The Relationship Between Childhood Trauma, Person Beliefs and Trust in a Clinical Sample of People Experiencing Paranoia in Psychosis.

Melissa Hoban

D.Clin.Psy. Thesis (Volume 1)

2020

University College London
UCL Doctorate in Clinical Psychology

Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

Name: Melissa Hoban

Date: 19/06/2020
Overview

The current thesis investigated two factors associated with psychosis; childhood trauma and person beliefs. Part one was a systematic review that quantitatively synthesised the existence of person beliefs in people with psychosis and at risk mental state (ARMS) compared to healthy controls, and the association of person beliefs with paranoia. More negative and less positive person evaluations were present in those with psychosis and ARMS, and negative person beliefs were consistently associated with paranoia. The greatest differences and associations were at the lower end of the psychosis continuum. A correlational meta-analysis for positive beliefs and paranoia could not be conducted due to the low number of studies available. The results are discussed in relation to models of persecutory delusions and help-seeking behaviour.

Part two used an interactive virtual reality scene with a friendly avatar to examine the impact of childhood trauma and person evaluations on trust (trust appraisal and trusting behaviour). Twenty-two male participants with psychosis experiencing paranoia were recruited. Virtual reality was reported to be a safe and valid tool. Trust appraisal was predicted by childhood trauma exposure, symptom severity and positive other-evaluations, whilst positive self-beliefs predicted trusting behaviour. The implications for clinical work and research were discussed. Part three was a critical appraisal which reflected on the process of recruitment, the complexity of studying psychosis and trauma and methodological considerations from both parts of the thesis. This was a joint project with a fellow trainee, Kate Watchorn. Each thesis had a different focus and work was completed and presented separately.
Impact Statement

A theme across both papers was the impact of childhood abuse on adult mental health, adding to existing literature highlighting the public health impact of childhood abuse. In both the literature review and empirical paper, a surprising finding was for the role of positive beliefs about the self and others. There has been a dearth of research into positive beliefs compared to their negative counterparts. Including them in future research as an outcome will further the understanding of their potential role in psychosis and how they interact with negative beliefs. Positive beliefs predicted trust, thus future research could focus on protective factors to psychosis and trauma that may inform positive beliefs. Promoting factors that enable trust may help to target social withdrawal and isolation in psychosis.

The findings of this thesis supports that evaluative beliefs could be a clear target for therapy, as they are formed and informed by early experiences, emotion and behaviour. Increasing positive person beliefs may help to deactivate the negative beliefs present in both psychosis and the sequelae of trauma. Being explicit about existing person beliefs and considering the use of interpersonal space as a safety behaviour, may aid the development of trust in the therapist when working with people experiencing persecutory delusions.

The high prevalence of people experiencing trauma in psychosis, and the impact of childhood trauma exposure on trust and trusting behaviours, supports a trauma informed approach to care being adopted by services. This would include routine trauma assessments for people with psychosis and offering trauma informed interventions. Considering an individual’s trauma history in understanding their symptoms and behaviour should be practiced in both the curriculum of doctoral courses and within services; shifting the focus from what is wrong with a person, to
what has happened to them and how they have survived. Taking this compassionate approach to understanding, for example attendance rates, can help to inform positive interactions in the face of potentially hostile behaviour.

Virtual reality was shown to be a safe environment for people experiencing persecutory delusions. The findings that both affect post virtual reality was positive and positive person beliefs were activated, supports the idea that virtual reality can be a safe environment to try out therapeutic techniques. Virtual reality is an exciting area for psychological intervention and increasing the ability to interact with the avatar should be a focus of future research. On a wider scale, governmental policy should invest in advancing this technology within NHS mental health services.

The findings of this research are intended to be disseminated in psychological journals and shared with the early intervention services that took part in recruitment. On a societal level, ensuring funding is going towards efforts to eradicate the pandemic of childhood abuse, developing measures to better identify survivors of trauma and support them in what is causing the most distress, is imperative. This could include increasing public awareness of the impact of childhood abuse, the different symptoms it can contribute to and the varied existing avenues for help.
Table of Contents

List of Tables ........................................................................................................... 11

List of Figures .......................................................................................................... 12

Part 1: The Literature Review .................................................................................. 15

Abstract ................................................................................................................... 16

1. Introduction ......................................................................................................... 17
   1.1 Evaluative Beliefs ............................................................................................. 17
   1.2 Person Evaluations and Adversity ................................................................. 18
   1.3 Person Evaluations and Psychosis Models .................................................... 19
   1.4 Existing Reviews ............................................................................................. 20
   1.5 Aims ................................................................................................................ 21

2. Method ................................................................................................................ 22
   2.1 Eligibility .......................................................................................................... 22
   2.2 Search Strategy ................................................................................................. 23
   2.3 Study Selection Procedure ............................................................................. 24
   2.4 Quality Assessment ......................................................................................... 26
   2.5 Planned Analysis ............................................................................................. 26
      2.5.1 Group-Comparison Analyses ................................................................... 27
      2.5.2 Association Analysis ............................................................................... 27
   2.6 Heterogeneity of Effect Sizes ......................................................................... 28
   2.7 Publication Bias ............................................................................................... 29

3. Results .................................................................................................................. 29
   3.1 Assessment of Quality .................................................................................... 30
   3.2 Evaluative Belief Measures: ........................................................................... 43
   3.3 Measures Used for Symptom Associations .................................................... 44
      3.3.1 Paranoia Measures ................................................................................... 44
      3.3.2 Psychotic Symptom Measures ................................................................. 45
   3.4 Group Comparison Quantitative Analysis ...................................................... 53
      3.4.1 Negative Self-Evaluations ....................................................................... 53
      3.4.2 Negative Other-Evaluations .................................................................... 55
3.4.3 Positive Self-Evaluation ................................................................. 57
3.4.4 Positive Other-Evaluations ............................................................. 59
3.5 Associations with Psychosis Symptoms ................................................. 60
  3.5.1 Negative Self-Evaluations ................................................................. 60
  3.5.2 Negative Other-Evaluations ............................................................... 61
  3.5.3 Positive Person Evaluations ............................................................. 61
3.6 Quantitative Associations with Paranoia. ................................................ 62
  3.6.1 Negative Self-Evaluations ................................................................. 62
  3.6.2 Negative Other-Evaluations ............................................................... 64
  3.6.3 Positive Evaluations ............................................................. 66
3.7 Summary of Meta-Analyses .................................................................. 67

4. Discussion ......................................................................................... 71
  4.1 Current Review Findings and Existing Literature .................................... 71
  4.2 Focussing on the ‘Other’ ........................................................................ 72
  4.3 Positive Evaluations- the Neglected Side? .............................................. 73
  4.4 Enhanced Role of Person Evaluations in the At Risk Group? ...................... 74
  4.5 Differences Across the Continuum ........................................................ 76
  4.6 Limitations ......................................................................................... 76
    4.6.1 Included Studies ........................................................................ 76
    4.6.2 Meta-Analysis ........................................................................... 77
  4.7 Clinical Implications: ......................................................................... 79
  4.8 Future Research ................................................................................ 80

5. Conclusions .................................................................................... 81

References .......................................................................................... 83

Part 2: The Empirical Paper ..................................................................... 96

Abstract ............................................................................................. 97

1. Introduction ....................................................................................... 98
  1.1 Childhood Trauma ........................................................................ 98
  1.2 Childhood Trauma and Psychosis ....................................................... 98
  1.3 Paranoia and Childhood Trauma ........................................................ 99
  1.4 Beliefs About the Self and Other ....................................................... 100
  1.5 Paranoia and Trust .......................................................................... 101
  1.6 Virtual Reality ............................................................................... 102
  1.7 Aims ............................................................................................. 104
1.7.1 Hypotheses .................................................................................................................. 104

2. Method .................................................................................................................................. 105

2.1 Overview ................................................................................................................................. 105
2.2 Research Design ....................................................................................................................... 105
2.3 Power Analysis ......................................................................................................................... 105
2.4 Participants ............................................................................................................................... 106
2.5 Recruitment ............................................................................................................................ 107
2.6 Overview of Study Day ............................................................................................................. 109
2.7 Virtual Reality ......................................................................................................................... 109
  2.7.1 The Scenario ....................................................................................................................... 109
  2.7.2 Contingency ......................................................................................................................... 111
2.8 Measures: ................................................................................................................................. 112
  2.8.1 Screening ............................................................................................................................. 112
  2.8.2 Pre VR .................................................................................................................................. 112
  2.8.3 During VR ............................................................................................................................ 114
  2.8.4 Post VR ............................................................................................................................... 115
2.9 Ethics .......................................................................................................................................... 116
2.10 Planned Analysis ..................................................................................................................... 117
  2.10.1 Does Childhood Exposure Impact Trust and Trusting Behaviour? ............................... 118
  2.10.2 Does Severity of Each Trauma Type Predict Trust and Trusting Behaviour? 118
  2.10.3 Do Person Beliefs Predict Trust? ....................................................................................... 118
  2.10.4 Exploratory Analysis ......................................................................................................... 118

3. Results ...................................................................................................................................... 119

3.1 Demographics ......................................................................................................................... 119
3.2 Data screening ........................................................................................................................ 120
  3.2.1 Missing data ....................................................................................................................... 120
  3.2.2 Assumptions ....................................................................................................................... 120
  3.2.3 Outliers ............................................................................................................................... 120
3.3 Virtual Reality Safety and Validity Checks ............................................................................. 120
  3.3.1 Affect .................................................................................................................................. 120
  3.3.2 Sense of Presence and Attention ....................................................................................... 121
3.4 Pre-Virtual Reality Variables .................................................................................................. 122
  3.4.1 Paranoia ............................................................................................................................. 122
  3.4.2 Person Beliefs ..................................................................................................................... 123
  3.4.3 Childhood Trauma ............................................................................................................. 125
3.4.4 Is Childhood Trauma Associated with Self and Other-Beliefs? ..................................127
3.5 Trust Towards a Virtual Agent ..........................................................................................131
  3.5.1 Impact of Contingency Manipulation ............................................................................132
  3.5.2 Impact of Severity of Paranoid Ideation .................................................................132
3.6 Study hypotheses .............................................................................................................133
  3.6.1 Do those who have experienced childhood trauma, compared to those who have not, report higher levels of subjective trust and keep further away from the avatar? ....133
  3.6.2 Severity of each type of childhood trauma will be associated with lower subjective trust and greater interpersonal distances. .........................................................135
  3.6.3 Do beliefs about the self and others predict trust towards a virtual agent? ......137
3.7 Summary of Findings: ...................................................................................................139

4. Discussion .........................................................................................................................139
  4.1 Prevalence of Childhood Trauma and Person Beliefs ..................................................139
  4.2 Virtual Reality: A Valid Tool .......................................................................................141
  4.3 Main Findings for Trust ...............................................................................................142
    4.3.1 Severity of Paranoia and Paranoid Delusions ......................................................142
    4.3.2 Trauma and Multiple Trauma Types .....................................................................144
    4.3.3 Emotional Neglect ...............................................................................................145
    4.3.4 Positive Beliefs .....................................................................................................145
  4.4 Inus-condition ................................................................................................................146
  4.5 Limitations ....................................................................................................................147
    4.5.1 Analysis and Interpretation ..................................................................................147
    4.5.2 Generalisability ....................................................................................................148
    4.5.3 Virtual Reality .......................................................................................................149
  4.6 Strengths .......................................................................................................................150
  4.7 Research Implications .................................................................................................151
  4.8 Clinical Implications .....................................................................................................152
  4.9 Conclusions ..................................................................................................................153

References ...............................................................................................................................155

Part 3: Critical Appraisal .........................................................................................................167

1. Introduction .........................................................................................................................168
  1.1 Recruitment ..................................................................................................................168
    1.1.1 Ethical Approval .................................................................................................169
    1.1.2 Involving care-coordinators ................................................................................170
List of Tables

Part 1: The Literature Review

Table 1  Two Component Search String for Systematic Search  23
Table 2  Characteristics of Included Studies  31
Table 3  Measures Used in the Studies that Reported an Association Between Person Evaluations and Psychosis Symptoms  47
Table 4  Summary of Meta-Analytic Results  69

Part 2: Empirical Review

Table 1  Contingent Avatar Behaviours  112
Table 2  Full Pack of Measures  116
Table 3  Participant Demographics  119
Table 4  Summary Statistics for Pre VR Measures  123
Table 5  Childhood Trauma Questionnaire Descriptives  126
Table 6  Associations Between the Trauma Subscales  127
Table 7  Correlation between Trust and Psychosis Symptoms  133
List of Figures

Part 1: The Literature Review

Figure 1  Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow-chart of the Study Selection 25

Figure 2  Meta-Analytic Output for Group Differences in Negative Self-Evaluative Beliefs 53

Figure 3  Meta-Analytic Output for Group Difference in Negative Other-Evaluative Beliefs 56

Figure 4  Meta-Analytic Output for Group Difference in Positive Self-Evaluative Beliefs 57

Figure 5  Meta-Analytic Output for Group Differences in Positive Other-Evaluative Beliefs 60

Figure 6  Meta-analytic Output for Association between Negative Self-Evaluations and Paranoia 63

Figure 7  Meta-analytic Output for Association between Negative Other-Evaluations and Paranoia 65

Part 2: Empirical Paper

Figure 1  Participant Recruitment Flow Chart. 108

Figure 2  Images from Piloting the VR scene 111

Figure 3  Mean Positive and Negative Affect Score (PANAS) Pre and Post VR 121

Figure 4  Side by Side Boxplots for the Spread of Each Person Belief Subscale 124

Figure 5  Mean Score for Individual Items on the BCSS 125

Figure 6  Mean Score for BCSS Subscales for Childhood Trauma Exposure vs No Exposure 128

Figure 7  Scatterplots of Associations Between Abuse Types and Negative Other Beliefs. 130

Figure 8  Relationship Between Subjective Trust and Interpersonal Distance 131

Figure 9  Impact of Multiple Trauma Types Exposure on Trust Variable 134
Figure 10  Association Between Abuse Subscales and Trust Variables  136
Figure 11  Association Between Beliefs and Trust Variable  138
Acknowledgements

“It’s so easy to laugh, it’s so easy to hate. It takes guts to be gentle and kind”

Smiths, 1986

I would like to thank first and foremost my research partner, Kate Watchorn. An intelligent and calm researcher, a kind psychologist and, a much valued friend. Her quick wit never failed to make me laugh in the harder moments and I am lucky to have done this journey with her.

I would like to thank my supervisor, Dr. Miriam Fornells-Ambrojo for her unwavering support, even through a pandemic! Her passion, dedication and knowledge for research, were essential factors of completing the thesis.

Thank-you to all the participants who gave their time, energy and expertise to this project. Your openness and bravery are humbling, and your expertise is invaluable. I would like to acknowledge the services who supported our recruitment, and whose friendly and welcoming energy made it a joy to visit.

I would like to thank David Swapp for his flexibility and good humour, sailing us through the, at times choppy, waters of the VR technology and booking systems.

A huge thank-you to my parents and sister for the proof reads, supportive acts and words of encouragement and love throughout the doctorate.

Finally, I would like to thank my partner, Joseph. Your ability to find the silly amongst the serious makes all of life’s paths easier and more enjoyable to tread.

Thank-you.
Part 1: The Literature Review

From the Self to the Other: A Systematic Review and Meta-Analysis of

Evaluative Person Beliefs Across the Psychosis Continuum
Abstract

**Aims:** Evaluations of the self and other people (person evaluations) are one factor considered in the development and maintenance of psychosis. Previous narrative reviews have predominantly focused on negative self-evaluations. This is the first meta-analysis to quantitatively synthesise the existence of both positive and negative person evaluations in people with psychosis compared to the general population and consider their association with symptoms across the psychosis continuum.

**Method:** A systematic search of the literature was conducted up to the 29/11/2019 which produced 27 papers. Twenty-three of these were quantitatively synthesised in group comparison and correlational meta-analyses.

**Results:** Individuals on the psychosis continuum held more negative and less positive person evaluations than controls, with the largest effects being found in the at risk mental state. Negative person evaluations were consistently associated with the continuum of paranoia and this was most pronounced for negative other-evaluations. Positive person evaluations were under-researched compared to their negative counterparts.

**Conclusions:** The findings support cognitive models that have implicated person evaluations as a factor for the development and maintenance of psychosis. Person evaluations may provide a concrete focus of therapy that could increase social participation. Future research is needed to consider how person evaluations interact with the multiple contributing factors to psychosis.
1. Introduction

Approximately one in every 150 people will be diagnosed with psychosis at some point in their lifetime (Moreno-Kustner, Martin & Paster, 2018). Psychosis represents a cluster of disorders where a person will experience their own combination of symptoms. Symptoms are grouped into positive (hallucinations, paranoid or grandiose delusions, perceptual abnormalities) or negative (withdrawal, alogia, avolition) domains (National Institute of Health and Care Excellence, NICE, Guideline 2014). Psychosis is associated with public stigma and discrimination, the symptoms are distressing and can lead to hospitalisation (NICE Guideline, 2014). Determining factors that contribute to the development and maintenance of psychosis is important to better inform interventions that reduce the impact of this disorder on a person’s life.

1.1 Evaluative Beliefs

One such factor are beliefs a person holds about themselves and other people (Freeman, 2007; Garety et al., 2001). The term beliefs can represent different inter-related concepts in the literature. Person evaluations represent appraisals of abilities derived from past experiences (Brown, Dutton & Cook, 2001). They can be about the self (self-evaluations) or other people (other-evaluations). This differs from related belief concepts such as global self-esteem, which considers the person as a whole, and relational beliefs, how a person believes they are represented in the mind of another. In this respect evaluative beliefs have been considered a facet of global self-esteem (Brown et al, 2001) and the belief concept most strongly linked to developing distressing emotions and behaviour (Ellis, 1973). Negative person evaluations have
been associated with mental health problems, such as depression, anxiety and psychosis (Beck, 1987; Chadwick et al., 1999).

1.2 Person Evaluations and Adversity

A child depends on their caregivers to keep them safe, if a caregiver is abusive it can be especially threatening to a child. Experiencing childhood trauma or a critical interpersonal environment can inform more negative self (I am weak) and other-evaluations (people are dangerous). These can exacerbate or trigger feelings of anxiety or vulnerability in social situations and influence social withdrawal or hyper-vigilance; emotions and behaviour that contribute to the sustained perception of threat characteristic of persecutory delusions (Fowler et al., 2006). This may form the basis of further relational beliefs (people will reject me if I try to socialise), and global self-esteem beliefs (on the whole I am unhappy with who I am; Rosenberg, 1965). The influence is bi-directional; at times of anxiety and low global self-esteem, more negative person evaluations may be triggered and contribute to symptoms (Alameda et al., 2020).

Person evaluations are constructs of the way a person see’s themselves and other people that are formed and informed by behaviour and emotions. As such, they are potentially clear targets for therapy which relate thematically to the ongoing distressing symptoms of psychosis and capture a person’s psychosocial environment (Alameda et al., 2020). This review will consider the role of both positive and negative evaluations across the existing literature. Barrowclough et al. (2003) highlighted the distinction of positive and negative evaluations and their independent effect on emotion and behaviour, as one can hold positive and negative beliefs simultaneously.
1.3 Person Evaluations and Psychosis Models

A cognitive model of the positive symptoms of psychosis suggest there are multiple interacting factors that contribute to symptom development and maintenance, one of which are more negative person and world beliefs informed by adverse early experiences (Garety et al., 2001). A recent systematic review and meta-analysis found self, other and world schemas to be the most consistent mediator of childhood abuse and psychosis, lending support to cognitive models of positive symptoms that highlight the role of trauma and negative beliefs (Alameda et al., 2020).

Trower & Chadwick (1995) highlighted the role of self and other-evaluations in their theory that there are two types of paranoia, ‘poor me’ and ‘bad me’ which differ by beliefs of persecution and punishment. In ‘poor me’ paranoia the persecutory delusion protects against explicit negative self-evaluations, by blaming the persecution of others for one’s feared lack of success. In ‘bad me’ paranoia the persecution is perceived as justified and is associated with beliefs about the self as bad. The category of ‘bad me’ paranoia has been reported as rare, with Fornells-Ambrojo & Garety (2005) finding only three participants out of forty who could represent this category. Rather than conceptualising the two as static categories, paranoia can be understood as a dynamic process with beliefs about deservedness of persecution fluctuating in response to the current threat (Marley et al., 2017; Udachina et al., 2012).

Bentall et al., (2001) put forward an updated defence model for persecutory delusions which involves underlying negative self-evaluations. Events and self-representations interact dynamically; if an event triggered an underlying negative
self-evaluation (I am a failure) an external attribution would be made to protect the individual’s explicit self-esteem. Yet the individual’s implicit (unconscious) self-esteem would remain low, contributing to self-esteem instability. There have been inconsistent findings regarding implicit-explicit self-esteem discrepancy in the literature. Implicit self-evaluations are beyond the scope of this review, for a comprehensive systematic review and meta-analysis testing the predictions of Bentall’s models see Murphy et al. (2018).

Freeman et al., (2002) applied Garety et al.’s (2001) multi-factored cognitive model to persecutory delusions, conceptualising delusions as attempts to explain anomalous experiences such as ambiguous social information or internal feelings. Their interpretation is informed by multiple factors, including negative person beliefs (Freeman, 2007; Freeman, 2016). For example, holding negative evaluations of the self as vulnerable and others as hostile would make a threat explanation of an anomalous experience more likely.

