing effect size for the ‘Lonely and Distressed’ group. Controlling for covariates also removed the significance from the ‘Lonely and Distressed’ result.

Females c’ Paths

Each path for females reached significance in terms of the variance explained by the path after moderating for loneliness. The moderating effect was seen in the variance explained values for the social/interpersonal and disorganised symptom clusters but not for the cognitive/perceptual symptom cluster. In each case the upper value across the groups of loneliness showed a greater effect than the variance explained before loneliness was introduced to the model. The moderator improved the model in each case.

Again, for females there were more effects than for males. Again, there were more effects within the trauma classes than within the social defeat classes. Females showed moderation across all the PLE symptom clusters. The social defeat drug use class produced moderating results along the pathway to the social/interpersonal symptom cluster. Controlling for covariates reduced the effect sizes. In the trauma groups, there were moderating effects between females in the Physical Abuse class with the social/interpersonal symptom cluster and the disorganised symptom cluster. Again, controlling for covariates reduced the effect sizes for each of the loneliness groups. The Sexual Abuse trauma class showed moderating effects along the pathways to both the cognitive/perceptual cluster and the disorganised cluster. Again, controlling for covariates reduced effect sizes. The females in the Sexual and Physical Abuse trauma class showed moderating effects along the pathways with the

social/interpersonal cluster and the disorganised cluster. Again, controlling for covariates reduced the effects.

Summary

By taking an overall view of all pathways, some interesting relationships are worthy of note. The effects of moderation are much stronger for females than for males again highlighting the role of gender. Results were stronger within the trauma classes than within the social defeat classes. Again, as with the mediation, the role of covariates was seen to be one of importance. In each case the upper limit of the variance explained by the loneliness groups in each pathway showed that the model was improved with the addition of the groupings. In terms of the PLE symptom clusters, the social/interpersonal and the disorganised symptom clusters play a stronger role than the cognitive/perceptual cluster. However, addressing the results that do include the cognitive/perceptual cluster shows that the pathway between it and females in the sexual abuse trauma class is the most relevant pathway.

Table 6.5 Female and Male Adjusted and Unadjusted Estimates for Covariate Effects for the IV – DV Pathways (c' Paths) by Loneliness Group.

Pathway			Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
Social Defeat Migrant					
	Female	Not Lonely	.013 (.010)	.008 (.008)	-.008 (-.009)
		Lonely	-.016 (-.026)	-.023 (-.038*)	-.055* (-.064*)
		Lonely and Distressed	-.045 (-.047)	-.061 (-.068)	-.004 (-.004)
	Male	Not Lonely	.027 (.027)	.004 (.002)	-.014 (-.014)
		Lonely	-.019 (-.022)	-.083* (-.093*)	-.078* (-.083*)
		Lonely and Distressed	-.005 (.007)	.011 (.032)	.164 (.174)
Drug Use					
	Female	Not Lonely	.022 (.038*)	.000 (.015)	.061* (.073*)
		Lonely	.013 (.039*)	.009 (.044*)	.021 (.047*)
		Lonely and Distressed	.026 (.020)	.014 (.027)	.115 (.114)
	Male	Not Lonely	.047* (.067*)	.025* (.050)	.074* (.097*)
		Lonely	.076* (.095*)	.072* (.101)	.092* (.117*)
		Lonely and Distressed	.-.035 (-.006)	.021 (.047)	.173* (.162)

Pathway			Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
Intermediate					
	Female	Not Lonely	.007 (.009)	-.007 (-.006)	.017 (.018)
		Lonely	.008 (.016)	.004 (.014)	-.005 (.003)
		Lonely and Distressed	-.010 (-.010)	-.023 (-.017)	.089 (.088)
	Male	Not Lonely	.036* (.042*)	.019 (-028*)	.059* (.067*)
		Lonely	.013 (.021)	-.032 (-022)	.019 (.028)
		Lonely and Distressed	.093 (.068)	.047 (.027)	.151 .(160)
Physical Abuse					
	Female	Not Lonely	.072* (.089*)	.055* (.075*)	.039* (.052*)
		Lonely	.057* (.072*)	.082* (.101*)	.079* (.095*)
		Lonely and Distressed	.090 (.124*)	.086 (.130)	.093 (.106)
	Male	Not Lonely	.082* (.097*)	.100* (.118*)	.079* (.096*)
		Lonely	.077* (.092*)	.057* (.077)	.058* (.074*)
		Lonely and Distressed	.098 (.145)	.071 (.104)	.094 (.080)
Sexual Abuse					
	Female	Not Lonely	.096* (.112*)	.063* (.082*)	.064* (.076*)
		Lonely	.091* (.114*)	.081* (.110*)	.097* (.121*)
		Lonely and Distressed	.142 (.155)	-.015 (.013)	.086 (.092)

Pathway			Mean Cognitive/Perceptual Adjusted (Unadjusted)	Mean Social/Interpersonal Adjusted (Unadjusted)	Mean Disorganised Adjusted (Unadjusted)
	Male	Not Lonely	.051* (.066*)	.027 (.047*)	.029 (.047*)
		Lonely	.074 (.089*)	.003 (.022)	.062 (.079*)
		Lonely and Distressed	-.009 (-.007)	-.056 (-.031)	-.030 (-.024)
Sexual and Physical Abuse					
	Female	Not Lonely	.069* (.080*)	.053* (.068*)	.057* (.066*)
		Lonely	.060* (.079*)	.105* (.131*)	.057* (.078*)
		Lonely and Distressed	.033 (.075)	.105 (.158*)	.125 (.141)
R^2	Female	Not Lonely	.084* (.062*)	.128* (.091*)	.075* (.060*)
		Lonely	.084* (.055*)	.162* (.111*)	.097* (.064*)
		Lonely and Distressed	.142* (.090*)	.274* (.214*)	.193* (.186*)
	Male	Not Lonely	.084* (.058*)	.131* (.091*)	.098* (.018*)
		Lonely	.112* (.086*)	.124* (.078*)	.115* (.025*)
		Lonely and Distressed	.150* (.097*)	.359* (.239*)	.163* (.073*)

Discussion

This chapter has seen the models shown in Figure 6.1 and Figure 6.2 expanded to include loneliness as a moderator. A number of predictions were made for the chapter. The first prediction was that by adding social isolation to the model, the model would be improved and this would be evidenced by the resultant fit indices and the resultant R^2 values. The second prediction was connected to the importance of being able to identify those who were distressed by their lonely feelings. Loneliness would be seen to exist in the sample on a continuum. There would be a baseline of people who are not lonely and these would be the majority in each grouping addressed. There would then be a level of people who were lonely and these would be a considerably smaller group of people. The smallest group however would be those who felt distressed by their loneliness. The third prediction was that social isolation would be found to have a moderating effect in terms of these groups of people. Further, that there would be a dose response to the effects of feeling lonely which would be seen over the levels of loneliness measured. Those at the baseline level would show the least effects from the mediators in the study, those at the next level, who are lonely but not reporting distress would show higher levels but possibly not remarkably higher and finally, those at the highest levels of loneliness, those distressed by their lonely feelings, would show the strongest effects.