1.4 Existing Reviews

A narrative systematic review by Kesting & Lincoln (2013) investigated associations between self-concepts and persecutory delusions. They reported that, compared to healthy controls, people with psychosis endorsed more negative self-evaluations and had lower global self-esteem. Both of these self-concepts were associated with severity of paranoia across the continuum. People with psychosis surprisingly endorsed a similar amount of positive self-evaluations and the data was inconclusive for their association with paranoia. They concluded that, to get a more detailed understanding of psychosis, it is important to go beyond global self-esteem and into specific self-schemas. Their review did not review other-evaluations.
Tiernan, Tracy & Shanon (2014) narratively reviewed the literature for the association between self-concepts and paranoia. They reported that people with psychosis held more negative self-concepts compared to non-clinical groups and that more explicit negative self-concepts were associated with paranoia. More recently Beck, Himelstein and Grant (2019) did a narrative synthesis of existing literature reporting evidence that the cognitive triad form the content of positive and negative symptoms of psychosis and were associated to symptom severity. They found beliefs about the self as vulnerable and worthless, and others as dangerous and rejecting, were common for both positive and negative symptoms. Beck et al., (2019) reported that as an individual’s mental health improves more positive beliefs are activated, formulating that when positive beliefs are activated they deactivate negative ones.

1.5 Aims

Existing reviews of person evaluations in psychosis have either focused solely on self-evaluations or used a broad category of belief concepts (Beck et al., 2019; Kesting & Lincoln, 2013; Tiernan et al., 2014). This current review will expand on the findings of Kesting & Lincoln (2013) and address a gap in the literature for positive and other-evaluative beliefs, using measures specific to person evaluations. To the authors knowledge, this will be the first systematic review to assess both positive and negative person evaluations and quantitatively synthesise the results. Evaluative beliefs form the basis of how a person interacts with and adapts to their social world, understanding more about their presence in psychosis may help to inform interventions that improve a person’s quality of life (Beck, 1987; Fowler et al., 2006). The review addresses the following questions:
1. Are negative self and other-evaluations higher in people with psychosis compared to healthy controls?

2. Are positive self and other-evaluations lower in people with psychosis compared to healthy controls?

3. Are more negative and less positive self and other-evaluations associated with symptoms in psychosis?

2. Method

This review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) method (Moher, Liberati, Tetzlaff & Altman, 2009). A systematic search of the literature was undertaken to identify relevant papers to address this review’s questions.

2.1 Eligibility

Papers were included if they met all of the following criteria:

1. Participants had a diagnosis of psychosis spectrum disorder, at risk mental state (ARMS) or were from the general population
2. Used a measure of explicit self and/or other-evaluations.
3. Used a validated measure for psychosis symptoms
4. Had a non-clinical comparison group or reported an association between evaluative beliefs and psychosis symptoms
5. Written in the English language and published in a peer-reviewed journal
If studies met any of the following criteria they were excluded:

1. Examined mixed psychiatric groups (‘population using mental health services’) or non-psychosis diagnostic groups
2. Looked at the impact of therapeutic interventions on beliefs
3. Used a general measure of beliefs which contained person evaluative items amongst other related concepts e.g. self-esteem or relational beliefs

2.2 Search Strategy

Three databases were selected that were most relevant to this research question: Embasse, PsychInfo and Pubmed. An initial scoping search was conducted to determine a two-component search string (Table 1). This search string was entered into all three databases from the start date of each database up to and including the 25/11/2019 (Appendix 1).

Table 1

Two Component Search String for Systematic Search

<table>
<thead>
<tr>
<th>Psychosis/Schema*</th>
<th>AND</th>
<th>Evaluative Beliefs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosis/</td>
<td>Schema*</td>
<td></td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>“Self-schema”</td>
<td></td>
</tr>
<tr>
<td>Delus*</td>
<td>“early maladaptive schema*”</td>
<td></td>
</tr>
<tr>
<td>Persecut*</td>
<td>“other NEAR schemas”</td>
<td></td>
</tr>
<tr>
<td>Hallucinat*</td>
<td>“evaluative beliefs”</td>
<td></td>
</tr>
<tr>
<td>Psycho*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
Terms within the column were combined using OR. Then the two columns were combined using AND
‘Belief’ was not entered in the search string as it was trialled in the scoping search yet produced too many false positives (e.g. religious beliefs), emitting it allowed for sensitivity
“Self-evaluation” or “other-evaluation” was not used in the final search string as they produced too many false positives during the scoping search (e.g. organisational performance reviews)
2.3 Study Selection Procedure

The search procedure followed the systematic review protocol for centre of reviews and dissemination (2008). All studies were entered into computer software programme Mendeley (Mendeley Ltd, 2008). The search yielded a total of 1368 papers which were reduced to 996 after duplicates were removed. Papers were first screened by title and then abstract. Papers that met inclusion criteria (k = 115), were then read in full to ensure they were eligible (k = 38). Where eligibility was unclear, papers were cross-checked by the project supervisor. Reference lists were searched for relevant papers (k = 4). Several poster or conference abstracts were identified and some papers had not reported all necessary data, authors were contacted to see if these were later published and for missing data (k = 12). Papers were excluded if data could not be provided or the author did not reply within the deadline (k = 12). Data from abstracts were not included in the analysis as it would be difficult to appraise the study quality. In total there were 27 papers with complete data, 23 of which were included in the final meta-analysis and review (Figure 1).
Figure 1

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Flow-chart of the Study Selection

- Records identified through database searching (n = 1368)
- Additional records identified through other sources (n = 4)
- Records after duplicates removed (n = 996)
- Phase 1: Title/abstract screened (n = 116)
- Phase 2: Full-text screening (n = 39)
- Phase 3: Final Eligibility (n = 27)
- Studies included in quantitative synthesis (23)

Records excluded (n = 880)
- topic not relevant = 716
- No measure of evaluative beliefs = 48
- Non psychosis = 2
- Review/conceptual/article = 90
- Qualitative/case study = 24

Records excluded (77)
- no evaluative belief measure/control group comparison = 22
- No non clinical control group = 3
- No baseline measure in a co-intervention = 4
- No association between evaluative belief and psychosis symptom = 17
- Mixed diagnosis = 6
- Posters, conference and dissertation abstracts = 15
- Non English language = 2
- Duplicates = 8

Records excluded (12)
- Author contacted but unable to provide data = 5
- Author contacted but no response to request = 7
2.4 Quality Assessment.

The Standard Quality Assessment Criteria for Evaluating Primary Research Papers (Kmet, Lee, & Cook, 2004) was used to assess the quality of included studies (Appendix 2). The quality assessment scale (QAS) had 14 criteria to rate papers against. Each criterion was scored by the following: 2 (fulfilled completely), 1 (partially fulfilled), 0 (not fulfilled at all) and n/a (not applicable). As the included papers used non-randomized cross-sectional data, three questions from the original QAS that pertained to randomization were removed and were replaced with questions specific to this review (Appendix 2). The total for papers that used a group comparison was 28. As the correlational studies did not have a comparison group, question 5, “Were the subject and group comparison groups similar and treated the same?” was not applicable and thus the total score was 26.

2.5 Planned Analysis

Multiple meta-analyses were conducted using Review Manager 5 (RevMan 5.3, Copenhagen, 2014) for group comparison and “metafor” (Viechtbauer, 2010) statistical package for R (R Core Team, 2012) for correlational associations. All meta-analyses used a random effects model as the studies included differed by age, demographics and the measures used. Variance in effect size could have been introduced by these factors which would violate the assumption of the fixed effects model, that there is one true effect and variance is due to sampling error alone (Borenstein et al., 2009).
2.5.1 Group-Comparison Analyses

Eight meta-analyses were conducted to compare the relationship of positive and negative self and other-evaluations across the psychosis continuum with non-clinical controls. The means, standard deviations and sample size for each study was extracted. As the included studies used different scales, the mean difference in each study was divided by the standard deviation to create the standardized mean difference (SMD) for effect size which is comparable across studies (Borenstein et al., 2009).

One study (Peters et al., 2016) reported means and standard deviations for an additional subsample of non help-seeking individuals with psychotic like experiences. They reported that the psychosis group held more negative person evaluations than the non help-seeking group, who held more positive person evaluations. As reporting multiple effect sizes from the same study would violate the assumption of independence for a meta-analysis, only the psychosis and non-clinical group effect sizes were used.

One paper (Haarmans et al., 2018) reported the means and standard deviations for psychosis and healthy control populations in two ethnicity subgroups: white and minority. Whilst they reported a significant difference between psychosis and controls for person evaluations, there was no effect for ethnicity. The subgroups means and standard deviations were combined using group combination formula (Higgins et al., 2019) to create two groups, psychosis and healthy controls.

2.5.2 Association Analysis

As the included studies reported associations between different symptoms, individual measures were grouped into the symptom dimensions they represented.
These were positive symptoms (general, perceptual abnormalities, paranoia, disorganisation) and general negative symptoms. The minimum number of studies for a meta-analysis is three (Borenstein et al., 2009). Only the symptom paranoia included the necessary three or more studies in each group across the continuum (psychosis, ARMS and non-clinical) for each belief category (positive self, negative self, positive other, negative other) for a quantitative synthesis. The other symptom dimensions and evaluative belief associations were summarised briefly in the results and displayed in Table 3.

Association analyses was conducted to explore the relationship between evaluative beliefs and paranoia across the continuum. The studies reported Pearson’s $r$ co-efficient for the relationship between evaluative beliefs and paranoia, which was treated as the effect size and extracted from the papers in addition to the significance value ($p$) and sample size. As the variance depends on the correlation, the correlation co-efficient was converted to Fisher’s $z$ scale for the analysis, then converted back to $r$ for presentation (Borenstein et al., 2009).

2.6 Heterogeneity of Effect Sizes

To consider whether the effect sizes reported in the meta-analyses were consistent across the studies, the heterogeneity of effect sizes were calculated. The $Q$ statistic was reported to consider the heterogeneity introduced by sampling error. As this is sensitive to the number of studies included, the $I^2$ statistic was also reported to consider between-study variance (Borenstein et al., 2009; Higgins & Thompson, 2002). $I^2$ values can be interpreted as representing low (25%), moderate (50%) and high (75%) heterogeneity respectively (Higgins, Thompson, Deeks & Altman, 2003).

Sensitivity analysis was conducted when there was high heterogeneity to
consider where the variance may have occurred. Studies were selected for one study removed analysis based on methodological issues (sampling, sample size or measurement) detected during the quality assessment ratings. When multiple studies were removed with no reduction of heterogeneity this is commented on in the results and reported in full in Appendix 4.

2.7 Publication Bias

Publication bias was not assessed as it is recommended there should be at least ten studies in the meta-analysis for funnel plot or advanced regression-based assessment tests to have enough power to distinguish chance from real asymmetry (Higgins et al., 2019). Results of the meta-analysis should therefore be interpreted tentatively.

3. Results

Of the 27 included studies; 16 were based in the UK, three in Spain, two in Germany, two in the USA, two in Canada, one in the USA and Canada, and one in the UK and New Zealand (Table 2). Fifteen studies used a group comparison cross-sectional design between clinical and non-clinical populations, five of these also reported an association with psychosis symptoms. Twelve studies had examined the association of evaluative beliefs with psychosis symptomology in clinical (k = 9) and non-clinical (k = 3) populations. In total there were 2994 clinical participants with a diagnosis of psychosis, 1407 ARMS participants and 2605 non-clinical participants from the general population. Sample sizes ranged from 11 (Bedford et al., 2012) to 1809 (Freeman et al., 2019).
3.1 Assessment of Quality

Quality scores ranged from 69% to 96%, with a mean of 83.15% (Table 2). Higher rated studies clearly specified the research design, inclusion and exclusion criteria and their recruitment procedure. They also used more comprehensive, validated measures of paranoia rather than subscales or single items. Lower rated studies had smaller sample sizes and did not use validated evaluative belief measures, with two studies using a measure created for the study (Bedford et al., 2012; Kinderman, 1994). Two common quality issues were that all the association studies were correlational designs preventing causality to be established, and in the comparison studies the control group was often not matched on key characteristics or treated the same during the study as the clinical group. The study with the lowest score (69%) (Addington & Tran, 2009) did not control for confounding factors, had a small sample size and did not report non-significant results (Appendix 3). These factors will be considered during heterogeneity analysis.
<table>
<thead>
<tr>
<th>Study, date and country</th>
<th>Total Participants (n)</th>
<th>Clinical Participant Profile</th>
<th>Age Mean (SD)</th>
<th>Evaluative belief measure “e.g. item”</th>
<th>Psychosis measure</th>
<th>Data type</th>
<th>Symptom Association</th>
<th>QAS score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appiah-Kusi et al., 2017 UK</td>
<td>30</td>
<td>UHR clinical population</td>
<td>23.93 (4.78)</td>
<td>BCSS “I am bad”</td>
<td>PSQ</td>
<td>✓ ✓ ✓</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38</td>
<td>General population</td>
<td>26.14 (4.70)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedford et al., 2012 UK</td>
<td>11</td>
<td>Schizophrenia clinical population</td>
<td>39 (11)</td>
<td>Trait adjective endorsement “Dishonest”</td>
<td>PANNS</td>
<td>✓ ✓</td>
<td>79%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>General Population</td>
<td>31 (9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>QAS score (%)</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>---------------</td>
<td>---------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collett et al., 2016 UK</td>
<td>21</td>
<td>Persecutory delusions clinical population</td>
<td>45.6 (12.1)</td>
<td>BCSS “I am loveable”</td>
<td>PANNS</td>
<td>✓    ✓</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>General population</td>
<td>41.9 (12.2)</td>
<td></td>
<td>PSYRATS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PaDs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cowan et al., 2019 USA</td>
<td>73</td>
<td>UHR clinical population</td>
<td>18.7 (1.8)</td>
<td>BCSS “Other people are kind”</td>
<td>SIPS</td>
<td>✓    ✓ ✓</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>Community</td>
<td>18.1 (2.6)</td>
<td></td>
<td>SCID-IV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haarmans et al, 2018 Canada</td>
<td>43</td>
<td>Psychosis AVH</td>
<td>42.14 (13.38)</td>
<td>BCSS “I am talented”</td>
<td>PANSS</td>
<td>✓    ✓ ✓</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>General Population</td>
<td>33.90 (12.83)</td>
<td></td>
<td>SIPS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type</td>
<td>Beliefs</td>
<td>Symptom Association</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>---------------------------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td><strong>Kinderman, 1994, UK</strong></td>
<td>16</td>
<td>Persecutory Delusions</td>
<td>34.3 (12.5)</td>
<td>PPQ “kind”</td>
<td></td>
<td></td>
<td>✓       ✓</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MacKinnon et al., 2011, UK</strong></td>
<td>22</td>
<td>Persecutory delusions</td>
<td>41.69 (11.09)</td>
<td>BCSS “I am a failure”</td>
<td>SCID-I</td>
<td></td>
<td>✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Peters et al., 2016, UK</strong></td>
<td>84</td>
<td>Psychosis*</td>
<td>42 (n.r)</td>
<td>BCSS</td>
<td>AANEX</td>
<td></td>
<td>✓ ✓ ✓ ✓</td>
<td>82%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>QAS score (%)</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------</td>
<td>-------------------------------</td>
<td>---------------</td>
<td>--------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>Valiente et al., 2014a Spain</td>
<td>55</td>
<td>Psychosis inpatient</td>
<td>34.6 (11.1)</td>
<td>EBS “I am worthless”</td>
<td>Mini-PLUS V5</td>
<td>✓</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>57</td>
<td>General Population</td>
<td>36.1 (12.7)</td>
<td></td>
<td>PSE- 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vazquez et al., 2008 Spain</td>
<td>40</td>
<td>Acute deluded inpatients</td>
<td>33.3 (8.4)</td>
<td>The Self-Referent</td>
<td>PSE- 10</td>
<td>✓</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>General Population</td>
<td>30.4</td>
<td>Incidental Recall</td>
<td>Task</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: QAS = Questionnaire of Asymmetry of Self-Experience; PLE = Personal Life Experience; PSQ = Personal Self-Questionnaire; EBS = Evaluative Belief Scale; Mini-PLUS V5 = Mini-Positive and Liking Scale; PSE- 10 = Positive and Self-Evaluation Scale.
<table>
<thead>
<tr>
<th>Study, date and country</th>
<th>Total Participants (n)</th>
<th>Clinical Participant Profile</th>
<th>Age Mean (SD)</th>
<th>Evaluative belief measure “e.g. item”</th>
<th>Psychosis measure</th>
<th>Data type Beliefs</th>
<th>QAS score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carol &amp; Mittal., 2015 USA</td>
<td>37</td>
<td>UHR clinical population</td>
<td>18.84 (1.69)</td>
<td>BCSS “Other people are hostile”</td>
<td>SIPS*</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td>Fowler et al, 2006 UK</td>
<td>252</td>
<td>Psychosis</td>
<td>38 (10)</td>
<td>BCSS “other people are fair”</td>
<td>Paranoia scale*</td>
<td>✓ ✓ ✓ ✓ ✓</td>
<td>82%</td>
</tr>
<tr>
<td>Fowler et al, 2006 UK</td>
<td>747</td>
<td>Undergraduate Students</td>
<td>23.70 (6.67)</td>
<td>BCSS “successful” “stupid”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>QAS score (%)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------</td>
<td>---------------------------------</td>
<td>---------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Stowkowy et al., 2016, USA, Canada</td>
<td>765</td>
<td>CHR</td>
<td>18.47 (4.24)</td>
<td>BCSS “other people are nasty”</td>
<td>SIPS</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>280</td>
<td>General Population</td>
<td>19.65 (4.67)</td>
<td>EBS “other people are failures”</td>
<td>PSE-10</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td>Valiente et al., 2014b, Spain</td>
<td>55</td>
<td>Persecutory delusions inpatient</td>
<td>34.6 (11.1)</td>
<td>BCSS “others are harsh”</td>
<td>PSYRATS</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td>Vorontsova et al., 2013, UK</td>
<td>60</td>
<td>Schizophrenia</td>
<td>40.1 (10.7)</td>
<td>BCSS “others are harsh”</td>
<td>GPTS*</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>General Population</td>
<td>40.4 (13.1)</td>
<td>BCSS “other people are nasty”</td>
<td>SOPS*</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td>86%</td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>Data type Symptom Association</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------</td>
<td>------------------------------</td>
<td>---------------</td>
<td>---------------------------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Addington &amp; Tran, 2009, Canada</td>
<td>38</td>
<td>CHR clinical population</td>
<td>19.7 (3.4)</td>
<td>BCSS</td>
<td>SOPS*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“other people are accepting”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bright et al., 2018, UK</td>
<td>100</td>
<td>CHR</td>
<td>20.71 (4.34)</td>
<td>BCSS</td>
<td>CAARMS*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“other people are supportive”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freeman et al., 2013, UK</td>
<td>130</td>
<td>Non affective Psychosis clinical population</td>
<td>41.1 (11.6)</td>
<td>BCSS</td>
<td>State</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“I am interesting”</td>
<td>Paranoia*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SAPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>QAS score (%)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------</td>
<td>------------------------------------------------------------------</td>
<td>---------------</td>
<td>----------------------------------------</td>
<td>-------------------</td>
<td>------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Freeman et al., 2019, UK</td>
<td>1809</td>
<td>Non-affective psychosis clinical population</td>
<td>41.3 (12.9)</td>
<td>BCSS</td>
<td>GPTS*</td>
<td>Positive</td>
<td>✓  88%</td>
</tr>
<tr>
<td>Galbraith et al., 2014, UK</td>
<td>134</td>
<td>Undergraduate students</td>
<td>21.7 (5.5)</td>
<td>BCSS</td>
<td>PIQ*</td>
<td>Positive</td>
<td>✓  85%</td>
</tr>
<tr>
<td>Gracie et al., 2007, UK</td>
<td>228</td>
<td>Undergraduate students</td>
<td>28.9 (8.7)</td>
<td>BCSS</td>
<td>Paranoia Scale*</td>
<td>Positive</td>
<td>✓  77%</td>
</tr>
<tr>
<td>Lamster et al., 2017, UK</td>
<td>65</td>
<td>Schizophrenia Spectrum Disorders</td>
<td>40.49 (12.61)</td>
<td>BCSS</td>
<td>Paranoia checklist*</td>
<td>Positive</td>
<td>✓  88%</td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type</td>
<td>Beliefs</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>---------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Germany</td>
<td>114</td>
<td>ARMS help-seeking</td>
<td>20.3 (13.3)</td>
<td>BCSS</td>
<td>PaDS*</td>
<td>Self</td>
<td>Positive Negative Positive Negative</td>
</tr>
<tr>
<td>Morrison et al., 2015, UK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CAARMS</td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Muller et al., 2018, Germany</td>
<td>211</td>
<td>Persisting Positive Symptoms</td>
<td>37.5 (9.8)</td>
<td>BCSS</td>
<td>PANNS*</td>
<td>Symptom Association</td>
<td><img src="true" alt="✓" /></td>
</tr>
<tr>
<td></td>
<td>137</td>
<td>CHR *</td>
<td>25.1 (5.3)</td>
<td></td>
<td>SIPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oliver et al., 2012</td>
<td>700</td>
<td>Undergraduate students</td>
<td>28 (11.71)</td>
<td>BCSS</td>
<td>PDI*</td>
<td><img src="true" alt="✓" /></td>
<td>73%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study, date and country</th>
<th>Total Participants (n)</th>
<th>Clinical Participant Profile</th>
<th>Age Mean (SD)</th>
<th>Evaluative belief measure “e.g. item”</th>
<th>Psychosis measure</th>
<th>Data type Beliefs</th>
<th>QAS score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UK, New Zealand</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al., 2006, UK</td>
<td>100</td>
<td>Non-affective psychosis</td>
<td>39 (10.9)</td>
<td>BCSS</td>
<td>PSYRATS</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“other people are supportive”</td>
<td>PANNS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SAPS*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taylor et al., 2014, UK</td>
<td>20</td>
<td>First Episode Psychosis</td>
<td>22.4 (5.4)</td>
<td>BCSS</td>
<td>CAARMS*</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>113</td>
<td>ARMS *</td>
<td>20.4 (4.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>Help seeking controls</td>
<td>21.3 (3.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study, date and country</td>
<td>Total Participants (n)</td>
<td>Clinical Participant Profile</td>
<td>Age Mean (SD)</td>
<td>Evaluative belief measure “e.g. item”</td>
<td>Psychosis measure</td>
<td>Data type Beliefs</td>
<td>Data type Symptoms Association</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>--------------------------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>PLE non help seeking</td>
<td>22.8 (3.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key for studies included in the meta-analyses: Addington & Tran, 2009; Appiah-Kusi et al., 2017; Bedford et al., 2012; Carol & Mittal, 2015; Collett et al., 2016; Cowan et al., 2019; Fowler et al., 2006; Freeman et al., 2013; Freeman et al., 2019; Galbraith et al., 2014; Gracie et al., 2007; Haarmans et al., 2018; Kinderman, 1994; Lamster et al., 2017; MacKinnon et al., 2011; Morrison et al., 2015; Muller et al., 2018; Peters et al., 2016; Stowkowy et al., 2016; Valiente et al., 2014a; Valiente et al., 2014b; Vazquez et al., 2008; Vorontsova et al., 2013

Note: * denotes the measure and/or group used in the meta-analysis where there are multiple measures and/or groups reported in a single study. N.R denotes not recorded.

References: BCSS = The Brief Core Schema Scale (Fowler et al., 2006), EBS = Evaluative Belief Scale (Chadwick, Trower & Dagnan, 1999), SRIRT = Self Referential Incident Recall Test (Vazquez et al., 2008), PPQ = personal profile questionnaire (Kinderman, 1994), PSQ = Psychosis Screening Questionnaire (Bebbington and Nayani, 1995), PANNS = positive and negative syndrome scale (Kay, Fiszbein, & Opler, 1987), SIPS = (Miller et al., 1999), SCID-IV = The Structured Clinical Interview for Axis-I DSM-IV Disorders (First et al., 1995), SCID-II (First et al., 1997), SCID-I (First et al., 2002), PSYRATS = psychotic symptom rating scale (Haddock et al., 1999), PaDs = Persecution and Deservedness scale (Melo et al., 2009), Paranoia Scale (Fenigstein & Vanable, 1992), PDI = The Peters et al. Delusions Inventory (Peters et al. 1999),
3.2 Evaluative Belief Measures:

Five self-report evaluative belief measures were used across the studies. The Brief Core Schema Scale (BCSS, Fowler et al., 2006) was the most commonly used (k = 22). The BCSS is a 24-item measure of both positive and negative self and other-evaluations (Table 2). It was designed to capture the type of person evaluations characteristic to people experiencing psychosis (Fowler et al., 2006). It has good internal consistency, concurrent/discriminate validity and is reportedly valid for psychosis, ARMS and non-clinical populations (Addington & Tran, 2009; Fowler et al., 2006).

The Evaluative Beliefs Scale (EBS, Chadwick, Trower & Dagnan, 1999) was used only in two studies. The EBS is an 18-item scale designed to measure negative person evaluations. It is comprised of three scales that measures negative self-evaluations (self to self, e.g. I am worthless), negative other-evaluations (self to other, e.g. Others are worthless) and a person’s beliefs of other people’s evaluations of them (other to self, e.g. people see me as worthless). In the current review the latter scale was not used as represents a relational rather than evaluative beliefs. The EBS (and individual subscales ) has good internal reliability, it was validated on a sample of people with depression yet has been used in psychosis and non-clinical populations (Chadwick et al., 1999).

Three studies used trait adjective endorsement to measure evaluative beliefs. Bedford et al. (2012) created a list of 72 trait adjectives that were either positive (e.g. special), negative (e.g. cruel), physical illness (e.g. diabetic) or mental illness related (e.g. crazy) which participants endorsed as describing the self or another person. Kinderman (1994) created a list of 60 adjectives, 30 positive (e.g. kind) and 30 negative (e.g. bad), and asked participants to rate which one’s were self-descriptive.
on a Likert scale from 1 (does not describe me at all) to 5 (describes me totally). Neither of these scales had been validated in a population experiencing psychosis.

Vazquez et al. (2008) used the SRIRT which has 30 positive (e.g. successful), negative (e.g. useless) or neutral (e.g. ordinary) trait words which participants tick if the trait represents themselves. The test goes on to measure implicit self-evaluation, however this was not used in the current review. They reported a Cronbach’s alpha \( (a = .81) \) for both positive and negative scales, indicating acceptable reliability.

### 3.3 Measures Used for Symptom Associations

#### 3.3.1 Paranoia Measures

Eleven studies examined the relationship between evaluative beliefs and paranoia (Table 3). Six self-report measures were used: The Green Paranoid Thoughts Scale \( (k = 2) \) (GPTS, Green et al., 2008) which has good psychometric properties for both scales in clinical and non-clinical populations; The persecution subscale of the Persecution and Deservedness Scale \( (k = 2) \) (PaDs, Melo et al., 2009), the subscale has good concurrent validity; The State Paranoia Scale \( (k = 1) \) appeared to have been created for the purpose of the study, they reported good internal reliability but not previous validation with a psychosis population (Freeman et al., 2013); The Paranoia Checklist \( (k = 1) \) (Freeman et al., 2005), has good internal reliability and convergent validity with other known paranoia measures; the Persecutory Ideation Questionnaire \( (k = 1) \) (McKay, Langdon, & Coltheart, 2006) has shown convergent and criterion validity in a non-clinical sample; and the Paranoia Scale (Fenigstein & Vanable, 1992) \( (k = 1) \) which is a widely used measure of paranoia with good internal consistency and reliability \( (\alpha = .84) \).
Two observer rated measures were used: the Scale of Prodromal Symptoms-
suspiciousness subscale (SOPS, \( k = 1 \)), the individual subscale has good reliability 
(McGlashen et al., 2010) (Addington & Tran, 2009); and the PANNS persecution 
suspiciousness item (Kay, Fiszbein, & Opler, 1987) (\( k = 1 \)). The use of a single item 
makes this a less comprehensive representation of paranoia, whilst the individual 
subscales have shown good internal reliability and validity, the individual item has 
not been validated.

### 3.3.2 Psychotic Symptom Measures

There were four clinician rated measures. The Structured Interview for 
Prodromal Syndromes (SIPS) and The Scale of Prodromal Symptoms (SOPS) 
(Miller et al., 2003) subscales were used to assess general positive (\( k = 3 \)) and 
negative symptoms (\( k = 2 \)), unusual thought content (\( k = 1 \)), perceptual abnormalities 
(\( k = 1 \)) and disorganisation (\( k = 1 \)). The individual subscales have excellent inter-
rater reliability and good validity (Miller et al., 2003). The Scale for the Assessment 
of Positive Symptoms (SAPS, Andreasen, 1984) general positive symptoms (\( k = 1 \)) 
was used along with the persecutory delusion (\( k = 1 \)) and auditory hallucination 
subscale (\( k = 1 \)). The SAP and its subscales have good inter-rater reliability and 
concurrent validity (Andreasen et al., 1991; Peralta & Cuesta, 1993).

The comprehensive assessment for at risk mental state (Yung et al., 2005) 
subscales for unusual thought content (\( k = 2 \)), perceptual abnormality (\( k = 2 \)) and 
disorganisation (\( k = 2 \)) were used. The individual subscales have good to excellent 
reliability and validity, yet the negative subscales have been found to be more 
predictive of psychosis than the positive (Yung et al., 2005).
Three self-report questionnaires were used. The Peter’s Delusion Inventory (Peter’s et al. 1999, k = 1) has been validated in non-clinical populations and has good internal consistency ($\alpha = 0.88$), yet only two items assessing grandiosity were used which have not been individually validated. The Cardiff Anomalous Perception hallucination subscale (Bell et al., 2006, k = 1) has high internal reliability ($\alpha = 0.92$, Freeman et al., 2019). Finally the Launy Slade Hallucination Scale (Launy & Slade, 1981, k = 1) has been found to have good reliability in a non-clinical population ($\alpha = 0.90$, Fonseca-Pedrero et al., 2010).
### Table 3:

*Measures Used in the Studies that Reported an Association Between Person Evaluations and Psychosis Symptoms*

<table>
<thead>
<tr>
<th>Symptom Domain</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General</td>
<td>Delusions</td>
</tr>
<tr>
<td>Study/Measure</td>
<td>SIPS - P</td>
<td>SOPS - P</td>
</tr>
<tr>
<td>Addington &amp; Tran, 2009</td>
<td>AR</td>
<td>AR</td>
</tr>
<tr>
<td>Bright et al., 2018</td>
<td>AR</td>
<td>NS</td>
</tr>
<tr>
<td>Carol &amp; Mittal, 2015</td>
<td>AR</td>
<td>NS</td>
</tr>
</tbody>
</table>

Note: AR = Association Reported; NS = Not Significant; NO = Not Observed; + = Positive Association; n.s = Not significant; PO = Perceptual Organisation; PD = Perceptual Disorganisation.
<table>
<thead>
<tr>
<th>Study/Measure</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>General</td>
<td>Delusions</td>
</tr>
<tr>
<td>Fowler et al., 2006</td>
<td>NC PS +</td>
<td>NC NO +</td>
</tr>
<tr>
<td>Freeman et al., 2013</td>
<td>C NS +</td>
<td>C NS +</td>
</tr>
<tr>
<td>Freeman et al., 2019</td>
<td>C NS +</td>
<td>C NS +</td>
</tr>
<tr>
<td>Galbraith et al., 2014</td>
<td>NC NS +</td>
<td>NC NS +</td>
</tr>
<tr>
<td>Gracie et al., 2007</td>
<td>NC NS +</td>
<td>NC NS +</td>
</tr>
<tr>
<td>Symptom Domain</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>----------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>General Delusions Paranoia Perception abnormalities Disorganisation General Study/Measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study/Measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamster et al., 2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morrison et al., 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muller et al., 2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oliver et al., 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al., 2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptom Domain</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delusions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paranoia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceptual abnormalities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disorganisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Study/Measure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDS - P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS - P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAPS - P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAARMS-UTC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS-UTC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAPS - PD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PdS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS - S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANNS - P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS - PA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAARMS - PA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPS - H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAPS - AH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS - D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAARMS - D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHS - N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOPS - N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Stowkowy et al., 2016**
- AR
- NS
- n.s
- NO
- n.s
- PS
- PO
- n.s

**Taylor et al., 2014**
- AR
- NO
- +
- NS
- +
- PO
- n.s
- PS
- n.s

**Valiente et al., 2014b**
- C
- NS
- +
- NO
<table>
<thead>
<tr>
<th>Symptom Domain</th>
<th>General</th>
<th>Study/Measure</th>
<th>Delusions</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cat</td>
<td>SIPS - P</td>
<td>SOPS - P</td>
<td>CATARS - UTC</td>
<td>SOPS - UTC</td>
</tr>
<tr>
<td></td>
<td>Vorontosov a et al., 2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Letter in italics denotes the population across the psychosis spectrum: C = Clinical psychosis, AR = At risk mental state, NC = non-clinical. Underneath is the evaluative belief subscale used in the correlational analysis: NO = negative other, PO = positive other, NS= negative self, PS = positive self

Note: ‘+’ = significant relationship between evaluative belief and symptom, ‘n.s’ = no significant relationship between evaluative belief and symptom.

Note: Shaded in grey are the studies used in the meta-analysis

Measures: CAARMS = Comprehensive assessment for at risk mental state (Yung et al., 2005), CAARMS – UTC = CAARMS unusual thought content, CAARMS – PA = CAARMS perceptual abnormalities, CAARMS- D= CAARMS disorganized Speech, GPTS- Green et al Paranoid Thoughts Scale (Green et al., 2008), PS= Paranoia Scale (Fenigstein & Vanable, 1992) PaDs = Persecution and Deservedness Scale, (Melo et al., 2009), PIQ = Persecution Ideation questionnaire (McKay, Langdon, & Coltheart,
PC = Paranoia Checklist (Freeman et al., 2005), PANNS = positive and negative syndrome scale (Kay, Fiszbein, & Opler, 1987), SAPS = Scale for the Assessment of Positive Symptoms, (Andreasen, 1984), SAPS – PD = SAPS persecutory delusions, SAPS – P = SAPS- positive total, SIPS = The Structured Interview for Prodromal Syndromes, (Miller et al., 2003a), SIPS - N = SIPS total negative SIPS - P = SIPS total positive, SOPS = The Scale of Prodromal Symptoms, (Miller et al., 2003a), SOPS - D = SOPS disorganised communication, SOPS-P = SOPS Total Positive Symptoms, SOPS-N = SOPS Total Negative Symptoms, SOPS-PA = SOPS perceptual abnormalities, SOPS- S = SOPS suspiciousness, SOPS- UTC = SOPS unusual thought content, CAPS – H = Cardiff Anomalous Perceptions Scale-Hallucinations (Bell, 2003), LSHS = The Launay Slade Hallucination Scale (Launay & Slade, 1981), PDI = Peter’s Delusion Inventory (Peters et al. 1999)
3.4 Group Comparison Quantitative Analysis

3.4.1. Negative Self-Evaluations

Eleven studies used a clinical psychosis population, and four an ARMS population, to investigate if each of these groups endorsed more negative self-evaluations than non-clinical controls. Those with a diagnosis of psychosis (n = 677) compared to the general population (n = 1119) held significantly more negative self-evaluations (SMD = 0.80, 95% Confidence Intervals, CI, from 0.60 to 1.01, z = 7.73, p < .001), to a large effect (Cohen, 1988). Those with an ARMS (n = 206) held significantly more negative self-evaluations (SMD = 1.18, 95% CI from 0.76 to 1.61, z = 5.46, p < .001) than the general population (n = 288) to a large effect. The difference to controls was greater for ARMS (SMD = 1.18) than for psychosis (SMD = 0.80) (Figure 2). However, the CI overlapped, thus it cannot be concluded that this group difference was significant without running further tests (Bower, 2003).

Figure 2:

Meta-Analytic Output for Group Differences in Negative Self-Evaluative Beliefs

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Psychosis Mean</th>
<th>SD Total</th>
<th>Control Mean</th>
<th>SD Total</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1 Psychosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedford 2012</td>
<td>0.23</td>
<td>0.42</td>
<td>11</td>
<td>0.22</td>
<td>0.41</td>
<td>11</td>
</tr>
<tr>
<td>Colthe 2015</td>
<td>9.45</td>
<td>5.02</td>
<td>21</td>
<td>3.65</td>
<td>4.98</td>
<td>21</td>
</tr>
<tr>
<td>Fowler 2006</td>
<td>7.2</td>
<td>5.9</td>
<td>232</td>
<td>3.5</td>
<td>3.5</td>
<td>754</td>
</tr>
<tr>
<td>Haarman 2013</td>
<td>0.85</td>
<td>0.55</td>
<td>48</td>
<td>0.39</td>
<td>0.55</td>
<td>48</td>
</tr>
<tr>
<td>Kinderman 2014</td>
<td>79.44</td>
<td>18.19</td>
<td>10</td>
<td>50.81</td>
<td>14.67</td>
<td>16</td>
</tr>
<tr>
<td>MacKinnon 2011</td>
<td>6.19</td>
<td>5.15</td>
<td>16</td>
<td>0.85</td>
<td>1.66</td>
<td>20</td>
</tr>
<tr>
<td>Peters 2016</td>
<td>6</td>
<td>6.2</td>
<td>83</td>
<td>1.8</td>
<td>3.2</td>
<td>82</td>
</tr>
<tr>
<td>Vallente 2014a</td>
<td>2.2</td>
<td>3.2</td>
<td>55</td>
<td>0.7</td>
<td>0.7</td>
<td>57</td>
</tr>
<tr>
<td>Vallente 2014b</td>
<td>1.95</td>
<td>3.04</td>
<td>55</td>
<td>0.23</td>
<td>0.8</td>
<td>44</td>
</tr>
<tr>
<td>Vazquez 2008</td>
<td>1.77</td>
<td>2.51</td>
<td>35</td>
<td>0.22</td>
<td>0.42</td>
<td>36</td>
</tr>
<tr>
<td>Vorontzov 2013</td>
<td>4.83</td>
<td>3.57</td>
<td>90</td>
<td>1.67</td>
<td>1.49</td>
<td>10</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.89 (-0.60, 1.01)</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.06; Chi² = 25.15, df = 10 (P = 0.003); I² = 60%

Test for overall effect: Z = 7.73 (P < 0.000001)

<table>
<thead>
<tr>
<th>2.1.2 ARMS</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Applin-Kuss 2017</td>
<td>5.27</td>
<td>5.63</td>
<td>30</td>
<td>1.61</td>
<td>2.8</td>
<td>38</td>
</tr>
<tr>
<td>Carol 2015</td>
<td>5.31</td>
<td>5.15</td>
<td>37</td>
<td>1.7</td>
<td>2.62</td>
<td>42</td>
</tr>
<tr>
<td>Cowan 2019</td>
<td>5.35</td>
<td>5.3</td>
<td>73</td>
<td>1.61</td>
<td>1.5</td>
<td>73</td>
</tr>
<tr>
<td>Standley 2016</td>
<td>0.86</td>
<td>0.85</td>
<td>66</td>
<td>0.61</td>
<td>1.49</td>
<td>133</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.18 (0.70, 1.66)</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.14; Chi² = 13.09, df = 3 (P = 0.004); I² = 77%

Test for overall effect: Z = 5.46 (P < 0.000001)
3.4.1.1 Psychosis Subsample Heterogeneity: Sensitivity Analysis. There was significant heterogeneity (Q(df = 10) = 25.15, p < .001) and the I² was 60% indicating a moderate level of between-study variance (Higgins et al., 2003). Both Bedford et al. (2012) and Valiente et al. (2014a) had methodological issues, which were identified during the quality assessment of included papers as potential contributors to bias which may have impacted the reported effect sizes, with no significant difference between healthy controls and psychosis.

The difference in Bedford et al. (2012) could be due to the validity of the measurement used. They created an evaluative belief measure which was not validated in a population with psychosis and may not have captured relevant evaluative beliefs characteristic of this population. They also had the smallest sample size of eleven patients with a diagnosis of schizophrenia and healthy controls, limiting the generalisability to the wider population. The difference in effect size for Valiente et al. (2014a) could be due to sampling error. They scored 1 for the QAS item relating to sampling (Appendix 3) as their clinical sample excluded patients who reported guilt with their delusions and included those with milder forms of schizophrenia. This created a biased sample who were less unwell and could have made differences to the general population harder to detect.

Both studies were removed one by one, removing Bedford et al (2012) did not greatly reduce the heterogeneity (Appendix 4). However, when Valiente et al. (2014a) was removed the between-study variance decreased to 0% and heterogeneity was not significant (Q (df = 9) = 9.01, p = .44). The main summary effect for the analysis remained significant (SMD = .88, CI from .77 to .99, z = 15.72, p < .001).
3.4.1.2 ARMS Subsample Heterogeneity: Sensitivity Analysis There was significant heterogeneity ($Q (df = 3) = 13.09\ p < .001$) and the $I^2$ was 77% showing high between-study variance. The different methodological approach taken by Stowkowy et al (2016) may have contributed to the observed heterogeneity. They followed up with participants two years after the study to check their diagnostic status. They then reported the BCSS data for the subset of the initial clinically high risk sample who had later transitioned to psychosis. This introduced a biased sample of ARMS participants who were most unwell, and could have contributed to the larger group difference reported by Stowkowy et al., (2016). When it was removed, heterogeneity reduced to 0% ($Q (df = 2) = .81,\ p = .67,\ I^2 0\%$). The overall effect size remained significant ($SMD = 1,\ 95\% CI from .75 to 1.24,\ z = 8.02,\ p < .001$).