This discussion addresses first if the model improved. It looks at moderation findings in the model, specifically in terms of that dose response effect. It then addresses the theoretical implications for the model. It does this by progressively moving along the model in temporal order, in the context of theories which potentially explain the results of the moderation. It then addresses clinical implications for the findings. It addresses

strengths and limitations as built on from the previous chapter and finishes by drawing some overall conclusions from the addition of loneliness as a moderator.

Improving the Model

An analysis of the fit indices is the first piece of evidence that points to an improved model. Results in chapter 5, Table 6.1 show fit indices for the mediation while results documented in this current chapter in Table 6.2 show the fit indices once loneliness has been added as a moderator. For males the AIC value reduces from 196793.434 to 159953.999 with the BIC and the ssa-BIC following a similar reduction in values. For females the AIC reduces from 275355.418 to 268943.992, again with the BIC and the ssa-BIC values also reducing.

Using the variance explained values it can be seen that adding loneliness as a moderator has again improved the overall model. Comparing Tables 6.3, 6.4 and 6.5 of this chapter with results from the mediation chapter allows this comparison to be made. To illustrate, the R^2 value for the a path relationship between the independent variables and the practical factor of social support, is shown in Table 5.3, chapter 5 for the mediation, and in Table 6.3 of this chapter for the moderation. For males the variance explained by this pathway after mediating for social support and discrimination is 5.2%. After adding loneliness as a moderator, for males in the 'Not Lonely' group, the variance explained is 3.7%. For males in the 'Lonely' group, the variance explained is 5.4%. For males in the 'Lonely and Distressed' group, the variance explained jumps to 19.5%. This pattern is consistent for all paths for both genders with variance explained rising to as much as 35.9% for males for the pathways to the social/interpersonal symptom cluster path. Consistent with the mediation findings, all R^2 values were significant.

Levels of Loneliness

In terms of the pattern of loneliness endorsed in the sample, Table 6.1 shows that it was as expected. For both males and females and in the total data, there is was a baseline of participants who are 'Not Lonely'. For females this was 73.9% of respondents, or 14424 participants. For females, the next category who are people who report as 'Lonely', are 24.6% or 5263 participants. And the final category of females, those who endorse being both 'Lonely and Distressed', represent 1.5% or 279 females. The same pattern was reflected in the male data with 73.6% or 10509 in that baseline of people, 25.3% or 3804 who are 'Lonely', and 1.1% or 172 males, who are both 'Lonely and Distressed'.

Being able to draw out this element of distress is one of the central strengths of this study. In the review of studies which have looked at loneliness as a moderator, a number of techniques have been applied to the operationalisation of the loneliness variable. The majority of studies created a dichotomous loneliness variable. For some this was done using the mean or the median of results for the scale used to create the variable (Cho et al., 2015; Doane & Thurston, 2014; Murphy et al., 2015; Norman et al., 2011; Shafiq & Malik, 2017). One study which used a single item measure asking if the participants felt lonely, coded a dichotomous variable from that response (Chan et al., 2014). The remaining studies in the review used the scores themselves on the scales used and entered them into regression models. Results and discussion did reflect degrees of loneliness along the scale but with no element of distress measured (Chang et al., 2008; Hirsch et al., 2012; Tucker & Rodriguez, 2014; Zeligman et al., 2013). This current study did of course measure that element of distress and was therefore able to apply a categorical variable which did reflect not only if participants were lonely or not, but also if the participants were distressed by their loneliness. What this allows to

happen, reflecting on the literature, is for that separation of people who may be experiencing loneliness as we would expect to as part of the human condition from those who are distressed (Jones, 1987, Young, 1982). People who may be part of the 80% of people who report feeling lonely at least some of the time (Berguno et al., 2004; Pinquart & Sorenson, 2001; Weeks, 1994). People for who loneliness is perhaps situational (Shaver et al., 1985). People who see this as a temporary and rational reaction to a life event or a set of changed circumstances (Wenger & Burholt, 2004). People who have a set of active coping skills that they can and will employ to deal with the current situation (Shaver et al., 1985). People for whom loneliness has not become a chronic state. Or maybe even people who are enjoying their state of solitude as opposed to feeling lonely (Hawkley & Cacioppo, 2010; Tillich, 1959).

Where Moderation Exists

Evidence of moderation was found. The moderating effects were mainly identified in relation to the trauma classes and in relation to the female gender. One of the most striking examples of moderation was for females in the physical abuse class in relation to all of the mediators (Table 6.3). Although not all of the results reach significance, these results show that there is an increase in effect sizes from the 'Not Lonely', to the 'Lonely', to the 'Lonely and Distressed', groups of females in the physical abuse class. The first discussion is of the relationship with the advice factor of social support. Those in the 'Not Lonely' group had a result of -.020 while those in the 'Lonely' group had a result of -.048. This highlights both that those who are in the physical abuse class will experience less social support in the form of advice than those in the baseline group, and also that those in the 'Lonely' group will have a stronger loss of this important social capital than those who are 'Not Lonely'.

To extend the discussion to those who were both ‘Lonely and Distressed’ for females in the physical abuse trauma class, the results jump from -.048 for this who were lonely -.145 for those who were ‘Lonely and Distressed’. For females in this group, this pattern repeats in relation to the social support factor of practical support. For those in the ‘Not Lonely’ group, the effect size is -.019, this then jumps to -.051 for those in the ‘Lonely’ group. However again, the most dramatic jump is for those in the ‘Lonely and Distressed’ group who have an effect size of -.157. Again, the patterns exists for the group of females in relation to the social support factor of activities. Those in the ‘Not Lonely’ group have an effect size of -.007, those in the ‘Lonely’ group have an effect size of -.039, with the same more dramatic increase for those in the ‘Lonely and Distressed’ group, with an effect size of -.120. Again, in Table 6.1, this same pattern can be seen in the relationship between this same group of females with the discrimination mediator. The effect for the ‘Not Lonely’ group was .072, for the ‘Lonely’ group it was .074 and for the ‘Lonely and Distressed’ group it was .135.