3.4.2 Negative Other-Evaluations

Seven papers used a population with clinical diagnosis of psychosis, and three used an ARMS population to compare negative other-evaluative beliefs with non-clinical controls (Figure 3). Those with a diagnosis of psychosis ($n = 594$) compared with the general population ($n = 1035$) held significantly more negative other-evaluations ($SMD = .89,\ 95\% CI from .65 to 1.13,\ z = 7.29,\ p < .001$) and the effect size was large. Those with an ARMS ($n = 169$), compared with the general population ($n = 246$), held significantly more negative other-evaluations ($SMD = .90,\ 95\% CI from .57 to 1.24,\ z = 5.24,\ p < .001$) to a large effect (Cohen, 1988). The difference to controls was almost the same for psychosis ($SMD = .89$) and ARMS ($SMD = .90$).
Figure 3:

Meta-Analytic Output for Group Difference in Negative Other-Evaluative Beliefs

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Psychosis Mean</th>
<th>Psychosis SD</th>
<th>Psychosis Total</th>
<th>Control Mean</th>
<th>Control SD</th>
<th>Control Total</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowler 2006</td>
<td>9.1</td>
<td>6.8</td>
<td>252</td>
<td>4</td>
<td>4</td>
<td>754</td>
<td>1.05 [0.90, 1.20]</td>
<td></td>
</tr>
<tr>
<td>Haarmans 2018</td>
<td>1.28</td>
<td>0.98</td>
<td>43</td>
<td>0.53</td>
<td>0.71</td>
<td>48</td>
<td>0.88 [0.45, 1.31]</td>
<td></td>
</tr>
<tr>
<td>MacKinnon 2011</td>
<td>8.31</td>
<td>6.66</td>
<td>16</td>
<td>1.45</td>
<td>2.81</td>
<td>20</td>
<td>1.37 [0.63, 2.11]</td>
<td></td>
</tr>
<tr>
<td>Peters 2016</td>
<td>9.1</td>
<td>6.8</td>
<td>83</td>
<td>3.8</td>
<td>5.4</td>
<td>82</td>
<td>0.86 [0.54, 1.18]</td>
<td></td>
</tr>
<tr>
<td>Valiente 2014a</td>
<td>1.83</td>
<td>3.2</td>
<td>55</td>
<td>0.7</td>
<td>3.1</td>
<td>57</td>
<td>0.36 [-0.02, 0.73]</td>
<td></td>
</tr>
<tr>
<td>Valiente 2014b</td>
<td>1.59</td>
<td>3.09</td>
<td>55</td>
<td>0.14</td>
<td>0.67</td>
<td>44</td>
<td>0.61 [0.21, 1.02]</td>
<td></td>
</tr>
<tr>
<td>Vorontsova 2013</td>
<td>11.35</td>
<td>6.83</td>
<td>90</td>
<td>2.77</td>
<td>4.19</td>
<td>30</td>
<td>1.36 [0.91, 1.81]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td></td>
<td></td>
<td>594</td>
<td></td>
<td></td>
<td>1035</td>
<td>0.89 [0.66, 1.13]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau^2 = 0.06; Chi^2 = 18.88, df = 6 (p = 0.004); I^2 = 68% Test for overall effect: Z = 7.29 (p &lt; 0.00001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.4.2.1 Psychosis Subsample Heterogeneity: Sensitivity Analysis

The Q statistic was significant (Q (df = 7) = 20.88, p < .01) evidencing sampling error and moderate between-study variance (I^2 = 67%). One study removed analysis was conducted for Valiente et al. (2014), in relation to the potential sampling error discussed above, which could have contributed to the reported lowest group difference. This reduced the between study variance to 40% and heterogeneity was no longer significant (Q (df = 5) = 8.38, p = .14). The main summary effect for the overall comparison (SMD = .98, 95% CI from .80 to 1.17) remained significant (z = 10.27, p < .001) to a large effect (Cohen, 1988).

3.4.2.2 ARMS Subsample Heterogeneity. There was a trend towards heterogeneity (Q (df = 2) = 4.90, p = .09) and there was moderate level of between study variance (I^2 = 59%). One study removed analysis could not be undertaken as there were only 3 studies included in this meta-analysis. A potential contributor to
heterogeneity was hypothesised to be Stowkowy et al. (2016) in relation to sampling bias of the most unwell ARMS participants.

3.4.3 Positive Self-Evaluation

Nine papers used a population with psychosis, and four an ARMS population, to compare the amount of positive self-evaluations with healthy controls (Figure 4). People with psychosis (n = 567) held significantly less positive self-evaluations (SMD = -.48, 95% CI from -.80 to -.17, z = 3.02, p < .01) compared with healthy controls (n = 1018), to a small effect size (Cohen, 1988). Those with an ARMS (n = 206) compared with healthy controls (n = 153) held significantly less positive self-evaluations (SMD = -.92, 95% CI from -1.26 to -.59, z = 5.39, p < .001) and the effect was large (Cohen, 1988). The ARMS had a greater difference compared to the psychosis population, yet the upper and lower CIs overlapped so this cannot be assumed to be significant without further tests (Bower, 2003).

Figure 4:

Meta-Analytic Output for Group Difference in Positive Self-Evaluative Beliefs
3.4.3.1 Psychosis Subsample Heterogeneity: Sensitivity Analysis

There was significant heterogeneity ($Q (df = 8) = 39.54 \ p < .001$) and $I^2$ was 80%, indicating sampling error and high between-study variance. Two studies had methodological issues that stood out as potential contributors to sampling bias. Collett et al. (2016) had scored 1 for the QAS item relating to sample size, with the third lowest sample size of all the studies. This reduces the generalisability of the study and may have contributed to the largest effect size reported, with the wide range of CIs indicating a less precise effect. Fowler et al. (2006) scored a 1 on QAS item relating to confounding factors. The control group were in their final year of a degree, which could introduce a biased sample of anxious controls, making group differences harder to detect (as anxiety is known to impact evaluative beliefs). They had the largest sample and had a small CI range, however this sampling bias could have contributed to the smallest group difference, being the only study’s summary effect to cross the line of no effect (Figure 4).

Each study was removed one by one from the analysis yet heterogeneity remained high (Appendix 4). When both studies were removed heterogeneity was no longer significant ($Q (df = 6) = 6.32, \ p = .35$) and $I^2$ reduced to 5%. The overall main effect remained significant ($SMD = -.43, 95\% CI from -.61 to -.25, z = 4.58, \ p < .001$).

3.4.3.2 ARMS Subsample Heterogeneity: Sensitivity Analysis

There was a significant Q statistic ($Q (df = 3) = .80, \ p = .03$) and the $I^2$ was 66% suggesting moderate between study variance. For issues regarding sampling bias, by reporting data only for participants who transitioned to psychosis, Stowkowy et al. (2016) was removed from the analysis. Heterogeneity was no longer significant and between
study variance reduced to 0% (Q (df = 2) = .80, p = .67, $I^2$ 0%). The overall effect size remained significant (SMD = -.75, 95% CI from -.99 to -.51, z = 6.17, p < .001), but now to a medium effect (Cohen, 1988). This remained larger than the psychosis group difference (SMD = -.50).

3.4.4 Positive Other-Evaluations

Five papers used a population with psychosis and three used an ARMS population to compare amount of positive other-evaluations with non-clinical controls. Those with a diagnosis of psychosis (n = 484) compared to the general population (n = 934) held significantly less positive other-evaluations (SMD = -.34, 95% CI from -.63 to -.06, z = 2.64, p < .05) to a small effect (Cohen, 1988). Those with ARMS (169) compared to the general population (246) held significantly less positive other-evaluations (SMD = -.81, 95% CI from -1.01 to -.60, z = 7.67, p < .001) to a large effect. There was not significant heterogeneity (Q (df = 2) = 1.07, p = .59) and there was no between study variance ($I^2 = 0\%$). Those with ARMS had a larger difference to controls than those with psychosis, the CI overlapped by .03, suggesting a trend towards a significant difference, however this would need further statistical testing to determine (Bower, 2003).
3.4.4.1 Psychosis Subsample Heterogeneity: Sensitivity Analysis

Heterogeneity was significant to a moderate level (Q (df = 4) = 14.13, p = .007, I² = 72%). For the potential sampling bias in the control group discussed above, Fowler et al. (2006) may have contributed to the heterogeneity. One study removed analysis was conducted which reduced the between study variance to 0% and heterogeneity was not significant (Q (df = 3) = .94, p = .82). The main effect for comparison (SMD = -.48, 95% CI from -.68 to -.28) remained significant (z = 4.63, p < .001).

3.5 Associations with Psychosis Symptoms

The association of psychosis symptoms with person evaluations not included in the meta-analysis (Table 3), are briefly narratively synthesised. Generalising to the wider population is limited due to the low number of studies per symptom (k ≤ 3).

3.5.1 Negative Self-Evaluations
In ARMS (k = 3), there were consistent associations with delusion severity (Addington & Tran, 2009; Carol & Mittal, 2015; Stowkowy et al., 2016). Associations with general positive symptoms were inconsistent, with significant (Addington & Tran, 2009; Carol & Mittal, 2015) and non-significant (Stowkowy et al., 2015) associations reported. For psychosis (k = 2), one study reported no significant associations between general positive symptoms (Smith et al., 2006) and there was inconsistent findings with perceptual abnormalities. In non-clinical populations (k = 2), one study reported a significant association with delusions (Oliver et al., 2012) and one with perceptual abnormalities (Gracie et al., 2007).

### 3.5.2 Negative Other-Evaluations

In ARMS (k = 4) there was a significant association with general positive symptoms (Addington & Tran, 2009; Stowkowy et al., 2015), delusion and perceptual abnormality severity (Addington & Tran, 2009; Taylor et al., 2014). One study reported no association with perceptual abnormalities in ARMS (Bright et al., 2018), however a portion of the sample had received CBT prior to the study which may have contributed to the lack of association. In psychosis (k = 1), there was a significant association with general positive symptoms but not delusion severity or perceptual abnormalities (Smith et al., 2006). In non-clinical (k = 1) Gracie et al. (2007) reported an association with perceptual abnormalities.

### 3.5.3 Positive Person Evaluations

These were reported on by only a small number of studies in psychosis (k = 1), ARMS (k = 4) and non-clinical (k = 2) populations. For psychosis, Freeman et al. (2019), reported a significant association between perceptual abnormalities and
lower positive self-evaluations. In a non-clinical population, there was a significant association between more positive self-evaluations and grandiose delusions (Fowler et al., 2006), and less positive person evaluations with perceptual abnormalities (Gracie et al., 2007). In the ARMS population there was consistently no significant association between positive person evaluations and negative symptoms (Carol & Mittal, 2015; Stowkowy et al., 2015), delusion severity (Taylor et al., 2014), perceptual abnormalities and disorganisation (Bright et al., 2018; Taylor et al., 2014). There were inconsistent associations reported between positive self-evaluations and general positive symptoms (Carol & Mittal, 2015; Stowkowy et al., 2015).

3.6 Quantitative Associations with Paranoia.

3.6.1 Negative Self-Evaluations

There was a significant total effect for negative self-evaluative beliefs and paranoia across the continuum, with an r value of .44 (k = 10, 95% CI = .38 to .49, z = 13.17, p < .001). This suggests negative self-evaluative beliefs were associated with more severe paranoia to a medium effect (Cohen, 1988). There was moderate heterogeneity in this model (Q = 19.74, p = .02, I² = 66%). Subgroup analyses were conducted for the different diagnostic groups (Figure 6).

For the psychosis population there was a significant effect with r = .39 (k = 3, 95% CI = .24 to .43, z = 6.39, p < .001). Heterogeneity was not significant (Q = 2.01, p = .37) and I² was 3%. A similar effect size was found in the ARMS population, with an r = .38 (k = 3, 95% CI = .25 to .50, z = 5.42, p < .001). Heterogeneity was not significant (Q = 2.45, p = .29) and I² was 30.38% representing small between study variance. Both the psychosis and ARMS populations had a medium effect size.
Figure 6:

Meta-analytic Output for Association between Negative Self-Evaluations and Paranoia

a) In psychosis

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeman et al. 2013</td>
<td>0.25 [0.08, 0.40]</td>
</tr>
<tr>
<td>Freeman et al. 2019</td>
<td>0.47 [0.43, 0.51]</td>
</tr>
<tr>
<td>Valiente et al. 2014b</td>
<td>0.41 [0.23, 0.56]</td>
</tr>
<tr>
<td>Vorontsova et al. 2013</td>
<td>0.37 [0.20, 0.52]</td>
</tr>
<tr>
<td>RE Model</td>
<td>0.39 [0.29, 0.49]</td>
</tr>
</tbody>
</table>

b) In ARM5

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addington &amp; Tran 2009</td>
<td>0.39 [0.08, 0.63]</td>
</tr>
<tr>
<td>Morrison et al. 2015</td>
<td>0.47 [0.31, 0.60]</td>
</tr>
<tr>
<td>Muller et al. 2018</td>
<td>0.30 [0.14, 0.45]</td>
</tr>
<tr>
<td>RE Model</td>
<td>0.38 [0.25, 0.50]</td>
</tr>
</tbody>
</table>

c) In non clinical

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowler et al. 2006</td>
<td>0.50 [0.45, 0.54]</td>
</tr>
<tr>
<td>Galbraith et al. 2014</td>
<td>0.49 [0.35, 0.61]</td>
</tr>
<tr>
<td>Gracie et al. 2007</td>
<td>0.54 [0.44, 0.63]</td>
</tr>
<tr>
<td>RE Model</td>
<td>0.51 [0.47, 0.54]</td>
</tr>
</tbody>
</table>
For the non-clinical population there was a large effect size between paranoia and negative self-evaluative beliefs, with $r = .51$ ($k = 3$, 95% CI from .47 to .54, $z = 20.54$, $p < .001$). The CI did not overlap with the psychosis population suggesting a significant group difference (Bower, 2003). There was not significant heterogeneity ($Q = .62$, $p = .73$) and $I^2$ was 0%.

### 3.6.2 Negative Other-Evaluations

There was a significant large total random effects estimate for negative other-evaluations across the continuum, with $r = .52$ ($k = 10$, 95% CI = .42 to .61, $z = 8.82$, $p < .001$). There was significant heterogeneity and between-study variance ($Q$ (df = 8) = 34.26, $p < .001$, $I^2 = 81\%$), thus subgroup analyses were conducted across the continuum (Figure 7).

For psychosis, there was a large significant effect with $r = .52$ ($k = 3$, 95% CI = .30 to .70, $z = 4.15$, $p < .001$). Heterogeneity was significant and there was high between study variance ($Q$ (df = 2) = 7.67, $p < .05$, $I^2 = 75\%$). For ARMS there was a medium significant effect size with $r = .48$ ($k = 3$, 95% CI = .16 to .71, $z = 2.83$, $p < .01$). Heterogeneity was significant ($Q$ (df = 2) = 16.71, $p < .001$) and $I^2$ was 87\%.

For non-clinical population there was a large significant effect with $r = .57$ ($k = 3$, 95% CI = .53 to .60, $z = 23.77$, $p < .001$). Heterogeneity was not significant and there was no between-study variance ($Q$ (df = 2) = .10, $p = .95$, $I^2 = 0\%$). Those who held more negative other-evaluations experienced more severe paranoia, to the least degree in those with ARMS.
Figure 7

*Meta-analytic Output for Association between Negative Other-Evaluations and Paranoia*

a) In Psychosis

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamster et al. 2017</td>
<td>0.70 [0.55, 0.81]</td>
</tr>
<tr>
<td>Valiente et al. 2014b</td>
<td>0.44 [0.27, 0.58]</td>
</tr>
<tr>
<td>Vorontsova et al. 2013</td>
<td>0.39 [0.14, 0.60]</td>
</tr>
</tbody>
</table>

b) In ARMS

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addington &amp; Tran 2009</td>
<td>0.67 [0.41, 0.83]</td>
</tr>
<tr>
<td>Morrison et al. 2015</td>
<td>0.57 [0.43, 0.68]</td>
</tr>
<tr>
<td>Muller et al. 2018</td>
<td>0.19 [0.02, 0.35]</td>
</tr>
</tbody>
</table>

| RE Model             | 0.48 [0.16, 0.71] |

c) In non clinical

<table>
<thead>
<tr>
<th>Author and year</th>
<th>r (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fowler et al. 2006</td>
<td>0.57 [0.53, 0.61]</td>
</tr>
<tr>
<td>Galbraith et al. 2014</td>
<td>0.55 [0.42, 0.66]</td>
</tr>
<tr>
<td>Gracie et al. 2007</td>
<td>0.57 [0.48, 0.65]</td>
</tr>
</tbody>
</table>

| RE Model             | 0.57 [0.53, 0.60] |
3.6.2.1 Other-Evaluations Heterogeneity Two studies in the psychosis and ARMS analysis were identified as having methodological differences to the other included studies that may have contributed to heterogeneity, and from viewing the forest plots they can be seen to differ in the size of effect reported and CI range to the other two studies. Sensitivity analysis was not performed as there were not enough studies to conduct a meta-analysis if one was removed.

*Psychosis:* Lamster et al. (2017) scored a 1/2 for QAS item assessing the study design and recruitment (Appendix 3). This was an online study and relied on participant’s self-report for the psychosis diagnosis. People who self-select for online studies are often more prone to, or relate more to, the variable being studied. This method also cannot control for the experience of founded paranoia which is less of a clinical representation. This may have introduced bias in the sample and contributed to a larger effect.

*ARMS:* Muller et al. (2018) reported the smallest effect which was lower than the minimum CIs of the other two studies, showing true variation. Whilst they had the largest weight due to their sample size, it was the only study to use a single item as a measure of paranoia. The individual item is not validated and does not provide a detailed exploration of paranoia which may have contributed to the smaller effect size reported.

3.6.3 Positive Evaluations

There were not enough studies to quantitatively synthesise the effect for the relationship between positive person beliefs with paranoia across the continuum, these are discussed below.
Psychosis: Two studies reported an association for positive self-evaluations. Freeman et al. (2019) in a large sample found less positive self-evaluations were significantly associated with higher paranoia severity (r = -.17, p < .001). However, Vorontsova et al. (2013) did not report a significant association (r = -.17, p = .22). Vorontsova et al., (2013) was the only study for positive other-evaluations, finding no significant association with paranoia (r= -.06, p =.68).

ARMS: Only one study reported less positive self (r = -.19, p < .05) and other-evaluations (r = -.25, p < .01) were associated with more paranoia (Muller et al., 2018).

Non-clinical: Both Fowler et al., (2006) (r = -.49 p < .001) and Gracie et al., (2007) (r = -.48, p < .001) reported a significant medium association with less positive other-evaluations and paranoia. Additionally, Gracie et al. (2007) reported a medium significant association between paranoia and less positive self-evaluations (r= -.42, p < .001).

There are mixed findings for the association of less positive person evaluations and more severe persecutory delusions in psychosis. Small effects were reported for psychosis and ARMS, whilst medium effect sizes were reported for non-clinical samples. This must be interpreted with caution due to the low number of studies (k ≤ 2).

3.7 Summary of Meta-Analyses

In summary, those on the psychosis spectrum consistently differed from non-clinical controls in the amount of positive and negative self and other-evaluations they held, ranging from a medium to a large effect size (Table 4). The ARMS differed to a greater extent to the general population than those with psychosis,
except in negative other-evaluations where they had a similar effect size. The more negative and less positive self and other-evaluations an individual held was associated with more severe paranoia across the continuum, this was most pronounced in the non-clinical group. Negative other-evaluations had larger associations to paranoia than self-evaluations.
Table 4:

Summary of Meta-Analytic Results

<table>
<thead>
<tr>
<th>Quantitative Synthesis</th>
<th>Research Questions</th>
<th>Clinical Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Psychosis Vs Non clinical SMD (95% CI)</td>
</tr>
<tr>
<td>Group Comparison SMD (95% CI)</td>
<td>1. Are negative self-evaluations higher in people with psychosis compared to healthy controls?</td>
<td>.80*** (.60 to 1.01)</td>
</tr>
<tr>
<td></td>
<td>a) Sensitivity analysis</td>
<td>.88*** (.77 to .99)</td>
</tr>
<tr>
<td></td>
<td>2. Are negative other-evaluations higher in people with psychosis compared to healthy controls?</td>
<td>.89*** (.65 to 1.13)</td>
</tr>
<tr>
<td></td>
<td>a) Sensitivity analysis</td>
<td>.98*** (.80 to 1.17)</td>
</tr>
<tr>
<td></td>
<td>3. Are positive self-evaluations lower in people with psychosis compared to healthy controls?</td>
<td>-.48** (-.80 to -.17)</td>
</tr>
</tbody>
</table>
4. Are positive other-evaluations lower in people with psychosis compared to healthy controls?

a) Sensitivity analysis

<table>
<thead>
<tr>
<th>Association</th>
<th>Psychosis R (95%CI)</th>
<th>ARMS R (95%CI)</th>
<th>Non-clinical R (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Are self and other-evaluations associated with symptoms in psychosis?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paranoia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Negative self-evaluations</td>
<td>.39***</td>
<td>.38***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.29 to .49)</td>
<td>(.25 to .50)</td>
</tr>
<tr>
<td></td>
<td>b) Negative other-evaluations</td>
<td>.52***</td>
<td>.48**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.30 to .70)</td>
<td>(.16 to .71)</td>
</tr>
</tbody>
</table>

Key: (p)* = .05, ** = .01, *** = .001

Key: shaded grey is the SMD reported after sensitivity analysis was conducted
4.Discussion

4.1 Current Review Findings and Existing Literature

This review aimed to expand on the findings of Kesting & Lincoln (2013). It did so, reporting that people with psychosis held more negative self and other evaluative beliefs to healthy controls, partly in agreement with Kesting & Lincoln (2013), yet their finding that people with psychosis held similar positive evaluations was not supported. The current review included an additional ten studies to the Kesting & Lincoln (2013) group comparisons. One study from Kesting & Lincoln (2013) was not included due to the evaluative belief measure representing self-esteem items (Bentall et al., 2008). Negative person evaluations were associated with paranoia, ranging from a medium to a large effect size across the continuum (Cohen, 1988). This is consistent with extensive literature implicating negative self-evaluations in models of paranoia (Garety & Freeman, 2013; Kesting & Lincoln, 2013, Tiernan et al., 2014) and cognitive models that suggest delusions are a direct reflection of evaluations and emotions of a person, rather than a defence for self-esteem (Freeman et al., 2002; Garety et al., 2001).

The consistent association with paranoia in both non-clinical and clinical groups lends support to the concept that psychotic like experiences, this case paranoia, lie on a continuum (Berry, Wearden, Barrowclough, 2006; Freeman et al., 2005). Yet evaluative beliefs were also associated with other psychosis symptom domains. For example, in ARMS populations there were consistent associations reported between negative self-evaluations with delusion severity and negative other-evaluations with general positive symptoms and delusion severity (Addington &
Tran, 2009; Bright et al., 2018; Carol & Mittal, 2015; Taylor et al., 2014). As such, there is no clear evidence of specificity of the role of person evaluations in paranoia.

4.2 Focussing on the ‘Other’

There appears to be more focus on the ‘self’ than the ‘other’ in the literature, reflected by the fewer studies available for other-evaluations. Yet the largest difference for the psychosis comparisons and for the association with paranoia was precisely with negative other-evaluations. This suggests that negative other-evaluations can contribute to the development of paranoia, either independently or in tandem to negative self-evaluations (Trower & Chadwick et al., 1995). Perhaps there has been an over-emphasis on the self.

Psychosis is characterised by disrupted interpersonal relationships and a mistrust towards the ‘other’ is paramount in persecutory delusions, which are defined by the belief that others intend to cause a person harm (Freeman et al., 2014). Surviving early adverse experiences can contribute to more negative other-evaluations; trauma has been implicated as a social risk factor which affects an individual’s person beliefs and can leave them vulnerable to developing threat explanations of anomalous experiences (Varese et al., 2012). Hardy et al., (2016) reported negative beliefs of the other, but not self, mediated the association between childhood emotional abuse and paranoid delusions in a clinical sample. Yet a recent systematic review by Williams et al. (2018), which reported an overall consistent mediating role for negative person beliefs with paranoia and trauma, highlighted the inconsistent findings of trauma specific mechanisms in psychosis symptomology.

There is evidence that loneliness contributes to paranoia in psychosis, mediated by negative other-evaluations (Lamster et al., 2017). This could account for
the greater difference in other-evaluations for psychosis, a disorder characterised by social withdrawal. Perhaps also more negative other-evaluations are experienced in clinical psychosis because of the associated stigma and discrimination of a diagnosis (Gerlinger et al., 2013). This may contribute to more negative evaluations of others based on their responses to a person’s illness. Furthermore, people with psychosis receive more assertive involvement from services and are more likely to be hospitalised (NICE Guideline, 2014), which in itself can be a traumatic experience which may influence negative evaluations of other people.

4.3 Positive Evaluations- the Neglected Side?

An interesting finding of this review was that the psychosis continuum held less positive person evaluations compared to healthy controls, to a large and medium effect. This should be interpreted with caution, in the psychosis group six of the nine studies reporting positive self-evaluations had large CI that included no difference between the groups. It was not possible to conduct an association meta-analysis, and generalisability is limited due to the few studies available.

A debilitating factor of psychosis is the loss of interpersonal relationships, influenced by the feeling of unsafety around others. Woods and Tarrier (2009) suggested that positive and negative beliefs could not be changed in isolation. Strength based treatments to improve low self-esteem in serious mental illness focus on an individual’s positive qualities and beliefs, which lead to a reduction in negative symptoms and an increase in quality of life (Hall & Tarrier, 2003; Padesky & Mooney, 2012). Freeman et al., (2014) conducted a CBT intervention incorporating positive psychology techniques. Whilst negative self-evaluations and paranoia improved to a small yet not significant effect, positive beliefs and wellbeing

73
increased significantly and the positive techniques were most used by the individual. However, no benefit of treatment was maintained at the 12 week assessment.

A study into the impact of identifying character strengths for those with psychosis showed an improvement in positive affect through directing participants attention towards memories of strengths and imagining future positive scenarios (Sims, Barker, Price & Fornells-Ambrojo, 2015). There was no effect on self-esteem and self-efficacy, however this may reflect the limitations of a one-day intervention on long standing negative self-evaluations.

4.4 Enhanced Role of Person Evaluations in the At Risk Group?

A surprising finding was that the difference in person evaluations was more pronounced in the ARMS population, except for negative-other evaluations. The ARMS subgroup consisted of only three studies; the smaller overall sample size compared to the psychosis analysis may have over-estimated the effect. ARMS was included in this meta-analysis to explore the presence and association of evaluative beliefs across the psychosis continuum. However, inclusion of studies investigating ARMS as well as psychosis can also introduce more variability, as the two populations differ on numerous factors. As such, the difference in evaluative beliefs may have been impacted by other factors, such as the experience of care received, experience of stigma/discrimination or the difference in severity and duration of psychotic experience (Fusar-Poli et al., 2014).

Yet, the difference in help-seeking behaviour may also have impacted this. The ARMS population are more likely to get in touch with services for support, compared to the psychosis population who present at times of crisis and get assertive outreach from services. Interestingly, anxiety and depression were reported as the
most common reason for seeking help in ARMS (Flakenberg et al., 2015; Velthorst et al., 2010), both disorders are associated with negative person evaluations (Beck, 1987; Chadwick et al., 1999).

Attachment style could also help to understand the more pronounced difference for person evaluations in ARMS. Attachment theory states that early caregiving relationships influence emotion regulation and future interpersonal ways of relating, through working models that represent the self and other people. Whilst there are different ways to categorize adult attachment, research has suggested two broad dimensions of attachment anxiety and avoidance (Berry, Barrowclough & Wearden, 2008). Attachment anxiety is associated with negative self-images, fear of rejection from others and negative affect, whilst avoidant is associated with negative other-images, avoidance of affect and social withdrawal (Berry et al., 2008). Commonly an avoidant attachment style has been associated with psychosis (Gumley et al., 2014), however, a recent meta-analysis reported a fearful attachment style, which the authors understood to be influenced by the inclusion of ARMS groups (Carr et al., 2019). Individuals with a fearful attachment style can oscillate between both anxious and avoidant attachment behaviour as they both need and fear the ‘other’. The experience of psychosis itself may contribute to an increase in characteristics associated with a particular style within fearful attachment; the prodromal stage may highlight more anxious behaviour (Carr et al., 2019) and could be one factor contributing to the pronounced negative-self evaluations in ARMS. However fluctuations in attachment ratings may be influenced by measurement issues, fluctuating mood or current interpersonal relationships (Berry et al., 2008).
4.5 Differences Across the Continuum

One may expect that larger effects would be reported at the more severe end of the continuum, where one is most unwell. Yet in the current study, the largest or more consistent effects were reported at the milder end of the psychosis continuum. Considering the Garety et al. (2001) cognitive model of positive symptoms, perhaps one route to psychosis is more common along the continuum, with evaluative beliefs being more influential for ARMS. Applying this to paranoid delusions, perhaps one of the multiple factors named as influential in Freeman et al.’s (2002) multifactorial model (psychotic experiences, pre-existing beliefs, emotion and the environment) are more likely to influence meaning making at difference stages of the continuum. For example, the experience of perceptual abnormalities present in psychosis may trigger meaning making through external agency, which contributes to paranoia. Whilst in the non-clinical groups, where these are less present, perhaps pre-existing person beliefs may contribute more to developing paranoia when anomalous experiences occur.

4.6 Limitations

This review’s findings should be interpreted alongside several limitations.

4.6.1 Included Studies

All studies used a cross-sectional, retrospective design which means causality cannot be inferred. For example, people may have held more negative person evaluations because they were unwell or experiencing more severe paranoia. Thirteen studies scored a 1 for the QAS item ‘controlled for confounding factors’ (Appendix 3). Psychosis is understood through multiple related risk factors, such as attachment, anxiety, childhood trauma, genetics. Without controlling for other
factors that could contribute to psychosis symptoms, the effect of person evaluations could have been over-estimated.

There was variation in the measures used by the studies. Most of the measures were self-report, which are susceptible to self-report and social desirability biases. Furthermore, all the studies scored one out of two on the QAS item “method of group selection described and appropriate”. Bias was introduced in sampling by recruiting convenience samples who were well enough to take part in the study and not matching the control group on important variables like education and age. Furthermore, the quality assessment ratings were conducted by one rater. The inclusion of multiple raters would have provided a more objective and methodologically sound quality assessment of the included studies and reduce potential rating bias.

4.6.2 Meta-Analysis

There was high heterogeneity in many of the analyses. Sensitivity analysis could not be conducted for the association analyses due to the small number of studies included. Sub-group analysis by measures could not be conducted as too few studies used the EBS (k = 2), therefore it cannot be inferred whether the evaluative belief measure was contributing to heterogeneity. When sensitivity analysis was conducted, studies were removed from each analysis if they had scored low on specific quality assessment criteria. For the ARMS group this was the same study for each sensitivity analysis, the study that had scored the lowest for sampling bias. However, for the studies using a psychosis population, this was judged independently for each belief subscale meta-analysis, removing the study from each group that had a methodological limitation identified during the quality assessment.
as introducing bias, compared to the other included studies. This approach was in response to the variability in the studies included, with multiple variables to consider that could be contributing to heterogeneity. However, this approach in itself could introduce bias, particularly in weighting which quality assessment item to focus on per analysis. Furthermore, as the exclusion criteria is then less transparent it is harder to replicate. A more systematic approach would have been to apply the same criteria to select which study to remove per analysis, such as the study that had the lowest overall quality rating. As such, the summary effects provided by the sensitivity analysis should be interpreted with caution, particularly for positive-other evaluations where completing sensitivity analyses increased the size and significance of the effect.

As a meta-analysis could not be conducted for other symptom domains, specificity between person evaluative beliefs and paranoia cannot be inferred. As there is not another quantitative synthesis to compare the effects found to, the findings should be interpreted with caution (Higgins et al., 2002).

It is not known if the impact of severity of symptoms and being in touch with services explains the group comparison findings aside from where they fall on the continuum. This review did not consider the impact of ethnicity, stigma or discrimination in any of the analyses, all factors that will influence how a person evaluates themselves and other people. Furthermore, person evaluations have been implicated in other diagnoses like depression and anxiety (Beck, 1987; Chadwick et al., 1999). Taking a transdiagnostic approach to research can be helpful, particularly for those who take a critical stance towards diagnostic categories.

Finally, publication bias was not assessed through the use of statistical analysis, such as funnel plots or regression based assessment. This was due to the
low number of studies and high heterogeneity in the meta-analysis, which can make publication bias tests unreliable (Sterne, Egger, & Davey-Smith, 2001). Attempts were made to address this during the literature search, yet the inclusion criteria of being published in a peer reviewed journal makes this review vulnerable to publication bias. Publication bias is when small or non-significant effects are not published in the literature, this also can lead to a bias where studies with a smaller sample size may not be published unless they have positive results (Thornton & Lee, 2000). This can lead to an over-estimation of the size of effect when combining studies in meta-analysis. From viewing the forest plots there were many positive findings reported, and visually there may have been an association between the study size and size of effect. As such, the meta-analytic results may have over-estimated the size of group differences in evaluative beliefs and their association to psychosis symptoms. The findings must be treated with caution until further quantitative synthesizes are conducted that can statistically assess the potential impact of publication bias.

4.7 Clinical Implications:

This meta-analysis contributes to existing literature that informs psychosis interventions. Person evaluations could be a target for therapy, as a more concrete platform to respond to the interpersonal difficulties characteristic of psychosis. As those with ARMS and psychosis hold less positive person evaluations, interventions that promote positive evaluations may be important, particularly in ARMS groups where the difference was greatest. This could be through strength-based intervention or approaches that focus on character strengths, values and positive future imagery (Laing, Moreland & Fornells-Ambrojo, 2016; Sims et al., 2015). They could also
draw from trauma focussed CBT, which recognises that trauma and its sequelae contribute to negative person evaluations, which represent one factor that can influence the development of psychosis (Garety et al., 2001). This approach aims to update negative appraisals by creating a narrative that recognizes the strength it took to survive the trauma, restoring a more positive sense of self and other-evaluations. Alameda et al., (2020) reported trauma focused CBT for negative schemas was a viable treatment targets for those not responding to traditional psychosis treatment who have a trauma history.

Given the prevalence of negative other-evaluations and disrupted interpersonal relationships, rapport is particularly important when working with people on the psychosis continuum. Focusing on other-evaluations in therapy and factors that may have contributed to their formation, such as discrimination, psychosis crises or loneliness, could help to improve social interactions and help-seeking at times of distress, particularly for those with psychosis.

In services, understanding help-seeking and attachment behaviour as an adaptive response to past experiences may encourage consistent positive appraisal of clients by staff and contribute to strong, empathetic therapeutic relationships even in the face of withdrawal or hostility.

**4.8 Future Research**

Associations between person evaluations and psychosis symptoms are most likely to be bi-directional, with symptoms, mood and environment influencing person evaluative beliefs. Future research should include confounding factors, such as anxiety, experience of psychosis and stigma to understand how these interact with person evaluations.
This review supports the call of Beck et al (2019) to include positive evaluations in research on psychosis and interventions. Past longitudinal studies have linked negative evaluations with predicting paranoia (Fowler et al., 2012), future longitudinal studies involving the four subscales of evaluative beliefs would enable more to be inferred about the direction of causality. In tandem to this would be building the evidence base on whether strength based approaches improve positive evaluations alongside global self-esteem in psychosis. Some studies exist that have compared person evaluations amongst other disorders, for example, Vazquez et al (2008) found people with major depression endorsed more negative and fewer positive trait words than those with psychosis. Conducting future meta-analyses comparing the pattern of evaluations between disorders could be useful to understand the relationship between evaluations, emotions and behaviour.

Furthermore the surprising finding that greater effects were reported at milder end of continuum warrants further investigation, into whether this is replicable and whether specific factors contributing to symptoms are more common at different stages of the continuum.

5. Conclusions

This review set out to investigate person evaluations across the psychosis continuum and address a gap in the literature for the role of positive evaluations. It did this, finding that people with psychosis and ARMS hold more negative and less positive person evaluations to the general population. Interestingly this difference is most pronounced for ARMS, to a large effect. This supports cognitive models that name these as a factor for the development and maintenance of psychosis. It is important to stress that causality cannot be inferred and the relationship with person evaluations is likely to be bi-directional with other factors, like psychosis experience.
Taking this review into account with existing literature, person evaluations may provide a concrete focus of therapy that could promote therapeutic alliance and increase social participation, responding to a symptom of psychosis that greatly impacts a person’s quality of life. This review is based on a limited amount of studies and holds several limitations which stress that the results should be interpreted with caution. When considering what is next for evaluative belief research, a more holistic perspective may focus on how they interact with the multiple biopsychosocial factors that contribute to the development of psychosis and whether these are more common at different parts of the continuum.
References


Andreasen, N.C., 1984. The Scale for the Assessment of Positive Symptoms (SAPS). The University of Iowa, Iowa City, IA.


http://www.minitab.com/uploadedFiles/Content/News/Published_Articles/confidence_intervals_misconceptions.pdf


stigma, schematic beliefs, self-esteem, fear of madness, and suicidal ideation.

*Psychiatry Research, 239, 79-84.*


*Structured clinical interview for DSM-IV axis II personality disorders (SCID-II).*


Biometrics Research, New York State Psychiatric Institute, New York.


gender-based analysis in psychosis research? Clinical Psychology & Psychotherapy, 25(6), 774-784.


doi:10.1097/01.nmd.0000231441.48007.a5


https://www.mendeley.com/download-desktop-new/


Part 2: The Empirical Paper

The Relationship Between Childhood Trauma, Person Beliefs and Trust in a Clinical Sample of People Experiencing Paranoia in Psychosis.
Abstract

**Aims:** Virtual reality was used to explore whether childhood abuse and person beliefs predicted trust and trusting behaviour towards an avatar, for people experiencing persecutory delusions in psychosis.

**Method:** The final sample consisted of 22 adults experiencing clinical paranoia, recruited from early intervention services for psychosis. They completed questionnaires that measured childhood trauma and person evaluative beliefs, then participated in a four-minute interactive virtual reality scenario with an avatar. Trust was measured by the interpersonal distance kept form the avatar and through ratings of the avatar’s trustworthiness.

**Results:** Childhood trauma exposure, experiencing multiple trauma types, more severe paranoia and persecutory delusions and having less positive other-beliefs predicted lower trust ratings of the avatar. There was a trend towards more positive self-beliefs being associated with standing closer to the avatar. Emotional neglect severity was associated with lower trust ratings. Surprisingly, negative person beliefs did not impact trust or trusting behaviour towards the avatar, despite being more pronounced in those who had experienced trauma.

**Conclusions:** The benefits of a trauma informed approach to care are discussed, alongside potential treatment targets for persecutory delusions. Implications for future research are considered, including replicating the study with a larger sample and including important confounding variables.
1. Introduction

1.1 Childhood Trauma

In England and Wales one in five adults have experienced at least one form of childhood abuse before the age of 16 (Office for National Statistics, 2020). This does not reflect the incidences of abuse that go unreported, with shame and uncertainty who to approach being some of the barriers to children seeking help (Cawson et al., 2000). Childhood trauma includes sexual, physical or emotional abuse, neglect and non-victimisation events, such as witnessing domestic violence. Experiencing childhood trauma has an immediate impact on a child’s physical and mental health and survivors can develop overlapping psychiatric diagnoses later in life, have longer and earlier first hospital admissions, increased suicidality, self-harm and higher global symptom severity (Read et al., 2005).

1.2 Childhood Trauma and Psychosis

Childhood trauma is considered a social factor to understanding psychosis and the link between the two is well established (Freeman & Fowler, 2009; Read et al., 2005). Psychosis represents a cluster of disorders characterised by a person’s thoughts, mood, behaviour and perception being altered (National Institute for Health and Care Excellence NICE, 2014). Psychosis encompasses both positive and negative symptoms such as, hallucinations, delusions, apathy and social withdrawal (NICE Guideline, 2014). A meta-analysis reported that people with psychosis were 2.78 (95% Confidence Intervals, 2.34–3.31) times more likely to have experienced childhood abuse than the general population (Varese et al., 2012). There were significant associations between all types of childhood adversity and developing psychosis later in life.
One framework for how childhood trauma contributes to the symptoms of psychosis is the traumagenic neurodevelopmental model (Read et al., 2001). In this, adverse childhood experiences cause a vulnerability to stress by affecting the development of neurological functions during childhood, a sensitive neurodevelopmental stage. Exposure to chronic distress increases glucocorticoid levels, which can sensitize the hypothalamic-pituitary-adrenal axis to stress, and affect the release of dopamine, which has been linked to the presence of persecutory delusions (Read et al., 2001). There appears to exist a dose-response relationship, with children who have experienced more severe or frequent trauma at a higher risk of developing psychosis later in life (Anda et al., 2005; Read et al., 2005).

1.3 Paranoia and Childhood Trauma

Paranoia refers to a pervasive mistrust of others and the environment (Garety & Freeman, 2013). Non-clinical paranoia lies on a continuum with clinical persecutory delusions at the severe end, where an individual believes others intend to cause them harm. Persecutory delusions are a distressing and common symptom of psychosis, which have been associated with lower levels of psychological well-being, increased hospital admissions and suicidal ideation (Freeman et al., 2014). In a systematic review, experiencing childhood trauma was consistently associated with severity of hallucinations and paranoid delusions (Bailey et al., 2018). There may be specificity between the type of childhood trauma experienced and the psychotic symptoms that develop, for example experiencing childhood sexual abuse has been consistently linked to developing auditory hallucinations (Hardy et al., 2016; Williams et al., 2018). Yet the evidence is less clear for persecutory delusions. There are inconstant findings for the association between
childhood physical abuse and paranoia (Ajnakina et al. 2018; Hardy et al., 2016). Studies have also reported an association between neglect, an institutional upbringing (Bentall et al., 2012; Bentall et al., 2014) and emotional abuse (Hardy et al., 2016) with paranoia and persecutory delusions.

Understanding the aetiology of persecutory delusions by considering a link with childhood trauma enables planning of psychological interventions that focus on the specific experiences causing distress reported by the individual (Combs & Penn, 2004; Garety & Freeman, 2013)

1.4 Beliefs About the Self and Other

Cognitive theory states that as a child makes sense of their environment, they form beliefs about themselves, others and the world which organise their experiences (Beck & Haigh, 2014). The term beliefs represent a variety of schema related concepts such as assumptions, rules and evaluations (Beck & Haigh, 2014). Evaluative beliefs are judgements made about the self and others (person beliefs) in specific situations which can be positive or negative; they are influenced by past experiences and represent an individual’s adaptation to their social world (Fowler et al., 2006). Adverse childhood experiences can influence evaluations of the self as vulnerable and others as dangerous, which, when activated during social interactions, contribute to a perception of threat characteristic of persecutory delusions (Freeman et al., 2014). Behavioural responses can be triggered to manage this threat, like avoidance and hyper-vigilance, which may maintain the poor interpersonal experiences, social isolation and negative person beliefs characteristic of psychosis (Beck, Himelstein & Grant., 2019; Sundag et al., 2016). Beliefs have a bidirectional relationship with other mechanisms, for example if a person is feeling anxious more
negative beliefs will be triggered, similarly the experience of psychosis itself may inform more negative person beliefs (Freeman et al., 2002).

There is converging evidence for person evaluations as one pathway between experiencing childhood trauma and developing paranoia in psychosis (Freeman & Fowler, 2009; Garety & Freeman, 2013; Read et al., 2005). A systematic review by Williams et al. (2018) implicated mediator factors grouped into families representing: post-traumatic sequelae, affect dysregulation (attachment, anxiety, depression) and cognitive factors (negative beliefs, self-esteem, self-concept clarity). Negative beliefs of defectiveness, shame and vulnerability have been associated with an increase in paranoid delusions (Freeman et al., 2014; Gracie et al., 2007). Positive person evaluative beliefs appear to be less studied in the literature. Positive self-evaluations were associated with less negative symptoms in schizophrenia (Barrowclough et al., 2003) and more negative and less positive self-evaluations have been associated with persecutory delusion severity (Garety et al., 2013). There is mixed evidence for specificity of belief mechanism by trauma type. For example, Hardy et al. (2016) reported negative other beliefs mediated the impact of childhood emotional abuse with persecutory delusions, whilst Fisher et al. (2012) reported no mediation in a non-clinical population.