Turning to the same pattern for males, Table 6.5 shows the relationship between males in the drug use social defeat class and the disorganised symptom cluster. The effect size for the ‘Not Lonely’ males is .074. This shows that males in this class are more likely than the baseline class of males to experience more disorganised symptoms. Again, the pattern that ‘Lonely’ males have a stronger effect size, .092, exists. Again, we see a much more dramatic increase in effect size however when we look at the ‘Lonely and Distressed’ males, .173. So, although there is a difference between those who are ‘Not Lonely’ and those who are ‘Lonely’, there is a more dramatic difference in every case in which moderation is found, between those who are ‘Lonely’ and those who are ‘Lonely and Distressed’.

The differences between those who were ‘Not Lonely’ and those who were ‘Lonely’ reflect findings in all of the studies reviewed in the moderation studies section. To compare with the results from another general population study (Cho et al., 2015), those who were lonely showed more risk of inflammation than those who were not. This study used a binary variable to address loneliness and did not factor in any element of distress. A number of the studies reviewed did use scores along a Likert scale to perform regressions (Chang et al., 2008; Hirsch et al., 2012; Tucker & Rodriguez, 2014; Zeligman et al., 2013). This allows some degree of comparison to be made with degrees of loneliness as opposed to dichotomous conditions of loneliness. These studies did find that higher levels of loneliness reflected higher levels of the dependent variables in the studies. Zeligman et al. (2017) found that loneliness moderated the relationship between trauma and posttraumatic growth. Those with increasingly higher scores of loneliness showed less growth after trauma. Hirsch et al. (2012) found the same in studying loneliness as a moderator between social problem solving and suicidal behaviours. Chang et al. (2008) again found the same relationship with rising scores in loneliness in the relationship between perfectionism and both depressive and anxious symptoms. Finally Tucker and Rodriguez (2014) found this again in the relationship between stress and risk of physical abuse. Although none of the studies in the review which used scores along a scale (Chang et al., 2008; Hirsch et al., 2012; Tucker & Rodriguez, 2014; Zeligman et al., 2013) specifically address if these lonelier people were more distressed, it is plausible in the context of the literature and the findings of these studies that distress is associated with those with the highest levels of loneliness. These findings add support for that flavour in the literature which suggests that to be lonely to an extent is part of being human (Jones, 1987; Young, 1982). That triggering loneliness will motivate humans to search for contact (Baumeister & Leary, 1995; Cacioppo et al.,

2000; Victor et al., 2000; Weiss, 1973). And that the real problem becomes if a human being reaches levels of loneliness that are distressing (Hawkley & Cacioppo, 2010). But what of those in the sample for whom moderation was not observed?

Where Moderation Does Not Exist

In this thesis, the large size of the sample has been of benefit consistently, however there are shortcomings in terms of the level of stratification of the data at this stage of the study. Table 6.1 shows that in the total sample only 451 participants endorse this highest level of loneliness, 279 females and only 172 males. These groups are then intersecting with the social defeat and trauma groups, with the trauma groups in particular reflecting very small sections of the data. In particular for males, the sexual abuse class reflected 0.7% of the male data as reported in chapter 2, Figure 2.1. This has plausibly had an influence on results for moderation in term of the small sample sizes for both trauma groupings and in particular loneliness groupings. There is a pattern of results consistent in the data whereby the moderation pattern starts to emerge and then disappears in the lonely and distressed level. To illustrate, Table 6.1 shows the relationship for males between being in the migrant social defeat class with discrimination. Moderation exists between the not lonely and the lonely group, then for the lonely and distressed' group, the effect disappears. The same is true in the pattern between the female drug abuse social defeat class and the practical social support factor, again between females in the drug use social defeat class and discrimination, and for males in the drug use social defeat class in the relationship with the social support factor of advice. This pattern can be seen across the results tables, Table 6.1, Table 6.2 and Table 6.3.

This pattern becomes more evident when we address the fact that findings were stronger for the females in the trauma groups compared to the males. Fisher et al.(2009) found gender to be a moderating factor in studies addressing the relationship between childhood trauma and the development of psychotic experiences. However, Shevlin, Murphy, and Read (2015b) addressed what they believed to be methodological issues with the finding of moderating affects in this relationship by addressing issues with males and endorsement of trauma. Males endorse less trauma, in particular sexual trauma. Chapter 2 of this thesis recorded rates of endorsement of trauma in the current sample (chapter 2, Table 2.3). In terms of molestation only 233 males, representing only 1.5% of the male data endorsed. For sexual abuse this was even lower at 166 or 1.0% of males. This translated in terms of the latent class groupings into a male sexual abuse class which reflected only 0.7% of the male data. Shevlin et al. (2015b) turned to a prisoner sample which had both more males and more males who endorsed trauma and found there to be no moderating effects by gender. It is possible that the nature of the sample when this level of stratification was implemented did distort the moderation results. As stated above, the female data contained evidence of moderation as did the male data to a lesser extent. Some recurring themes from the literature provide reasons why that moderation exists.

Theoretical Implications

This section will address these recurring themes and will then discuss them in the context of the central model of this thesis (Figure 6.1, 6.2). These themes are: the role of threat, the role of perception, the role of stress, the role of the HPA axis, the role of negative evaluations, the role of coping strategies, the impact of distress, connections to PTSD findings, the loneliness loop and the social deafferentation hypothesis. The model

will be addressed chronologically, and the theoretical implications discussion will move from the left of the model to the right thereby following this chronical order. For these purposes, the argument for plausible temporal ordering is repeated here.

The model has been developed by the selection of the questionnaire items, by the nature of how the variables have been constructed, by their placement within the model and by the statistical techniques selected in a way that allows causality to be addressed. Questions about childhood adversity which underlie the childhood adversity variables were asked in the context of experiences of respondents when they were under 18 years old. The remaining social defeat variables make up the second independent variable. The questionnaire items from which they were constructed are concerned with IQ, migrant status, drug use and urbanicity. Education was used as a proxy for IQ and specifically addressed if a respondent finished high school, an experience which typically happens under the age of 18. Migrant status concerned information about where the respondent and their parents were born, again specifically related to early life. Urbanicity asked about where a respondent resides. Living in a city at any point is highly correlated with being born and spending childhood years in a city. The drug use question covers all the respondent's lifetime and so while not specifically tied to childhood years, it does include them. The model's mediators are social support and discrimination. The social support items from the questionnaire specifically ask about experiences for the respondent now. The discrimination questions used are restricted to experiences in the past year. The dependent variables were the PLE classes and the items underlying these classes are asked in the context of the present time.

Giants in the world of loneliness literature endorse a theory of connectedness being a human drive, a necessary evolutionary requirement (Baumeister & Leary, 1995; Cacioppo et al., 2000; Weiss, 1973, 1974). In childhood, humans develop skills needed for social survival (Boivin et al., 1995). Missing out on these skills will have impacts which are felt throughout the lifespan (Asendorpf, 1990). The left-hand side of the model upon which this thesis is based (Figure 6.1, 6.2) contains two very strong forces which undeniably will interrupt social development. When trauma and experiences of social defeat occur, the first of our recurring themes start to emerge. The experience of an environment of threat so early in the lifespan will trigger a number of processes. This excessive experience of threat leads to excessive stress with all the implications that has for both the HPA axis and the subsequent regulation of threat arousal (Cacioppo & Hawkley, 2003). In terms of cognitions, it will also trigger the development of negative evaluations of the self, of others and of the world (Cacioppo & Hawkley, 2009; Hawkley & Cacioppo, 2010). With that comes the development of coping mechanisms which may be based on being afraid of the implications of social interactions (Bowlby, 1988; Rubin & Coplan, 2004).

The scenario described above already draws strong parallels with the loneliness loop as described by Cacioppo and Hawkley (2009) and Hawkley and Cacioppo (2010). At the core of the loneliness loop is a sense of hypervigilance to threat. Hypervigilance to threat is also at the core of the model for this thesis due to the central placement of experiences of trauma in childhood and social defeat. This link between trauma and threat is established in PTSD literature (Cloitre et al., 2009; Yehuda, Halligan, & Grossman, 2001). One study even addressed that social support might be a mediator in the relationship between PTSD and the development of psychotic symptoms (Mueser et

al., 2002). In the event of childhood trauma, a cognitive bias has been established in which the world is seen as a threatening place. Perception has been shown to play a key role in a number of the processes throughout this thesis, in how a person reacts to stressors, in how a person interprets events, in how well people can access social support. People who establish the world as a threatening place as a result of negative childhood events are more likely to react by adopting passive coping strategies. In particular, avoidance. Because of the passive coping strategies their own behaviour creates more distance with those around them. Interesting here is the work of Norman et al. (2011) in one of the moderation studies reviewed. This work centred on the effect of loneliness on reactivity to oxytocin. Without that social contact, there is that reduced impact of oxytocin which has been implicated in all those positive social processes: encoding of social memories, facilitation of positive communication and a decreased physiological reaction to threat. This is a very complex issue. It is multi-faceted. It involves the physical, the psychological, the emotional and the behavioural elements of being human. Social isolation now becomes a factor in the loop. As levels of fear, pessimism and anxiety increase so do levels of stress. The individual can now also see that people are distancing themselves thereby reinforcing what they already believe. The loneliness loop has become established. The individual is now primed to see the world and other people as increasingly unsafe and unwelcoming.

To move to the middle section of the model, mediators then come into play. This loop perpetuates. Those living the loop may respond in less effective ways to negative experiences. They will respond differently to people. Experiences of discrimination and a lack of social support in terms of advice, practical help and having people to perform day to day activities with, will all compound the loneliness cycle and all its constituent

elements. There is no alternative viewpoint which can present the world in different, more positive terms. No suggestions of places to access help, or someone to talk things over with. Everything that happens within the context of the loneliness loop only serves to reaffirm this view of the self, others and the world as being negative, unfriendly, and unhelpful. Those who feel lonely are more likely to cope by self-medicating or by avoiding social interactions which already cause distress (Heinrich & Gullone, 2006). The HPA axis is primed for threat and will respond with elevated stress levels and all of the negative implications for health and wellbeing. Sleep may be disrupted, again with all of its vital links to health and wellbeing (Cacioppo et al., 2002a). So, how does all this link with the dependent variables of the model, the clusters of PLEs?

One theory in the literature linking these experiences in the model with the subsequent emergence of psychotic symptoms within the context of loneliness, is the social deafferentation theory (Hoffman, 2007). All these experiences and the establishment and perpetuation of the loneliness loop result in the removal of meaningful social connections. The social brain will then react in the same way in which the physical brain reacts to the removal of a source of stimuli, such as a limb. It will reorganise and produce, in this case, psychotic symptoms. These may be in the form of hallucinations or delusions and they will most likely contain content which is of social meaning to the person (Hoffman et al., 1994; Leudar et al., 1997; Nayani & David, 1996). The moderation shows that along the pathways of the model, stronger effects can be seen for those who are lonely as opposed to those who are not lonely, with the strongest effects being for those who are lonely and distressed. This all lends support to the viewpoint that actually, social isolation may well precede the onset of psychotic symptoms as well as being as a result of them (Hafner et al., 1999; Hoffman, 2007; Hoffman et al., 2008;

Kwapil, 1998; Tan & Ang, 2001; van Os et al., 2000). Again, anecdotal accounts of extreme cases of isolation do support this hypothesis (Bond, 2014; Diab, 2016), 'you start to see human characteristics superimposed on the vocalisations of these animals.' (Diab, 2016, para. 11). Once these symptoms emerge and reach a clinical level, intervention is needed. The model in this thesis however does suggest that targeting loneliness, particularly at early stages of the model, can prevent clinical levels of psychosis.

Clinical Implications

> 'loneliness should command clinicians' attention in its own right'
> (Heinrich & Gullone, 2006, p. 695).