1.5 Paranoia and Trust

Trust allows an individual to succeed in everyday complex social environments. Unfounded lack of trust in the ‘other’ is a primary process underlying paranoid delusions (Freeman, 2016). Clients experiencing paranoid delusions have reported feeling paranoia towards their therapist, both in and out of session (Lawlor, Hall & Ellet, 2015). This can contribute to issues with engagement and therapists
identifying with beliefs that can threaten the therapeutic relationship, such as equating paranoia to their incompetency (Lawlor et al., 2015).

Self-report measures of trust can be susceptible to social desirability biases. Research suggests paranoia has an effect on the trusting behaviours a person shows, with increased inter-personal boundaries acting as a potential safety behaviour to reduce the threat others pose (Combs & Penn, 2013; Fornells-Ambrojo et al., 2016). As such, neuro-economic research has used interpersonal distance, representing trusting behaviour, as an objective measure of social dysfunction in psychosis (Fett et al., 2012; Gromann et al., 2013). Whilst paranoia and trust are separate entities, the association of paranoia and reduced trust and trusting behaviour can act as a more objective measure of paranoia manifesting in the social world.

1.6 Virtual Reality

Paranoia is often measured through self-report; however this format cannot safely exclude paranoid thoughts founded by real life experience (Freeman et al., 2008). Virtual reality (VR) allows for the behaviour of an avatar to be programmed in a neutral manner, which provides a more ecologically valid study of how paranoia affects the perception of neutral behaviour in social interactions (Freeman et al., 2008). Trusting behaviour can also be measured by tracking the inter-personal distance kept between the person and the avatar. The use of VR has provided a safe and ethical technique to study paranoia with individuals who experience mental health issues (Fornells-Ambrojo, 2008; Valmaggia et al., 2007). Previous studies showed participants endorsed a sense of presence in VR scenarios, whereby they felt they were actually in the scene rather than a laboratory and responded to characters as if they were real (Freeman et al., 2008; Sanchez-Vives & Slater, 2005; Valmaggia
et al., 2007). Studying social behaviour and trust in a clinical sample can inform how to support a trusting therapeutic relationship and promote engagement in mental health services (Freeman, 2009).

VR has been used to measure subjective trust ratings and trusting behaviour in clinical and non-clinical populations. Fornells-Ambrojo et al. (2016) used a VR paradigm to investigate the role of contingency on trusting behaviours across the continuum of paranoia in a non-clinical population. They found paranoia and dismissive attachment predicted larger interpersonal distances kept from the avatar. Unexpectedly, extremely paranoid individuals perceived an avatar as more trustworthy when it was programmed to be highly responsive to them.

Dolan (2018) investigated the relationship between childhood trauma, negative person beliefs and trust in a non-clinical population. No significant impact of having experienced childhood trauma on either measure of trust was found. However, there was evidence for a dose-response relationship, with those who experienced more severe childhood sexual and emotional abuse and neglect keeping larger distances from the avatar and lower avatar trust ratings. These associations were mediated by negative beliefs of the self and/or other people.

The psychosis proneness persistence continuum model states symptoms of psychosis can be transient in non-clinical populations, without the multiple interacting factors that contribute to a diagnosis (Van Os et al., 2008). Clinical psychosis may be dependent on the severity of environmental risk a person was exposed to (Van Os et al., 2008). Thus the relationship between trust, trauma and beliefs (Dolan, 2018) may exist in a sample of highly paranoid people experiencing psychosis.
1.7 Aims

This study aimed to understand the relationship between childhood trauma, person beliefs, subjective trust and showing trusting behaviour (interpersonal distance). It was the first study to examine this relationship in a clinical sample of people with psychosis experiencing paranoia using a VR paradigm. The current study was part of a wider project looking into the effects of avatar contingency on trusting behaviours for people experiencing paranoia.

1.7.1 Hypotheses

1. Previous experience of childhood trauma will be associated with greater interpersonal distance kept from an avatar and reduced subjective trust compared with people who have not experienced trauma.

2. Severity of each type of childhood trauma will be associated with lower subjective trust and greater interpersonal distances.

3. Person beliefs will mediate the effect of childhood trauma on trust and interpersonal distance.

4. Whilst investigating the potential impact of contingency was not an aim in the current study, exploratory analyses was planned to explore whether a history of childhood trauma enhanced/ diminished the possible impact of the contingency manipulation on trust.
2. Method

2.1 Overview

This project was undertaken with a fellow trainee (Watchorn, 2020), see Appendix 5 for the joint work statement.

2.2 Research Design

The current study’s independent variables were childhood abuse and person beliefs, the dependent variables were trust, measured subjectively (trust ratings) and objectively (interpersonal distance). A group comparison design (trauma/ no trauma) was used to test hypothesis one and a within-subject correlational design to test hypotheses two and three. Participants were randomly allocated to one of two contingency conditions before the VR, for the hypotheses the data was analysed as a whole across the two contingency conditions.

2.3 Power Analysis

Dolan (2018) used a similar methodology to investigate childhood trauma, subjective and objective trust and negative beliefs in a non-clinical sample.

*Group difference:* Dolan (2018) compared the difference for objective trust between those who had experienced trauma (M = 1.45, SD = .44) and those who had not (M = 1.36, SD = .25). Dolan (2018) ran the same test for subjective trust between the trauma (M = 4.4, SD = 1.54) and no trauma group (M = 5.15, SD = 1.23). G*Power 3 (Faul, 2007) analysis was conducted and yielded a necessary sample size for subjective trust of 16, eight in each group, and objective trust of 12, six in each group (α = .05, β = .80).
**Correlation:** Dolan (2018) conducted correlational analyses between beliefs, the trust variables and trauma severity. The average sample size needed out of the associations that remained significant after Bonferroni corrections has been reported (Appendix 6 for full details). A power analysis conducted using G*Power 3 (Faul, 2007) yielded an average necessary sample size of 34 ($\alpha = .05, \beta = .80$).

**Mediation:** Dolan (2018) conducted multiple mediation analyses and reported a range of effect sizes from large ($f^2 = .52$) to small ($f^2 = .19$). The average sample size needed has been reported here (Appendix 6). G*Power 3 (Faul, 2007) analysis yielded an average necessary sample size of 36 ($\alpha = .05, \beta = .80$). Therefore, the required sample size is 36 participants experiencing trauma and eight not experiencing trauma, a total of 44 participants.

The sample obtained was 22 participants, 18 who had experienced trauma. A post hoc G Power*3 analysis showed that the current study had 80% power to find only a large effect size (.50) for a two-tailed correlation analysis ($p < .05$), and a group difference between independent samples (trauma vs no trauma) with an effect size of 1.7 (Cohen’s d). As such, the current study only had power to find large effect sizes.

### 2.4 Participants

Participants were recruited from Early Intervention in Psychosis (EIP) services across different NHS foundation trusts, including: Central and North West London, South West London and St Georges, Camden and Islington and North East London Foundation Trust. As previous research suggested that males experience a greater sense of presence in VR than females and to control for potential gender
differences in the appraisal of the male avatar (Felrhofer et al., 2014), this study only recruited males.

Inclusion criteria was a diagnosis of psychosis, schizophrenia or schizoaffective disorder and experiencing paranoid beliefs of a persecutory nature. This was determined by a score of 33 or above on either Part A (social reference) or B (persecution) of the Green Paranoid Thought Scale (GPTS; Green et al, 2008)(Appendix 7). The cut off of 33 was selected based on a previous clinical trial that had used this as a cut off to recruit a population with psychosis and paranoia (Hardy et al., 2016). Exclusion criteria was experiencing a current mental health presentation which would prevent a participant from being able to complete the measures or follow the instructions in the scenarios, being under section, an inability to read or write English and a history of epilepsy.

2.5 Recruitment

Potential participants were approached by their care-coordinators in the service and given copies of the project information sheet. They were given at least 24 hours to consider whether they would like to be part of the study, care-coordinators then asked for their consent to be contacted by the researchers. If consent was given, the participant was contacted by a member of the research team to be screened for paranoia. The aim was to complete testing within a week of screening to minimise the risk of a participant’s paranoia level fluctuating below threshold for the study. Six participants did not meet threshold for paranoia during an initial meeting at their team base and were not invited to do the study (Figure 1). Two additional participants were rescreened on the day of testing as more than a week had elapsed since the initial screening. Both participants scored below threshold on the day and
were excluded from the study. Conversion rate from referral to testing was 25.6%.

This is comparable to other studies using a population of people experiencing paranoid delusions (Freeman et al., 2016; Reidy, 2016).

Figure 1:

*Participant Recruitment Flow Chart.*
2.6 Overview of Study Day

Research took place in the Computer Aided Virtual Environment (CAVE) at UCL. Arrangements were made with each participant for travel with the option of being accompanied by one of the researchers. A phone call or text was given the day before to remind participants of the study. Travel to the venue was refunded, including taxi journeys if the participant was uncomfortable using public transport.

The study began by re-reading the information sheet (Appendix 8) and written consent was then obtained (Appendix 9). Participants were reminded that they could withdraw from the study at any point. Participants completed a series of questionnaires before the VR scene (Table 2). They were then randomised to either the high or low contingency condition. Participants took part in the four minute VR scenario, after which they completed several additional questionnaires. After completion the participants were debriefed and paid £12.50 for their time. Duration of the study took between 45–90 minutes.

2.7 Virtual Reality

2.7.1 The Scenario

The VR scenario was projected in real-time via an immersive system on three high resolution screens, which created the illusion of a room. Participants wore Lightweight CrystalEyes 3D shutter-glasses and a motion head tracker, which enabled the room to be perceived in 3D from the participant’s point of view.

The scenario was the same as had been used in previous research (Dolan, 2018; Fornells-Ambrojo et al., 2016), it was programmed by the Department of Computer Science at UCL and the University of Barcelona. It consisted of an
interactive exchange with a male avatar, who introduced himself as Mark. The participant was given a prompt sheet with four scripted questions to ask Mark about his experience of flat sharing (Appendix 10). Each participant started at a designated spot and were then allowed to move freely around the scenario. The VR scene began with Mark introducing himself and asking the participant their name. He then indicated he was ready, which was the cue for the participant to ask the first question on the prompt sheet. After the last question, Mark invited the participant to view the terrace with him. Mark then received a phone call, after which he excused himself from the conversation and the scene ended (Appendix 11).

The scenario was designed to be pleasant, allowing comparisons to be made of the processes that may occur in positive encounters in the participant’s life. Mark resembled a young Caucasian male in his early twenties (Figure 2). He was designed to be non-threatening and was coded to mimic subtle ambient movements normal to social interactions (e.g. arm movement, swaying, blinking).
2.7.2 Contingency

Participants were randomly allocated to either a high or low contingency condition. The avatar was programmed to respond to the participant with a series of contingent behaviours that would be triggered by the participant’s behaviour (Table 1). Mark was programmed to respond with contingent behaviour after a 1.5 or a 20 second delay in the high and low contingency conditions respectively. The time delay was chosen to allow for enough time to have elapsed so that the contingent
behaviour did not appear to be linked to the participant’s behaviour (Elenabaas, 2014).

Table 1

*Contingent Avatar Behaviours*

<table>
<thead>
<tr>
<th>Participant Behaviour</th>
<th>Contingent behaviour triggered by Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant moves head side to side</td>
<td>Mark tilts head in the same direction</td>
</tr>
<tr>
<td>Participant moves head in any other direction</td>
<td>Mark moves body either side to side or front to back</td>
</tr>
<tr>
<td>Participant finishes speaking</td>
<td>Mark nods</td>
</tr>
</tbody>
</table>

2.8 Measures:

2.8.1 Screening

*GPTS (Green et al., 2008):* This consisted of two 16 item subscales that assess ideas of reference and persecution. Participants rated how much they agree with each statement (e.g. certain individuals have it in for me) from 1 (not at all) to 5 (totally). The GPTS has been validated with a sample of people experiencing persecutory delusions, reporting good internal consistency ($a=0.90$, Green et al., 2008). It has been used to assess paranoid thinking in previous VR research using clinical populations (Freeman et al., 2010)

2.8.2 Pre VR

Participants completed a participant information questionnaire which captured key demographics (age, gender, occupation, mental health diagnosis) (Appendix 12). The following questionnaires were then completed:
Childhood Trauma Questionnaire (CTQ, Beirnstein et al., 1994) (Appendix 13): This assessed the severity of childhood trauma experienced through 28 items which reflect five subtypes of abuse (Appendix 14). It assessed emotional abuse (e.g. I felt that someone in my family hated me), emotional neglect (e.g. people in my family looked out for each other), physical abuse (e.g. I was punished, with a belt…), physical neglect (e.g. I had to wear dirty clothes) and sexual abuse (e.g. someone molested me). Three items measured minimisation/denial (e.g. I had the perfect childhood). The participant rated whether they experienced each item on a five point Likert scale ranging from 1 (never) to 5 (very often true). The CTQ has good test-retest reliability and is safe and valid to use in clinical populations, with Cronbach alpha’s for each subscale above .80 (Bernstein et al., 1994; Powers et al., 2016).

Brief Core Schema Scale (BCSS, Fowler et al., 2006) (Appendix 15): This assessed participants’ beliefs of the self and other people through 24 items which created four subsets of person evaluations: positive self (e.g. I am respectful), negative self (e.g. I am bad), positive other (e.g. other people are fair) and negative other (e.g. other people are harsh). Participants circled whether they believe the statement (Yes/No) and if so, how much they agreed with it from 1 (believe it slightly), to 4 (believe it totally). This measure was designed for people with psychosis and has good internal consistency (α = .86) and construct validity (Fowler et al., 2006).

Paranoia Scale (PS: Feningstein and Vanable, 1992)(Appendix 16): This assessed levels of current paranoia through 20 statements representing ideas of reference and persecution (e.g. someone has it in for me) that the participant rated on a five-point scale from 1 (not applicable to me at all) to 5 (extremely applicable).
This is the most widely used scale for paranoia and is well validated, with good internal consistency ($a = .84$, Freeman et al., 2005).

*Psychotic Symptoms Ratings Scale-Delusions (PSYRATS-D; Haddock, McCarron, Tarrier, & Faragher, 1999)* (Appendix 17): This measured the levels of conviction and associated distress of the participant’s paranoid delusions and whether it disrupted their everyday life through six clinician rated items. The total scores range from 0-24. The individual subscale has been found to have good internal reliability, validity and test-retest reliability for those experiencing persecutory delusions (Drake et al., 2007).

*Positive and Negative Affect Scale (PANAS, Watson, Clark & Tellegen, 1988)* (Appendix 18): This was given before and after the VR to detect any change in affect caused by the experience. It comprised of two ten item subscales assessing positive (e.g. interested) and negative (e.g. ashamed) affect. Participants rated how applicable each item was to them on a 5-point scale from 1 (very slightly or not at all), to 5 (extremely). In a non-clinical sample it had a Cronbach’s alpha of .89 for positive affect and .85 for negative affect, suggesting good reliability and validity (Crawford & Henry, 2004).

**2.8.3 During VR**

*Inter-Personal Distance:* This was used to infer objective trusting behaviour from the participant. The average distance kept between the participant and the avatar after being invited to look out of the terrace was recorded. The head tracker recorded the horizontal Pythagorean distance frame by frame between their heads, which accounted for any height differences.
Total Avatar Movements: The total amount of avatar movements triggered by the participant’s movement was recorded for comparison between the contingency conditions.

2.8.4 Post VR

Subjective Trust (Appendix 19): this was measured through one item (How trustworthy did Mark seem) which the participant rated on a seven-point scale from 1 (not at all) to 7 (very much). This was used in past VR research using the same scenario (Fornells-Ambrojo et al., 2016)

Sense of Presence Questionnaire (SoP; Slater et al., 1998)(Appendix 20): This assessed how present a participant felt in the virtual world. Participants were asked to rate six statements (e.g. do you think of the virtual flat more as “images that you saw”, or more as “somewhere you visited”?) on a seven point Likert scale adapted for each statement.

Attention Check (Appendix 21): Whether the participant was paying attention to Mark during the scenario was assessed via two true or false questions, this gives an indication of how well the participant was attending to the virtual world. This was used in past VR research using the same scenario which can provide a comparison for attention in the current study to other existing VR studies (Dolan, 2018; Fornells-Ambrojo et al., 2016).
Table 2:

Full Pack of Measures

<table>
<thead>
<tr>
<th>Screening</th>
<th>Pre VR</th>
<th>During VR</th>
<th>Post VR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Paranoid Thoughts Scale **</td>
<td>Demographics**</td>
<td>Interpersonal Proximity from Avatar**</td>
<td>PANAS**</td>
</tr>
<tr>
<td>The Relationship Questionnaire #</td>
<td>The Relationship Questionnaire*</td>
<td>Total amount of Avatar movement**</td>
<td>VR Control Variables**:</td>
</tr>
<tr>
<td>Childhood Trauma Questionnaire*</td>
<td></td>
<td></td>
<td>-Sense of Presence Questionnaire</td>
</tr>
<tr>
<td></td>
<td>Brief Core Schema Scale*</td>
<td></td>
<td>-Attention Check</td>
</tr>
<tr>
<td>Paranoia Scale**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychotic Symptoms Rating Scale-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delusions**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PANAS**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
*measures specific to current study  **measures shared with research partner
# measures of research partner

2.9 Ethics

The project obtained NHS ethical approval in August 2015 (Appendix 22), an application for an extension until 2020 was granted (Appendix 23). As the sample consisted of people with psychosis and some measures were of a sensitive nature, a series of ethical considerations were made. The measure pack had been previously piloted by the UCL service user reference group. The researchers spent time in EIP services during recruitment and were available to meet participants to ease any nerves. People can experience paranoia in the VR scenario without increased anxiety or distress (Fornells-Ambrojo et al., 2008). The risk of adverse effects such as motion sickness are rare (Freeman et al., 2008) and participants were monitored for
any signs of distress throughout the study. A researcher was always present in the
laboratory with the participant for support, both researchers worked in trauma
specialist services and were trained in grounding techniques. Finally, there was a
debrief following the VR scenario for the participants to discuss their experience and
receive any support needed including, if necessary, being signposted to further
services.

2.10 Planned Analysis

All analyses were conducted using the statistics programme, Statistical
Package for Social Sciences (SPSS, version 26). The distribution and normality of all
variables were explored. The study did not reach sufficient sample size (n = 22) to
have adequate powered to conduct the confirmatory data analysis (CDA) needed to
test the hypotheses, particularly pertaining to mediation and moderation. Therefore,
it was not possible to test hypotheses as intended.

Two types of data analysis were taken: exploratory data analysis (EDA) and,
where possible, CDA. EDA is a technique used to explore the relationship, direction
and size, between explanatory and outcome variables (Seltman, 2018). It does this
through non-graphical (tables, frequencies) and graphical analysis (box-plots,
scatterplots). EDA enables the data to be visually explored for any trends that would
be missed with statistical testing. EDA and CDA can be used as complementary
processes, with EDA drawing attention to aspects of the data to induce with CDA
(Lovie & Lovie, 1991). To address the risk of Type I error, Bonferroni corrections
were applied to any analyses that involved multiple comparisons.
2.10.1 Does Childhood Exposure Impact Trust and Trusting Behaviour?

Graphical EDA was conducted for each childhood trauma subscale with the trust variables to assess how trust was impacted by severity of abuse. A non-parametric Mann-Whitney U test was conducted for those who had and had not experienced childhood trauma for both trust variables.

2.10.2 Does Severity of Each Trauma Type Predict Trust and Trusting Behaviour?

Graphical EDA using scatterplots was conducted for each sub-scale of the CTQ and trust variables. Correlational analysis was conducted on variables showing association trends from the graphs.

2.10.3 Do Person Beliefs Predict Trust?

It was not possible to investigate hypothesis three (person beliefs will mediate the effect of childhood trauma on trust and interpersonal distance) due to lack of power. Instead, this study looked at whether person beliefs predicted trust in the virtual interaction. Graphical EDA using scatterplots was conducted to see if positive and negative person beliefs predicted trust and trusting behaviour. Any graphical analysis that showed a trend was explored further through correlational analysis. This was done with the knowledge that no inferences about the possible mediating role of person beliefs can be made.

2.10.4 Exploratory Analysis

This was not conducted due to the low sample size.
3. Results

3.1 Demographics

The sample consisted of 22 male participants, 11 in each contingency condition. Their average age was 25.91 (SD = 6.49) years and they identified as a range of ethnicities (Table 3). Nine participants had previously experienced VR and eight participants had previous experience of flat sharing; six who had rated flat-sharing as a positive and two as a neutral experience.

Table 3:

Participant Demographics

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong> M(SD)</td>
<td>25.91 (6.49)</td>
</tr>
<tr>
<td>Range</td>
<td>18-44</td>
</tr>
<tr>
<td><strong>Ethnicity (n):</strong></td>
<td></td>
</tr>
<tr>
<td>White British</td>
<td>10 (45.5%)</td>
</tr>
<tr>
<td>Black British</td>
<td>5 (23%)</td>
</tr>
<tr>
<td>Polish</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Russian</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Asian British</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>African</td>
<td>2 (9%)</td>
</tr>
<tr>
<td>Romanian</td>
<td>2 (9%)</td>
</tr>
<tr>
<td><strong>Education (n):</strong></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>7 (31.8%)</td>
</tr>
<tr>
<td>Student</td>
<td>3 (13.6%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>12 (54.5%)</td>
</tr>
<tr>
<td><strong>Mental Health Diagnosis (n):</strong></td>
<td></td>
</tr>
<tr>
<td>Psychosis</td>
<td>19 (86%)</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Paranoid schizophrenia</td>
<td>2 (8%)</td>
</tr>
<tr>
<td><strong>Flat sharing (n):</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (36%)</td>
</tr>
<tr>
<td>No</td>
<td>14 (64%)</td>
</tr>
<tr>
<td><strong>Previous Experience of VR (n):</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 (41%)</td>
</tr>
</tbody>
</table>
3.2 Data screening

3.2.1 Missing data

One participant did not complete the Paranoia Scale (Fenigstein & Vanable, 1992) and another participant refused to do the PSYRATS-D (Haddock et al., 1999) as they did not identify with their diagnosis. These were coded in SPSS as missing values and thus excluded in any analysis utilising these scales.