Society Level Interventions

Addressing childhood trauma as covered in the previous chapter remains a clear and obvious choice as the point in which to interject in this model. The earliest possible intervention would aim to prevent the cycles at the core of the negative outcomes becoming established. If trauma does not occur to being with, the extreme outcomes which may be associated with that trauma will not manifest. Given that we do not live in an ideal world, and interventions aimed at eradicating childhood trauma are very much a work in progress, and given loneliness does exist and perpetuate, it is right that it is becoming considered as a public health issue in its own right. A lot of the research and application of interventions to date has been targeted at older people (Cattan, White, Bond, & Learmouth, 2005; Gerst-Emerson & Jayawardhana, 2015; Hunter, 2012) with interventions in childhood being a neglected area (Qualter, 2003). This is

understandable given that older people are a high-risk group for becoming lonely due to changes in lifestyle such as retirement, bereavement leading to the loss of both family and friends and illnesses associated with becoming older. However, if we address the need for interventions in the context of the model used in this thesis, the clear area of maximum impact is on the left-hand side of the model, at the beginning, when the cycle is most likely to become established.

Turning to the literature, the earliest point in development from which loneliness can become established is during infancy with attachment issues (Bowlby, 1969, 1973). Given that it is seen to be a stable trait and given the compelling list of negative outcomes associated with it, this seems like a logical place to target interventions. There is a second reason to also target interventions in childhood. As stated, this is a neglected area in terms of research and interventions are the best tool for informing and revaluating scientific research,

> ‘The role of interventions then, is not only about bringing change to individuals, but also interventions are extremely useful scientific tools’ (Qualter, 2003, p.13).

Childhood interventions can be delivered in a number of environments, such as in the home or through support services for families. One environment in which the majority of children will be found together is the school environment. Qualter (2003) discusses a number of ways in which the school environment can be used to implement interventions. One level is the whole school level. Interventions at this level can be in the form of policies on behaviour for example. Another whole school intervention can

be one in which classrooms and playgrounds are set up to ensure all children engage in social play through cooperative group work and play interventions. This might involve organising desks in the classrooms in pods, or incorporating cooperative learning groups. This level ensures that no child misses out and no child is singled out for help which helps reduce the chance of a child being stigmatised. Several studies also comment that there is an implication in terms of teacher training to help teachers develop skills needed to find lonely children. Other school based interventions can be working with the individual which is detailed below.

Interventions at an Individual Level

Each study reviewed for this chapter which specifically looked at the moderating effects of loneliness, without exception, called for clinicians to screen for loneliness in their clients (Chan et al., 2014; Chang et al., 2008; Cho et al., 2015; Doane & Thurston, 2014; Hirsch et al., 2012; Murphy et al., 2015; Norman et al., 2011; Shafiq & Malik, 2017; Tucker & Rodriguez, 2014; Zeligman et al., 2017). This is a finding which is reiterated in the overall literature on loneliness. Once loneliness has been identified as an issue, there are a number of approaches which are suggested in the literature. The same approaches are suggested for both children and adults, obviously with the caveat that the environment and the therapy be adapted for delivery to children. Delivery to children may be facilitated through schools or through conventional therapeutic channels.

Given that some of the findings of this research point to the fact that a degree of loneliness can be expected as part of the human condition (Heinrich & Gullone, 2006; Jones, 1987; Young 1982), cognitive restructuring is one way in which to help those

who perceive themselves as lonely to reframe the context of their loneliness and to impact on their perceptions (Chang et al., 2008; Hirsch et al., 2012). Throughout this thesis and strongly in this current chapter, the role of perceptions has been highlighted. So, if a person could be helped to see some of the time they spend alone in a different context and as something that all humans experience from time to time, it has the potential to reduce that distress element which is associated with that.

Cognitive restructuring can also be employed to target the self-defeating thoughts which are common to children and adults who feel lonely at a chronic level. This negative focus of themselves, others and the world has been a common theme running through the literature. Lonely individuals may misinterpret information from the environment and their own internal world, through the mechanisms of the loneliness loop in a way that maintains their negative view. A number of techniques have been shown to be successful in challenging these beliefs. At the core of these is to teach lonely people to identify these thoughts and to regard them, not as fact, but as a hypothesis to be tested based on actual evidence. A feature of these thoughts may be the use of words such as ‘everyone’ and ‘always’. For example, the belief that everyone always ignores me. Challenging this thought would entail looking for examples that support that statement and looking for examples that do not support it. This could be adapted for the classroom perhaps using resources such as circle time for group discussion or through the use of personal journals which help children explore these types of beliefs.

Complementing this technique of challenging self-defeating beliefs, is a set of interventions which focus on teaching the individual social problem-solving skills to help develop the skills needed to form relationships. Again, these can be adapted for use

with children and delivered in a classroom setting. These types of interventions are aimed at teaching lonely people how to initiate and maintain friendships. It can be seen that employing these interventions at the early stages of the model on which this thesis is based has the advantage of providing a ready-made environment. Children are already in a setting which is rich in social context providing the perfect backdrop to practise social skills. Children can be taught skills such as how to participate in groups and how to enjoy interaction. It can be much harder for a lonely adult, in which the trait has become more stable, to find opportunities to try out new social skills.

Strengths and Limitations

All strengths and limitations build on those detailed in the previous chapter covering the model in its entirety. With the addition of social isolation, as has been seen, the model in terms of explaining variance has been improved. A vitally important part of the way in which social isolation has been operationalised in this current study is in the way that the element of distress has been contained in the measure. This is the only study identified addressing the moderating effects of loneliness which has incorporated this element of distress. Additional limitations of the study are that at this level the groups of people who are at the more extreme level of the measures used are becoming small enough to lose their utility in this type of analysis. The most traumatised, the most isolated groups are naturally to be found in clinical and high-risk samples (Shah et al., 2014). However, this study wished to address the experience of PLEs in the general population and so that was the guiding principle that had to take priority. The single item measure used to assess social isolation is also subject to the possibility of validity and reliability issues compared to a multi-item scale. However, this measure allowed operationalisation of the vital level of social isolation which identifies those people who

are emotionally distressed by their isolation. The measure used is also of value in that it does not contain the word ‘lonely’. Heinrich and Gullone (2006) point out in a review of the loneliness literature that loneliness is more likely to be under reported when the word ‘lonely’ is used. The measure used in the study while still at risk of creating bias due to the potential perceived stigma of not reporting having many friends, does avoid the use of the word ‘lonely’. It then allows levels of distress to be assessed using the second part of the question.

Conclusions

There is evidence that there are groups of people in society who are lonely, but there is also evidence that not all of these people are distressed by their loneliness. This element of subjectivity has a role to play. For those who report that they have had few friends but are not distressed by it, this loneliness may be due to a need for solitude, it may be a transient state, they may have that one relationship which brings the quality of companionship they need to prevent the many and varied impacts of loneliness. Even for these people however, through the testing of the latent variable framework used in this model, it could be seen that there is an impact in the form of stronger mediating and moderating effect sizes along the pathways from experiences of trauma in childhood and experiences of social defeat, to the development of PLEs. However, those people who were distressed by their loneliness showed the most dramatic increases in effect sizes where moderation was evident. These are the group of people who show that a dose response effect does exist in regards to the effects of loneliness. The effects of loneliness are becoming increasingly clear through the mounting research being done in the area, and this evidence of a dose response effect is important in developing strategies to deal with loneliness. The size and the diversity of the list of negative

outcomes for those who feel lonely compels public health authorities to tackle this as the public health issue it is. Studies such as the present one add to that, it also shows that to be most effective, this top tier of people who feel distress at the loneliness they feel may be the most beneficial to initially target. In terms of those who experience trauma in childhood, who experience social defeat in early life, who then go on to experience deficits in social support or discrimination, which culminate in PLEs, the model has shown there to be evidence of moderating effects in relation to loneliness, most strongly for those who are female and who have experienced childhood trauma. This research also supports that for loneliness, like for childhood trauma, the optimal point for intervening in terms of ethics and effectiveness, is at the beginning. Interventions which target children to help prevent the trait of loneliness becoming stable are the ones which are the most likely to interrupt the process of becoming a lonely adult, with all the negative consequences that come with that. Including the potential to advance along the continuum of psychosis.

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Chapter 7

Discussion

Introduction

The central aim of this thesis was to provide evidence to support the paradigm shift away from a solely medical model view of psychosis and further, to show that social and environmental factors can play a role in the development of psychosis, and to greater understand how they do that. This was facilitated through a number of sub level aims. Firstly, to show that psychosis does occur along a continuum. Secondly, to show that the social factors of childhood adversity and social defeat are associated with these experiences of psychosis. Next, to show that social support and experiences of discrimination have a mediating role to play in these associations. Finally, to show that loneliness has a moderating role.

There were a number of defining features of this thesis which were described in chapter 5 and which are also considered throughout this discussion. These were firstly, that this work would move beyond the plentiful bivariate work that has been done and would address both direct and indirect effects. Secondly, that the statistical techniques which would be used would be in line with this move away from bivariate to multivariate work and would harness the power of the large dataset used in the study. Techniques such as LCA, CFA, mediation and moderation. The final guiding principle was that the role of gender would be addressed at each stage of the work done.

Bivariate Work

The thesis grounded itself in sound bivariate work in the initial phases, chapters 2, 3 and 4. It did this by addressing, at the core, the relationship between childhood trauma and

the development of psychosis, a relationship which has become established in the literature (Ashcroft, Kingdon, & Chadwick, 2012; Bendall, Jackson, Hulbert, & McGorry, 2008; Braehler et al., 2013; Gallagher & Jones, 2013; Johnstone, 2009; Misiak, Moustafe, Kiejna, & Frydecka, 2016; Read, Perry, Moskowitz, & Connolly, 2001). In terms of childhood trauma, this thesis addressed methodological issues in the study of these traumas (Pereda, Guilera, Forns, & Gomez-Benito, 2009; May-Chahal & Cawson, 2005; Wissink, van Vugt, Moonen, Stams, & Hendriks, 2015) and looked at not just the occurrence of, but also, the co-occurrence of both abuses and familial factors which contribute to abuse. In terms of psychosis, it sought to show that it exists along a continuum and to reflect that in its relationship with childhood trauma. It also sought to provide a unique way to operationalise social defeat beyond using proxies of these experiences and, further, to establish in a similar way, as with childhood trauma, that these experiences are associated with PLEs. These initial steps were firmly in the area of bivariate work and supported work which has already been done.

Multivariate Work

After these bivariate phases were completed, the thesis moved into the multivariate stages, chapters 5 and 6. It moved beyond the secure foundation of establishing these associations into developing a latent variable model validated by a plausible temporal order, which controlled for established risk factors. This model showed that social factors have both mediating and moderating effects in the relationship that both childhood trauma and social defeat have with the development of PLE symptom clusters while controlling for well-known confounders. Beyond this, it offered explanations as to why that might be. Explanations that address both theory and clinical

implications and in doing so, strengthen the move away from the medical model as the sole pathway used to explain the vast array of experiences of psychosis.

Experiences of Childhood Trauma.

The foundation upon which this thesis was built is the relationship between childhood trauma, abuse or adversity, and the development of PLEs. Work began by addressing how childhood trauma would be operationalised. A large population sample was used as the basis for addressing the methodological limitations which were apparent from a study of child abuse prevalence rates. These issues revealed themselves in studies at global (Finkelhor & Dziuba-Leatherman, 1994; Pereda et al., 2009), national (Perez-Fuentes et al., 2013) and UK (May-Chahal & Cawson, 2005; Radford, Corral, Bradley, & Fisher, 2013) levels. The sample used in this thesis allowed the study to move beyond issues with

sample type (Stoltenborgh, van Ijzendoorn, Euser, & Bakermans-Kranenburg, 2011), sample size (Pereda et al. 2009), restrictions in age limits and lifespan coverage (MacMillan, Tanaka, Duku, Vaillancourt, & Boyle, 2013), type and range of abuse. Issues which have been brought together in a number of meta-analytical studies (Pereda et al. 2009; Stoltenborgh et al., 2011).

Using LCA, this study allowed classes of people with similar experiences of abuse and trauma to be identified. Rates of abuse were shown to be within the range of other studies done (Laaksonen et al., 2011; MacMillan et al., 2013; Mohler-Kuo et al., 2014; Perez-Fuentes et al., 2013, Shah et al., 2014), in as much as it was possible to compare and contrast given the methodological issues covered. Similar gender patters of endorsement emerged such as males reporting more physical abuse than females but not

with the large disparity that is seen when comparing gender rates of sexual abuse. Females report sexual abuse in much higher rates than males. This study broke sexual abuse into molestation and abuse that involved attempted or actual penetration, allowing for further examination of different types of sexual abuse.