3.2.2 Assumptions

The normality of variables was assessed using tests of Kurtosis, Skewness and the Kolmogorov-Smirnov statistic (Appendix 24). Most variables showed normal distribution with degrees of skewness that did not reach significance except for, the physical and sexual abuse childhood trauma subscales and the negative pre-VR and positive post-VR affect scores. These were explored using non-parametric tests.

3.2.3 Outliers

There were two outliers in the data: one participant scored highly on the CTQ sexual abuse subscale, and another scored highly on positive affect before the VR (Appendix 24). Owing to the small sample size, coupled with the nature of the measures, it was not deemed appropriate to exclude the participants.

3.3 Virtual Reality Safety and Validity Checks

3.3.1 Affect
Participants appeared to rate positive affect higher than negative affect both before and after the VR exercise (Figure 3). There was no significant difference ($z = -.656$, $p = .528$) in positive affect ratings before the VR ($M = 37.64$, $SD = 8.67$, Median = 38) and after ($M = 38.64$, $SD = 11.36$, Median = 42). There was also no significant difference ($z = -1.04$, $p = .312$) in negative affect before the VR ($M = 15.36$, $SD = 6.04$, Median = 14) and after ($M = 14.09$, $SD = 4.43$, Median = 12.50). This suggests that the VR did not significantly impact mood and importantly, in line with previous research, was not distressing for participants (Fornells-Ambrojo et al., 2016).

**Figure 3:**

*Mean Positive and Negative Affect Score (PANAS) Pre and Post VR*

3.3.2 Sense of Presence and Attention

The Sense of Presence questionnaire had a maximum score of 42. Participants scores ranged from 11–42, with an average degree to which a participant felt
immersed in the VR experience of 24.68 (SD = 7.97). This is similar to a previous study using VR in a clinical population of people experiencing persecutory delusions (Fornells-Ambrojo et al., 2008; M = 24, SD = 6.4).

To check the participant’s attention during the scenario, two true or false questions were asked regarding information the avatar had given about flat sharing. Twelve participants (55%) answered both questions correctly, seven answered one question correctly (32%) and three answered neither correctly (13%). This was lower than a previous doctoral thesis by Reidy (2016) and Wingham (2016) that used a clinical population experiencing persecutory delusions. They reported 64% of the population answered both questions correctly.

3.4 Pre-Virtual Reality Variables

3.4.1 Paranoia

The average delusion severity and paranoia score for participants are displayed in Table 4. The average delusion severity score was higher than Reidy (2016) and Wingham’s (2016) (M = 13.1, SD = 4.33), yet slightly lower than other clinical studies using a psychosis population (Freeman et al., 2016, M = 17.3, SD = 2.70). Furthermore the average paranoia score was slightly lower than that reported by Collip et al. (2010), who used the scale with a clinical population of people experiencing psychosis (M= 64.1, SD=16.5).
Table 4

Summary Statistics for Pre VR Measures

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M(SD)</th>
<th>Sample Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosis Symptom Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[range]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paranoia Scale (20-100)</td>
<td>21</td>
<td>57.76 (17.25)</td>
<td>20-86</td>
</tr>
<tr>
<td>PSYRATS-D (0-24)</td>
<td>21</td>
<td>15 (4.24)</td>
<td>5-21</td>
</tr>
<tr>
<td>BCSS Belief Measure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[scale range:0-24]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Self</td>
<td>22</td>
<td>7.45 (6.1)</td>
<td>0-20</td>
</tr>
<tr>
<td>Positive Self</td>
<td>22</td>
<td>14.05 (6.04)</td>
<td>5-23</td>
</tr>
<tr>
<td>Negative Other</td>
<td>22</td>
<td>10.82 (7.07)</td>
<td>0-24</td>
</tr>
<tr>
<td>Positive Other</td>
<td>22</td>
<td>12.73 (5.28)</td>
<td>2-23</td>
</tr>
</tbody>
</table>

3.4.2 Person Beliefs

Average scores on schematic beliefs as assessed by the BCSS are displayed in Table 4. The averages for negative self, negative other and positive other-beliefs were similar to a large study (n = 84) of people with psychosis (Peters et al, 2016) who reported means for negative self-beliefs of 6 (SD = 6.2), negative other-beliefs of 9.1 (SD = 6.8) and positive other-beliefs of 11 (SD = 6). The average positive self-beliefs was slightly higher than that reported in the Peters et al. (2016) study, yet the spread of scores was similar (M = 10.2, SD = 6.9).

EDA was conducted via side by side boxplots (Figure 4). From viewing the medians, positive self-beliefs were more commonly endorsed than negative self-beliefs. There was a similar pattern for other-beliefs, but this difference was less marked. The lowest score for the positive self-subscale was five, indicating that all participants endorsed at least one positive self-item. The negative belief subscales’ lowest score was 0, indicating some of the participants had endorsed none of the
items. The negative self-interquartile range was lower than the other subscales, with almost 50% of people scoring below 10 from a possible range of 0-24. There was also less variation in the bottom 25% of participant scores, all being around 0. This suggests participants endorsed less negative-self items. All but the positive other-beliefs subscales were skewed, there was more variation in the top 25% than the bottom, indicating a variety of items being endorsed. From viewing the spread of each subscale, a slightly higher response variability was observed in beliefs about others than in beliefs about the self.

**Figure 4:**

*Side by Side Boxplots for the Spread of Each Person Belief Subscale*

EDA was conducted for the individual items of the BCSS (Fowler et al., 2006) to identify if there were certain attributes that were commonly endorsed (Figure 5). The most commonly endorsed negative self-beliefs were ‘I am vulnerable’ and ‘I am a failure’. The positive self-beliefs were more spread, with ‘I
am respectful’ being rated the most. There was an even spread between other-beliefs items.

**Figure 5**

*Mean Score for Individual Items on the BCSS*

---

**3.4.3 Childhood Trauma**

The majority of the sample (82%) had experienced a form of childhood trauma; two participants had experienced one type of childhood trauma (11%), and sixteen
had experienced multiple types (89%). Only four participants had experienced no childhood trauma.

Each subscale of the CTQ has four severity classifications, which have specific cut off ranges for each abuse type (Appendix 25). The number of participants in each severity classification for the subscales are reported in Table 5, along with the prevalence and mean score of the items for each abuse subscale. Emotional abuse was the most prevalent type of trauma in this sample (68%), followed by emotional neglect (55%). The prevalence rates are higher than studies that have used the CTQ with outpatients with psychosis (Devi et al., 2019; Duhig et al., 2015). Most participants scored on the less severe end (none-moderate) for each abuse subscale, except in emotional abuse where 41% of the sample scored in the moderate-severe end.

Table 5

*Childhood Trauma Questionnaire Descriptives*

<table>
<thead>
<tr>
<th>Scale (range)</th>
<th>Mean (SD)</th>
<th>Range</th>
<th>Prevalence %</th>
<th>None or minimal</th>
<th>Low to Moderate</th>
<th>Moderate to severe</th>
<th>Severe to extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[5, 25]</td>
<td>11 (4.2)</td>
<td>5-21</td>
<td>68%</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[5, 25]</td>
<td>9.27 (5.93)</td>
<td>5-25</td>
<td>45%</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[5, 25]</td>
<td>7 (4.41)</td>
<td>5-21</td>
<td>41%</td>
<td>13</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Emotional Neglect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[5, 25]</td>
<td>10.73 (4.84)</td>
<td>5-22</td>
<td>55%</td>
<td>10</td>
<td>7</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
Several of the CTQ subscales were associated with each other (Table 6). This is in line with previous research that suggests there is co-morbidity between different forms of childhood trauma (Dong et al., 2014). Bonferroni corrections were applied with an adjusted $\alpha$ level = .005 (.05/10). Only emotional abuse and emotional neglect remained significantly associated, in that the more emotional abuse one experiences the more likely they are to experience emotional neglect.

Table 6

<table>
<thead>
<tr>
<th>Associations Between the Trauma Subscales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1. Emotional Abuse</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2. Physical Abuse</td>
</tr>
<tr>
<td>3. Sexual Abuse</td>
</tr>
<tr>
<td>4. Emotional Neglect</td>
</tr>
<tr>
<td>5. Physical Neglect</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

| 1. Emotional Abuse | - | - | - | - | - |
| 2. Physical Abuse  | .432,$^{\text{rho}*}$ | - | - | - | - |
|                    | $p = .045$ |
| 3. Sexual Abuse    | .439,$^{\text{rho}*}$ | .546,$^{\text{rho}**}$ | - | - | - |
|                    | $p = .041$ | $p = .009$ |
| 4. Emotional Neglect| .623,$^{\text{r}**#}$ | .275,$^{\text{rho}}$ | .442,$^{\text{rho}}$ | - | - |
|                     | $p = .002$ | $p = .216$ | $p = .04$ |
| 5. Physical Neglect| .220,$^{r}$ | .189,$^{\text{rho}}$ | .405,$^{\text{rho}}$ | .302,$^{r}$ | - |
|                    | $p = .326$ | $p = .400$ | $p = .061$ | $p = .171$ |

$r$: Pearson’s correlation; $^{\text{rho}}$: Spearman’s correlation; $p<.05^*$, $p<.01^{**}$, # significant after Bonferroni corrections

3.4.4 Is Childhood Trauma Associated with Self and Other-Beliefs?

Graphical EDA showed that participants endorsed similar amounts of positive beliefs, yet those who had a history of childhood trauma appeared to hold
more negative beliefs about the self and other people (Figure 6). Visually, the greatest difference was for negative other-beliefs.

Guided by the EDA, statistical analysis was conducted reporting that those who had experienced trauma significantly rated ($U = 10$, $p = .026$) other people more negatively ($n = 18$, Median = 10.50) compared to those who had not ($n = 4$, Median = 2). This must be interpreted with caution due to the small sample size in each group, as significant effects in small samples cannot be assumed significant in larger samples without further testing (Simmons, Nelson & Simonsohn, 2011).

Figure 6

*Mean Score for BCSS Subscales for Childhood Trauma Exposure vs No Exposure*

![Graph showing mean scores for BCSS subscales for childhood trauma exposure vs no exposure.](image)

Further graphical EDA was conducted to visualise the relationship between negative other-beliefs and severity of trauma types to investigate if the identified trend was noticeable in a specific abuse or neglect type. There were no observable trauma type specific associations with negative other-beliefs (Figure 7). There was a greater range of scores for the experience of emotional abuse and neglect, with
variation in both the top and bottom 25% of scores. Furthermore the medians for these two subscales were higher than the other subscales, in the low-moderate range.
Figure 7

*Scatterplots of Associations Between Abuse Types and Negative Other Beliefs.*

<table>
<thead>
<tr>
<th>Abuse</th>
<th>Emotional abuse</th>
<th>Sexual abuse</th>
<th>Physical abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
<td><img src="image3.png" alt="Graph" /></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neglect</th>
<th>Emotional neglect</th>
<th>Physical neglect</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Graph" /></td>
<td><img src="image5.png" alt="Graph" /></td>
<td><img src="image6.png" alt="Graph" /></td>
</tr>
</tbody>
</table>
3.5 Trust Towards a Virtual Agent

Trust was measured by two variables, subjective trust ratings and objective trusting behaviour (distance kept from the avatar). On average participants rated the avatar as 5.14 (SD = 1.62) on a scale from 1 (not trustworthy) to 7 (trustworthy). This is higher than the clinical sample by Reidy (2016) and Wingham (2016) (M = 4.7, SD = 1.67). The average distance the participant kept from the avatar once they were invited to look at the terrace was 1.62m (SD = .36). This is larger than the average distance in non-clinical population reported by Fornells-Ambrojo et al. (2016) (M = 1.43, SD = 0.26). The less trustworthy a participant rated the avatar the larger distances they kept from him (r = -.431, p < .05) (Figure 8), which is in line with a previous study (Dolan, 2018).

Figure 8

*Relationship Between Subjective Trust and Interpersonal Distance*
3.5.1 Impact of Contingency Manipulation

Although not the focus of the current study, the impact of the contingency manipulation on the trust outcome variables was explored. Those in the high contingency condition experienced significantly more head movements than the low contingent group (U = 0.00, z = -3.81, p < .001). Yet total avatar head movements were not significantly associated with either subjective trust (r = -.042, p = .765) or objective trust (r = -.042, p = .854).

There was a trend towards significant difference in that those in the contingent (M = 1.75, SD = .43, Median = 1.83) compared to the non-contingent (M = 1.49, SD = .23, Median = 1.44) stood further away from Mark (U = 31, p = .056). There was no difference between those in the contingent (M = 4.82, SD = 1.66, Median = 5) and non-contingent (M = 5.27, SD = 1.68, Median = 6) conditions on subjective trust ratings (U = 50, p = .519), yet post hoc analysis suggested that the study was underpowered to find an effect (a = .05, β = 15%). The contingency manipulation may have had an influence on trusting behaviour, yet this could not be controlled for when testing the study’s main hypotheses due to the inadequate power of the study.

3.5.2 Impact of Severity of Paranoid Ideation

Those who had more severe delusions or scored highly on paranoia on the day reported less subjective trust towards the avatar, but this did not have an impact on interpersonal distance (Table 7). Only paranoia and subjective trust remained significant after Bonferroni corrections were applied (adjusted a level (.05/2) = .03).
Table 7

*Correlation between Trust and Psychosis Symptoms*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Subjective Trust (r)</th>
<th>Objective Trust (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paranoia Scale</td>
<td>-0.610***#</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(p = .003)</td>
<td>(p = .477)</td>
</tr>
<tr>
<td>PSYRATS-D</td>
<td>0.454*</td>
<td>-0.207</td>
</tr>
<tr>
<td></td>
<td>(p = .039)</td>
<td>(p = .185)</td>
</tr>
</tbody>
</table>

Key: \(r\) = Pearson’s two-tailed correlations, \# = remained significant after Bonferroni corrections. \(p < .05^*, p < .01^{**}\).

3.6 Study hypotheses

3.6.1 Do those who have experienced childhood trauma, compared to those who have not, report higher levels of subjective trust and keep further away from the avatar?

Those who had not experienced childhood trauma (median = 7, n = 4) compared with those who had (median = 5, n = 18) rated the avatar as significantly more trustworthy (\(U = 8.5, p < .05\)). There was no significant difference between those who had experienced trauma (median = 1.59) and those who had not (median = 1.52) for trusting behaviour (\(U = 32, p = .764\)). Yet, post hoc analysis for the latter group difference determined the study was underpowered to find an effect (\(a = .05, \beta = 15\%\)).

Graphical EDA was conducted in the form of a bar chart to explore the relationship of experiencing no trauma, one type or multiple types of trauma on trust (Figure 9). For subjective trust, there appeared to be a possible dose response relationship, where having experienced more forms of abuse predicted perceiving the
avatar as less trustworthy. There was no clear dose-response pattern observed for interpersonal distance in relation to childhood trauma.

**Figure 9**

*Impact of Multiple Trauma Types Exposure on Trust Variable*
3.6.2 Severity of each type of childhood trauma will be associated with lower subjective trust and greater interpersonal distances.

EDA explored the relationship between each trust variable and subscales of the CTQ. In the scatterplots, a trend was observed for participants who had experienced more severe emotional neglect to rate the avatar as less trustworthy (Figure 10). Interestingly, for all abuse subscales, participants who experienced more severe abuse appeared to stand closer to the avatar, although these trends were weak, as indicated by the gentle slope of the line.

Statistical analysis was conducted to investigate the potential trend between emotional neglect and subjective trust. Those who experienced more severe emotional neglect were more likely to rate the avatar as less trustworthy ($r = -.434$, $p = .043$).
Figure 10 Association Between Abuse Subscales and Trust Variables
3.6.3 Do beliefs about the self and others predict trust towards a virtual agent?

The relationship between person beliefs and trust variables was explored first through graphical EDA. It appeared that positive self-beliefs may be associated with objective trust and positive other-beliefs may be associated with subjective trust (Figure 11). There appeared to be no graphical associations between negative person beliefs and either trust scale.

Two-tailed Pearson’s correlations for these two trends suggested by the EDA confirmed that participants who endorsed more positive other-beliefs rated Mark as more trustworthy ($r = .522, p = .013$). There was also a trend for those who endorsed more positive self-beliefs keeping smaller distances between themselves and the avatar ($r = -.388, p = .074$). Post hoc analysis using G*Power 3 determined the study was underpowered to detect this effect size ($\beta = 60\%, a = .05$).

Figure 11: Association Between Beliefs and Trust Variables
3.7 Summary of Findings:

Those who experienced childhood trauma reported less subjective trust towards the avatar than those without a history of childhood trauma. This is possibly impacted by experiencing multiple types of traumas. There was no impact of childhood trauma exposure on trusting behaviour. Tentatively, experiencing more severe emotional neglect predicted less subjective trust. ¹Finally, against what was hypothesized, there was no evidence of negative beliefs impacting trust or trusting behaviour towards the avatar, despite being more pronounced in those who had experienced trauma. Interestingly, positive other-beliefs appeared to predict subjective trust and there was a trend towards positive self-beliefs being associated with standing closer to the avatar².

4. Discussion

4.1 Prevalence of Childhood Trauma and Person Beliefs

In the current study childhood trauma was common, with the majority experiencing multiple types. A high prevalence has been reported of childhood trauma in psychosis populations, not including the trauma experiencing psychosis can bring (Bonoldi et al., 2013; Duhig et al., 2015; Read et al., 2005). Co-morbidity of childhood trauma is common, a survey of adults using EIS in the UK found 60% had experienced a form of childhood maltreatment and of those, 66% had

---

¹ If correlational analysis had been conducted with all the abuse types and trust variables, Bonferroni corrections would have been applied and this finding would have no longer been significant (.05/10=.005)

² If correlational analysis was conducted with all the belief subscales and trust variables, Bonferroni corrections would have been applied and this finding would no longer be significant (.05/8=.006)
experienced multiple trauma types (Reeder et al., 2017). A tentative finding of this study was that trauma presence was linked to more negative beliefs about others. Negative person beliefs have been considered as representations of emotional and cognitive learning from early adverse experiences (Gracie et al., 2007). They feature in models of persecutory delusions as one of several factors that trigger threat explanations of anomalous experiences (Freeman et al., 2002) and have been reported as a mediator between emotional abuse and paranoia (Hardy et al., 2016).

In this sample, the most commonly endorsed beliefs were of the self as vulnerable, as a failure and as respectful. This could represent a theme of subordination in interpersonal relationships. Subordination is common between voice hearers and voices, which has been linked to subordination between the individual and significant others in their social world (Birchwood et al., 2000; Hayward, 2003). Social rank theory implicates difference in perceived power, rank, proximity and intimacy in impacting an individual’s interpersonal behaviour. Particularly, if a perpetrator is perceived as more powerful in these domains, and the self as vulnerable, than the individual may take on a more obedient or subservient relating style to the perpetrator. Interpersonal sensitivity and vulnerability have been associated with psychosis and with persecutory delusions in VR (Beck et al., 2019; Freeman et al., 2008; Gracie et al., 2007).

Yet Barrowclough (2003) reported one can hold positive and negative views of people at the same time. Participants in the current study who had experienced trauma also had a positive sense of self and of other people, visually similar to those who had not experienced trauma. Whilst it is widely accepted that people with psychosis endorse negative evaluations (Fowler et al., 2006; Thomas et al., 2015) less is understood about the role of positive schemas. The evidence is inconsistent in
the literature for the association of positive beliefs with both paranoia and persecutory delusions (Freeman et al., 2019; Gracie et al., 2007; Vorontsova et al., 2013). There is a dearth of literature on positive schemas in psychopathology, perhaps contributed by the idea they are the inverse of negative schemas (Keyfitz et al., 2002). Interestingly, in depression research, the presence of positive cognitions has been found to predict resilience in the face of life stress, depression and anxiety (Keyfitz et al., 2012; Lumley & McArthur, 2016). Keyfitz et al. (2012) reported that positive schemas exist on their own continuum separate from negative and could be considered in cognitive models alongside their negative counterparts.

4.2. Virtual Reality: A Valid Tool

Overall, VR was found to be a valid tool to investigate social interactions in people with psychosis who experience paranoia. The degree to which participants felt like they were in the virtual world was similar to previous clinical populations (Fornells-Ambrojo et al., 2008). As expected, the more a person trusted the avatar there was a tendency to stand closer to him within the VR scene. This lent validity to the virtual scenario, with virtual behaviour mirroring behaviour in real world social situations (Sanchez-Vives & Slater, 2005). VR has been used in therapy for people with psychosis as a safer environment than the real world to try dropping safety behaviours and to challenge beliefs about the power of voices (Russ-Calafell et al., 2018). The current scenario was designed to be non-threatening and enjoyable. The sustained high level of positive affect post VR suggests that it is a safe tool to use with people experiencing persecutory delusions.