The use of LCA provided the ability to group people with similar shared experiences together and so addressed the central issue of poly-victimisation which has been lacking in studies of childhood abuse (Finkelhor, Ormrod, & Turner, 2007). Further, it allowed the integration of familial issues which have been shown to be relevant (Brown, Cohen, Johnson, & Salzinger, 1998; Finkelhor & Dziuba-Leatherman, 1994; Finkelhor, Ormrod, & Turner, 2009) into the design of the study. From the LCA a clear picture of groups of people who experienced similar types of adversity, with similar family constellations, emerged. At this stage the relevance of gender to the study, became apparent with the female classes presenting an extra class of people who were more likely to experience both sexual and physical abuse. This use of LCA allows understanding of the experiences of abuse, trauma and adversity and the patterns in which these happen that goes beyond what can be understood by addressing endorsement rates alone. The next stage of the work was to address the operationalisation of PLEs.

Psychosis on a Continuum

Research and advancement in statistical techniques have meant that views of psychosis have moved far beyond the traditional view of a dichotomous state caused by the presence or absence of an illness (Kraepelin, 1919). Psychosis has shown itself to be both hierarchical and dimensional. Symptoms can be classified as positive, negative or

disorganised (Cochrane, Petch, & Pickering, 2010; Misiak et al., 2016). Positive symptoms can be further broken down into hallucinations and delusions (Johns & van Os, 2001; van Os & Kapur, 2009). Within hallucinations there are the dimensions of auditory, verbal, olfactory, tactile or taste. Beyond hierarchies and dimensions, network modelling offers the concept of sets of interconnected agents with links that differ in strength or weight (Borsboom & Cramer, 2013; Looijestijn, Dirk Blom, Aleman, Hoek, & Goekoop, 2015; McNally et al., 2015).

This study used a three-factor approach to conceptualise the symptoms of psychosis in line with previous studies (Battaglia, Cavallini, Macciardi, & Bellodi, 1997; Bergman et al., 1996; Fossati, Raine, Carretta, Leonardi, & Maffei, 2003; Gruzelier, 1996; Raine et al., 1994) including those which have used the NESARC dataset specifically (Ahmed et al., 2013). As the study was done at a population level, subclinical experiences were able to be used as the focus of the study. This approach reflects the assertion that psychotic experiences are present in the population at a range of levels (Ahmed et al., 2013; Strauss, 1969). Perceptual anomalies are at one end of this scale, with experiences along the scale differing in ways that are quantitative as opposed to qualitative. At the other end of the scale are experiences which require clinical intervention. As well as number and duration of experiences separating points on the scale, so does the level of distress associated with them (Shevlin, Boyda, Houston, & Murphy, 2015a). Studying these experiences in the general population allows the study of experiences which differ only quantitatively from severe psychotic symptoms without the confounders they bring and the confounders further added by psychiatric service utilisation (Newbury et al., 2016).

Findings as documented in chapter 3 supported this continuum view of psychosis. Responses to questions asked on the individual experiences items were skewed in terms of no endorsement, an endorsement of the item, and the item causing disruption to the life of the respondent. A response of endorsement was viewed as a schizotypal experience with a response indicating disruption being viewed as moving into PLE territory where severity of the experience is moving toward becoming clinically relevant. The largest group of respondents reflected no experiences, with a smaller group indicating they had experiences in the schizotypal range which did not disrupt their life, and the smallest responding in the PLE range. These findings were in line with existing research. A view which presents the experience of psychosis as much more integrated with the full range of human experiences which are typically represented along a sliding scale (Strauss, 1969; van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendaum, 2009). Analysis was stratified by gender dictated by the differences that emerged in relation to the childhood trauma classes. Psychosis was represented along a continuum for both males and females. Attention now turned to addressing associations between the trauma classes developed in chapter 2 and the PLE clusters.

The Relationship between Childhood Trauma and PLEs

So, having operationalised experiences of trauma in the form of classes of males and of females who had similar experiences of a range of both traumas and familial factors, and having established endorsement rates for each item across the PLE clusters, the next step was to use chi-square analysis to determine if that bivariate link was there. It was found to be present. All chi-square test results across genders and symptom clusters were significant. Further to that there was a consistent pattern across the genders of

those classes which represent the most traumatised members of the overall sample endorsing both the symptom clusters and the individual items in the highest percentages.

The Relationship Between Social Defeat and PLEs

Social defeat was the second independent variable in the study and was treated in the same way as childhood trauma in terms of the way in which it was operationalised. This approach is unique in the literature in that it used the actual components of social defeat (Selten & Cantor-Graae, 2005; Selten, van der Ven, Rutten, & Cantor-Graae 2013) as opposed to using proxies such as affective responses to being socially defeated (Valmaggia et al., 2015; van Nierop et al., 2014). Latent classes were identified based on the components of social defeat in line with the Selten and Cantor-Graae model: IQ, migrant status, drug use and living in an urban environment. Once the classes were identified, chi-square analysis showed that there were again bivariate associations between all classes of social defeat and endorsement of all PLE items across the symptom clusters. Murphy, Shevlin, Houston, and Adamson (2014) showed that LCA can be used to summarize patterns of co-occurrence for variables that are not necessarily within the same psychological or behavioural domain which is potentially true of the constituent elements in the social defeat model. In this model, LCA did prove to be a useful way of identifying complex patterns of occurrence and co-occurrence of these constituent factors of social defeat beyond that which could be seen by calculating chi-squares.

The case for Social Factors – A Paradigm Shift

Once this foundation of bivariate work was established, the study moved into the multivariate stage, broadening the implications of findings beyond purely identifying associations. The work then focused on finding explanations for these associations by drawing together the individual elements of the study developed up to that point and unifying them in a fully testable latent variable model, bringing to life the theory behind the framework.

Mediation Findings

The social factors which were selected from the NESARC database as the focus for the mediation were social support and discrimination. Also at this stage a robust set of well-established risk factors were operationalised – a lifetime diagnosis of anxiety, a lifetime diagnosis of depression, marital status, income and age. Again, with respect for the gender differences identified in the study, six mediation models each were run separately for male and female data. The best of these were identified in both cases as being the model which incorporated direct and indirect effects and which included the covariates. In terms of gender, differences in mediation findings were categorised as being subtle. Full mediation was seen to have occurred on pathways between social defeat and the PLE symptom clusters with the addition of the mediators and the covariates. Pathways which were significant in the bivariate relationship became non-significant while the mediating effects did reach significance on some paths. There was no evidence of full mediation on the pathways from the trauma classes to the PLE symptom clusters, however partial mediation was seen to have occurred. None of the c' pathways lost significance but the mediating pathways did show significance. As all bivariate pathways were significant for both childhood trauma and social defeat, indirect

effects of mediation were not seen. The presence of mediation at varying degrees was in line with the review of studies done previously which had addressed the relationship between childhood trauma and non-psychotic or mixed psychopathology (Shevlin, McElroy, & Murphy, 2015b; Sperry & Widom, 2013; Vranceanu, Hobfoll, & Johnson, 2007), between childhood trauma and psychosis or PLEs (Murphy, Murphy, & Shevlin, 2015; Murphy, Shevlin, Adamson, & Houston, 2013; Sheinbaum, Kwapil, & Barrantes-Vidal, 2014; van Nierop et al., 2014), and between childhood trauma and specific symptoms of psychosis (Fisher, Appiah-Kusi, & Grant, 2012; Perona-Garcelan et al., 2012; Pilton et al., 2016; Sitko, Bentall, Shevlin, & Sellwood, 2014).

There were no relevant previous studies with which to compare findings for the relationship between social defeat and the development of PLEs. One previous study (Stowkowy & Addington, 2012) had looked at this relationship using negative schemas as a mediator, however this study used a proxy for social defeat in the form of the affective response to perceived experiences of defeat. This thesis was unique in the operationalisation of social defeat and with the Stowkowy and Addington (2012) study, was one of the first to address mediating factors in the relationship.

Moderation Findings

The study of the moderating influence of loneliness in these relationships is extremely limited with only one other study addressing this (Murphy et al., 2015), in spite of a wide range of studies which have addressed the moderating role of loneliness in a variety of other areas (Cho, Seeman, Kiefe, Lauderdale, & Irwin, 2015; Doane & Thurston, 2014; Norman et al., 2011; Shafiq & Malik, 2017; Tucker & Rodriguez, 2014; Zeligman, Bialo, Brack, & Kearney, 2017). Moderation was found to be present,

the effects were identified more strongly for the childhood trauma variables than for the social defeat variables. They were also more in evidence for females than for males. One of the key strengths of this study was that it used a large general population sample, however this became a limitation at this stage of the study where a large clinical sample may be more suitable in evidencing moderation effects. This discussion now turns to addressing the implications of the mediating and moderating effects identified.

Theoretical Implications

The theoretical implications of testing the latent variable model in this thesis are plentiful and wide ranging. In terms of theoretical findings importance is assigned to: the role of childhood experiences; the role of stress; the role of distress; the role of the HPA axis; the role of coping strategies, the role of individual perception; the role of cognitive distortions; the role of aberrant salience, the loneliness loop, the social deafferentation theory, the role of hypervigilance. These theories are the building blocks that can be used to explain the relationships indicated by the findings in this study that even then represent only a small sample of the intricate relationships between human experiences, the human body, and psychological reactions and the constant interaction between these.

Clinical Implications

While examining the potential role of public health level interventions, this thesis asserted that given the nature of its central relationship between traumas in childhood and the development of PLEs, the severity of the outcomes for individuals dictate that interventions at the individual level are more appropriate and correct. Elements like the importance of developing a full trauma history when planning clinical interventions

have merged consistently, in line with the findings of other studies (Pilton et al., 2016; Read, Fosse, Moskowitz, & Perry, 2014; Sheinbaum et al., 2014; Sitko et al., 2014, van Nierop et al., 2014). The use of therapies which can target the negative beliefs which can become a feature of the psychology of the individual after experiences of trauma, social defeat, erosion of social support and discrimination, was another strong theme that emerged from this thesis. Therapies which can specifically address the social causes of difficulties (Read et al., 2014). These may be targeting those beliefs, providing ways to facilitate access social support, teaching social problem-solving skills, helping decrease levels of loneliness. The thesis does conclude that it is right that loneliness is becoming considered a public health issue and as such interventions at this level are appropriate. Particular relevance is given to campaigns which can target interventions in childhood which is seen as being of central importance to prevent many of the impacts documented in this thesis.

Conclusion

Epigenetics and neuroplasticity highlight the power that the environment has as it constantly interacts with, and changes, the human body and mind. Epigenetics show the power the environment has before we are born, possibly generations before. Neuroplasticity shows that those responses to the environment move beyond genetics to influence the human body throughout the lifespan dependent on experiences. This thesis has shown, using a large population sample and that there are associations between experiences of childhood trauma and experiences along the continuum of psychosis. That there are associations between experiences of social defeat and experiences along the continuum of psychosis. This thesis has used latent variable modelling to show that beyond these associations, social factors account for both mediating and moderating

effects in these relationships. The aetiology of psychosis continues to show itself as being complex and multifactorial with many pathways to a variety of expressions. The clinical implications for these findings are clear. As understanding of the causes of psychosis expands, so too must treatment responses to psychosis.

These findings are important. They are important for those who experience psychosis. They are important for the families of those who experience psychosis. They are important for society. They are important for helping society to understand and support those who experience psychosis. So that instead of fearing those who are seen as different, society can understand that people experiencing psychosis are having experiences which are an extension of what we all experience. They are important for helping to decide how public money is spent. Should some portion of the funding spent on finding pharmalogical solutions to experiences of psychosis be redirected into solving the social causes of psychosis, into delivering public health level interventions for those who are lonely, into delivering individual level interventions such as cognitive restructuring or social problem solving?

Evidence continues to accumulate which shows that it is time for a paradigm shift in how psychosis is viewed. Evidence which now includes this thesis. Factors beyond the genetic factors that have kept the medical model as the dominant paradigm are proving to have not only associations with, but to have causal roles, in these associations. This thesis adds to the calls that social theories of psychosis must be developed in terms of our understanding beyond the establishment of links between social factors and psychosis (Brand, Rossell, Bendall, & Thomas, 2017). This thesis supports the assertion that psychosis is linked to disruptions in adaptation to social context (van Os, Kenis, &

Rutten, 2010). Treatments therefore must be linked to understanding the context in which the individual experiences the world. Understanding the relevance of trauma in their life, understanding the background in which their early life was lived, the issues they currently face, all of this will allow relevant and useful treatment plans which allow people to move towards recovery. As with all illnesses, whatever the pathway from which they develop, the goal surely is recovery.

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