A potential drawback from this strategy is that participants are likely to have experienced less anxiety compared to real life scenarios. A qualitative study of threat evaluation in a VR environment, reported participants with persecutory delusions felt
the virtual environments were safer than the real world (Fornells-Ambrojo et al., 2015). In the controlled environment, people with persecutory delusions utilized a range of strategies to evaluate potential threat and reported similar paranoia to non-clinical controls. As such, without the physical arousal of anxiety, external threat explanations of anomalous internal experiences might not have been triggered within the VR scenario (Freeman et al., 2002).

4.3 Main Findings for Trust

Tentatively, trust appraisal and trusting behaviour were predicted by different variables.

4.3.1 Severity of Paranoia and Paranoid Delusions

Lower baseline paranoia and persecutory delusion severity predicted trust appraisal, yet there was no evidence of an influence on distance kept from the avatar. This may be as our study was underpowered to find anything other than large effects, similarly the contingency manipulation may have impacted trusting behaviour. Persecutory delusions have been defined as threat beliefs, that one is in danger of being harmed by another person (Freeman, 2016). In this sense, it is understandable that when persecutory delusion severity is lower a person is appraised as more trustworthy. Using trust paradigms, baseline trust levels have been found to be lower in both adolescents and adults with psychosis compared with healthy controls (Fett et al. 2012; Gromann et al. 2013). This generalised sense of mistrust towards other people can influence the interpretation of anomalous or neutral behaviour to be seen as hostile and threatening (Freeman et al., 2002). A qualitative exploration of trust towards the therapist in cognitive behavioural therapy for persecutory delusions
described how a generalized sense of others as untrustworthy and malevolent contributed to paranoid beliefs about the therapist developing and, at times, the therapist being included in the client’s paranoid delusion (Lawlor et al., 2015).

However, this may not materialise in the use of interpersonal distance as a safety behaviour. Interpersonal behaviour may depend on an interplay of social, cultural and personal characteristics which were not assessed in this study (Park et al., 2009). For example, as safety behaviours are socially learnt, social functioning and practical support may influence the use of interpersonal distance. In line with social learning theory, individuals who are consistently exposed to social interactions may have more adjusted proxemecs compared with those who are isolated (Bandura & Walters, 1963). In the current sample, 45% were employed or studying, perhaps increasing exposure to social interaction. The distance kept between the participant and the avatar may reflect compliance with the researcher, which may be particularly high when a person is experiencing paranoia and fearing another may have an intention to cause them harm. Interpersonal distance is also impacted by culture, age and gender (Remland, Jones & Brinkman, 1995). For example, cultural differences in the use of contact impact how closely individuals interact, how direct their body interaction is and their use of touch.

These factors limit the use of interpersonal distance as a potential clinical measure of change, for example tracking whether interpersonal distance as a safety behaviour reduced post clinical intervention. Whilst interpersonal distance could be seen as a measure of change that is embedded in an individual’s social world, more research would be needed into the multiple factors that could be mediating this relationship. Furthermore, whilst interpersonal distance was used to assess trust, paranoia and trust are separate entities, and a reduction in interpersonal distance
could not be inferred to mean a reduction in paranoia without further measurement. Validity was given to the relationship between paranoia and trust in the current study, through the negative association between reduced trust rating and larger interpersonal distances indicating interpersonal behaviour was in line with proxemics rules (Hall, 1966).

4.3.2 Trauma and Multiple Trauma Types

EDA indicated that participants might appraise the avatar as more trustworthy when they had experienced less types of trauma, this did not clearly impact trusting behaviour. This must be interpreted tentatively due to the small sample size of the groups, particularly for experiencing no trauma (n = 4) and one trauma type (n = 2). Experiencing multiple trauma types predicted psychosis in a large community sample (Shevlin et al., 2014). If a person has experienced multiple forms of abuse at the hands of another person it is understandable that it may be difficult to trust other people.

Applying this to childhood abuse, if a child is experiencing multiple forms of abuse it is more likely that abuse is occurring within a chaotic family unit (Van Der Kolk, 2014; Reeder et al., 2017). Children depend on their primary caregiver for safety in an attuned relationship, which allows them to explore the world and learn to regulate emotions (Bowlby, 1988). A secure attachment provides an infant a sense of trust in the environment and those around them, if a child is experiencing abuse or neglect by an attachment figure, this can lead to insecure or disorganized attachment (Berry et al., 2008). As a child is dependent on their caregiver, they can come to both fear and need their caregiver. This can result in dissociation or denial which, whilst
necessary for survival, as an adult may leave a person unsure of what they are feeling or who they can trust (Van der Kolk, 2014).

### 4.3.3. Emotional Neglect

The current study showed a possible association between experiencing more severe emotional neglect and rating the avatar as less trustworthy. It may have been the study was underpowered to find other abuse type associations, although there was no observable trend in graphical EDA. A longitudinal study reported that experiencing multiple forms of abuse, particularly emotional abuse and neglect, increased the likelihood of developing both hallucinations and delusions (Abajobir et al., 2017). This has also been reported in a non-clinical population using the same paradigm (Dolan, 2018). Emotional neglect is representative of an enduring interactional pattern between the child and their caregiver, indicative of unmet needs (Glaser, 2002). Experiences of neglect have been linked to paranoid delusions, mediated by negative beliefs, disrupted attachments and reduced ability to trust other people (Bentall et al., 2014). Cecil et al. (2017) conceptualised emotional abuse as a particularly detrimental form of abuse whose mechanisms warranted further exploration.

### 4.3.4 Positive Beliefs

Positive other-beliefs predicted trust appraisal and positive self-beliefs predicted trusting behaviour. Having a supportive, nurturing and loving relationship in childhood has been shown to be a protective factor against the negative impact of childhood abuse on mental health (Morgan & Gayer-Anderson, 2016; Van Der Kolk, 2014). This can be in the form of a close friendship, romantic relationship or parental
warmth following the aftermath of a trauma (Powers, Ressler, Bradley, 2009; Van der Kolk, 2014). Perhaps the presence of being cared for and valued reduces the generalisation of negative self and other-beliefs that can result from interpersonal trauma. This has been found in depression research, where positive schemas moderated the relationship between childhood emotional maltreatment and depression in adolescents (Lumley & McArthur, 2016).

Against the original hypothesis, negative person beliefs did not predict trust. This was surprising, particularly as these schemas were greater for those exposed to childhood trauma. The study may have been underpowered to detect this, yet there were no apparent trends visible from the EDA. Negative person beliefs mediated associations of childhood trauma with trust in a non-clinical population (Dolan et al., 2018) and there is extensive literature on negative person beliefs as a mediator of childhood abuse and psychosis (Appiah-kusi et al., 2017; Bentall et al., 2014; Hardy et al., 2016). Beck et al. (2019) reported that as positive beliefs are activated there is a corresponding deactivation of negative beliefs. Perhaps in the current sample, underlying negative beliefs were not activated due to the high overall prevalence of positive self and other-beliefs, combined with the potential absence of threat activation during the pleasant virtual encounter (Beck et al., 2019).

4.4 Inus-condition

Inus-condition can be defined as “an insufficient but non-redundant part of an unnecessary but sufficient condition” (Freeman, 2016, p. 686). The experience of persecutory delusions is likely caused and maintained by multiple factors in bidirectional relationships, including adverse earlier experiences, emotions, attachment, genetic vulnerability, cognitive biases and person beliefs (Freeman et al.,
Childhood trauma and beliefs may be a factor necessary to trigger persecutory ideation, yet redundant without other related factors and unnecessary, as delusions could be triggered without them. Persecutory delusions are a complex phenomenon to study and each potential causal factor can be understood as an inus-condition.

4.5 Limitations

4.5.1 Analysis and Interpretation

Two of the original hypotheses pertaining to mediation and moderation could not be tested due to the small sample size. Post hoc analyses suggested the study was powered to find only large effects, such as positive other-beliefs and subjective trust (r = .522, p < .01), as such only tentative suggestions can be made from the data.

Multiple analyses were conducted which increases the risk of type one error. Whilst Bonferroni corrections were applied, these can be too conservative, particularly with the low power of the study, and may increase the risk of type two errors (Dienes, 2011). The correlational and exploratory design limits the ability to infer causality between the variables. The childhood trauma and belief variables consisted of multiple subscales. To avoid multiple comparisons and strike the balance between risk of type one and two errors, correlational analysis was guided by the findings from EDA. The study would need replication in a larger sample to test the hypotheses.

Trust and childhood trauma are complex and the failure to control for confounding factors in this study is a further limitation, such as social connectedness (Reidy, 2016), anxiety (Freeman et al., 2005) or interrelated risk factors for childhood abuse (Centre for Disease Control and Protection, 2020). Furthermore, interpersonal distance was used as a measure of objective trust, however it could
have been demonstrating compliance with the avatar, research team or curiosity towards the VR technology.

Finally, due to the sample size, contingency manipulation could not be controlled for in the study. This was the focus of the other researcher, yet the exposure to more contingent behaviour may have impacted both trust appraisal of the avatar and trusting behaviour displayed.

4.5.2 Generalisability

Several factors limit the generalisability of this study to the wider population. The sample size was small, only four participants had no exposure to childhood abuse, thus they may not represent patterns of trust and trusting behaviour in the larger population. Recruitment of the sample was from EIS only, excluding those who are non help-seeking, detained under the mental health act or in other mental health services. This can introduce a biased sample of participants who are well enough to travel to central London. Although severity of paranoia was comparable with other clinical studies and paranoia was above a specified severity threshold, the sample may not represent those who experience more severe persecutory delusions who, for example, isolate at home due to perceived threat.

Furthermore, the sample did not include females experiencing paranoia. Research has reported gender differences between both the types of childhood abuse experienced and the impact of childhood abuse on developing psychosis (Fisher et al., 2012; Pruessner et al., 2019). Finally, the interaction within the VR was brief, lasting only four minutes. Therefore, the interpersonal processes observed may not generalise to everyday encounters within a person’s social world.
Finally, the current study design did not include a control group. The current study aimed to replicate a previous doctoral study (Dolan, 2018) which had used a non-clinical population and thus a control group had not been deemed necessary to test the hypotheses. Further research should investigate subjective and interpersonal distance group differences between people with persecutory delusion and non-clinical controls, on as well as evaluating if the influence of beliefs on trust varies across the paranoia continuum.

4.5.3 Virtual Reality

Participants sense of presence was lower than in a non-clinical population using the same paradigm, but similar to other clinical populations (Dolan, 2018). This could have impacted the use of interpersonal distance as a safety behaviour and trust appraisal. Yet factors shown to be important for presence were mainly practical, like body engagement (being able to walk around the space) and sound (Sanchez-Vives & Slater, 2005). Furthermore, 45% failed one or both attention checks, higher than previously reported in VR studies, this could suggest that the sample was less able to attend in the virtual world (Fornells-Ambrojo et al., 2016; Reidy, 2016). The current sample experienced more severe delusions than Reidy and Wingham (2016), perhaps the experience of persecutory delusions impacted concentration on the conversation.

Cognitive impairments in working memory and attention have been reported in people experiencing schizophrenia and psychosis (Reichenberg, 2005), the lower correct attention check answers may highlight these cognitive impairments and the need to adapt VR scenarios to reduce the cognitive load for clinical populations in future studies. The higher rate of incorrect answers to attention checks could impact
the reliability of the results. Yet, the attention check format was true or false, it may be that the dichotomous nature of the question overestimated errors. It may also reflect the position of this questionnaire towards the end of testing, with participants leaving answering up to chance. The potential impact of sense of presence and attention on trust and trusting behaviour could not be controlled for due to the small sample size. However, on the whole the data collected – ranging from the affect scores, to the trust variables and associations between them – indicate that the participants felt sufficiently immersed in the experience.

A further limitation was the design of the avatar used in the current study. His characterisation as a Caucasian male may have impacted a participant’s ability to trust him, as ethnicity has been found to impact trust (Ito & Senholzi, 2013). Society is plagued with racism and discrimination, and the inclusion of a white male may have represented a figure to participants of dominance, aggression or as a perpetrator of racism for non-Caucasian participants (53%). Due to the sample size, ethnicity and the possible impact on trust could not be explored statistically.

4.6 Strengths

The study recruited people with psychosis experiencing paranoid delusions. Inclusion of clinical populations ensures intervention is informed by the lived experience of participants (Freeman, 2016). The study contributed to the evidence base of the feasibility and safety of using VR with clinical populations, which represents a promising field for psychological intervention. As the environment can be designed and controlled collaboratively, it may present a more acceptable way of working than standard talking therapies (Russ-Calafell et al., 2018)
Using interactive VR in psychological research and intervention is a novel use of technology that allows experimental control over conditions that would be difficult to control in real life, increases ecological validity and furthers the understanding of how psychosis impacts interpersonal processes. A final strength of this study was including both a measure of subjective and objective trust by using interpersonal distance as representative of safety behaviours.

4.7 Research Implications

Replicating this study with a large sample that has the power to detect a range of effect sizes would allow more conclusive inferences to be made about childhood trauma, schematic beliefs and trust in persecutory delusions. A larger sample would allow for potential confounding variables to be controlled for within statistical hypothesis testing. Specifically, including anxiety as a confounding factor for the impact of trauma on trust and to measure whether the VR scenario was less anxiety provoking. Future research could consider whether ethnicity impacted trust and whether the impact of contingency was moderated by experiencing childhood abuse.

Considering the tentative findings, inclusion of positive beliefs as an outcome in persecutory delusion research is recommended, to understand more about their potential de-activating role with negative beliefs (Beck et al., 2019) and whether they mediate the impact of childhood trauma on psychosis. Future research in childhood trauma should include information about potential protective figures, through measures of social support or parental warmth, to increase the understanding of protective factors (Gayer-Anderson & Morgan, 2013). Finally, as the field of VR grows, continuing to advance the ability to interact with the avatar beyond scripted questions would allow for increased ecologically validity in the study of paranoia.
4.8 Clinical Implications

The high prevalence of childhood trauma supports the need for full trauma assessments to be given to those experiencing psychosis and for services to adapt to a trauma informed approach to care (Read & Colin, 2003). This shifts the focus from what is wrong with a person to what happened to them and how did they survive. Furthermore, a treatment target for those with psychosis could be to broaden existing firmly held beliefs to include positive evaluations (Freeman, 2016). This is particularly important when considering the potential activation/deactivation relationship of positive and negative beliefs (Beck et al., 2019).

A further tentative implication is for the impact of trust perception for the therapeutic relationship. A focus point is how to make oneself as the therapist worthy of trust, particularly for those clients with a trauma history and experiencing paranoid delusions (Van der Kolk, 2014). Openness about paranoia within the therapeutic relationship has been named as facilitator to creating trust (Lawlor et al., 2015), this could include focussing on client’s beliefs about the therapist.

The use of VR in psychological intervention is a promising field, the finding that positive affect and beliefs were activated within the VR scenario suggests VR could be a safe environment for psychological intervention in EIS. VR could be used clinically to assess psychotic symptoms or to treat these in intervention (Russ-Calafell et al., 2018). Two systematic reviews of the use of VR with people in psychosis reported that VR has been used to assess: functional capacity and social cognition, paranoia and paranoid thinking, reporting VR to be more valid then self-report questionnaires as it can control for founded paranoia (Russ-Calafell et al., 2018), cognitive deficits and social behaviours such as eye gaze and interpersonal distance (Veling, Moritz & van der Gaag, 2014). VR has also been used in psychosis
symptom treatment research as: avatar therapy for hearing voices which has shown a reduction in auditory hallucinations (Leff, 2013), cognitive remediation for cognitive deficits (Chan et al., 2010), social skills training (Russ-Calafell et al., 2014), and to reduce social anxiety and paranoia, with reductions in each remaining at 6 month follow up (Gega et al., 2013).

However, VR is in its infancy in clinical utility. The evidence base for the validity and reliability of VR for assessment needs to be expanded, for example through comparison to known valid assessment tools (Russ-Calafell et al., 2018). Furthermore, there are multiple mediating factors that would need to be researched and controlled for when designing how to measure constructs before VR could be used in clinical settings. Potential mediators are different cultural practices of social behaviour, the demographics of the avatar, being able to interact with the avatar, potential compliance/curiosity with the new technology influencing behaviour, duration of illness and use of medication, to name a few. Finally, a greater understanding of how VR findings translate to the real-world environment will be needed, particularly when considering how to capture meaningful change, such as the evidence based clinical norms that exist for current outcome measures (Russ-Calafell et al., 2018).

4.9 Conclusions

The use of VR with people experiencing persecutory delusions was supported; it is an exciting area for mental health research and intervention. As the study was underpowered there is a need to continually adapt recruitment and research to be more accessible to those with paranoid delusions. Tentatively, childhood trauma exposure, and trauma type co-morbidity, impacted a person’s
appraisal of trust and positive person beliefs predicted both trust appraisal and trusting behaviour. Elaboration of these within intervention could be a treatment target. In a society where childhood trauma sadly remains an epidemic, understanding the sequelae of trauma for adult mental health and adopting a trauma informed approach to care will remain an important area in psychological research to ensure survivors are supported across mental health services
References


Centre for Disease Control and Prevention (2020). CDC 24/7: Saving Lives, Protecting People. Retrieved from:

https://www.cdc.gov/violenceprevention/childabuseandneglect/riskprotectivefacts.html


IBM SPSS Statistics for Macintosh, Version 26.0. IBM Corp., Armonk, N.Y., USA


https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/bulletins/childabuseinenglandandwales/january2020#main-points


Van Os, J., Linscott, R.J., Myin-Germeyes, I., Delespaup, P. & Krabbendam, L. (2008). A systematic review and meta-analysis of the psychosis continuum:
evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. *Psychological Medicine, 1*-17


Part 3: Critical Appraisal
1. Introduction

This critical appraisal will first consider the recruitment process, including identified barriers and facilitators. The multi-factorial nature of psychosis, the impact and limitations of focusing on one specific mechanism and the complexity of trauma, as a key theme running through the thesis, will be discussed. It will then end with methodological considerations and the process of conducting research within a doctoral programme.

1.1 Recruitment

It can be difficult to ensure a person feels safe enough to participate in research whilst experiencing paranoid delusions, which are characterised by a mistrust in other people. As such, sometimes the label of ‘hard to reach’ is applied to psychosis populations. This refers to populations that engagement is difficult for a myriad of reasons, as a short hand it can be perceived as stigmatising and blaming (Cook, 2002; Sartorius, 2002). Particularly, it implies there is something wrong with the group and not the approach taken to research. I believe it isn’t populations that are ‘hard to reach’ but research that is hard to access. Recruitment challenges may dissuade people from pursuing doctoral research in persecutory delusions, despite persecutory delusions being a distressing and common symptom of psychosis (Freeman, 2014). There have been exciting developments in psychosis interventions that utilise technology, for example using virtual reality (VR) as a safer environment to practice dropping safety behaviours in social situations (Russ-Calaffel et al., 2018). As such, I was excited and motivated to be conducting research to contribute to the field of psychosis and VR. I was aware two previous projects had attempted to recruit from this population with difficulty, addressing any potential barriers and facilitators to
recruitment was prioritised by myself, research partner and supervisor from the beginning.

Whilst the benefits of research are acknowledged, particularly with a renewed focus on the clinical impact of a study to meet publication requirements, it can be ill received within clinical teams (Bucci et al., 2014). Often, the reliance on care-coordinators\(^3\) to identify and approach clients for their consent to participate can create a gate-keeper role, which can facilitate or challenge recruitment. Challenges can be influenced by the busy demands of the job, under staffing, a discomfort in promoting research that feels like it is not applicable to the real world or paternalism (Bucci et al., 2014). When planning our recruitment strategy, we were keen to address these potential issues and challenges identified from the previous studies.

### 1.1.1 Ethical Approval

One barrier identified by services to successful recruitment is a narrow recruitment period (Bucci et al., 2014). As a previous ethical submission had been granted we were lucky to not have to submit a new application for NHS ethics, instead submitting an amendment for a time extension and for our names to be added. The smaller ethics application significantly increased the recruitment time available to us compared to the previous projects, permitting us to recruit from services for fourteen months (January 2019 - March 2020). Initially, our recruitment target was sixty participants, to reach power for both theses, this would mean testing two participants each every month.

---

\(^3\) A care-coordinator is a registered mental health professional who is the main contact supporting an individual’s mental health needs and journey in the service. They co-create care plans with their clients based on their goals and regularly check-in to ensure care is being met.
1.1.2 Involving care-coordinators

Another barrier to recruitment can be the top down organisation of research, with care-coordinators being asked to support multiple projects without being given the additional time to facilitate this request within their day (Bucci et al, 2014). A priority was to reduce the impact of the recruitment on the work-load for care-coordinators, and integrate the recruitment procedure with the service’s ways of working. My research partner and I gave presentations with each team we were assigned, during this we posed open ended questions to consider how our recruitment process could fit within the team. The feedback was for a consistent presence to be maintained in the service and to be flexible with joining appointments with potential participants during service visits. This had also been a learning from previous studies, that they had felt too thinly spread between multiple services. As such, we focused on two services each at a time rather than all the services we had ethics for.

1.1.3 Maximising Autonomy

To minimise gate-keeping barriers, I was keen to maximise the opportunity for service users to be able to choose to participate in the research. Patel et al. (2017) reviewed a large sample of people with psychosis for their involvement in research in south London. They found that around 20% of the sample had been contacted to consent for research. With a reported rate of one in five people being approached for research in a psychosis population, I wanted to increase the likelihood of more people being approached. I spent at least a day every other week in the service, joining team meetings and sitting with care-coordinators to talk through their caseload and identify any potential participants to approach. This was useful to address any concerns the care-coordinator may have had which could prevent a
suitable participant being approached. From the process I made strong links with the

team members, being invited to their Christmas celebration. It is important to invest

in building relationships with the teams involved in recruitment, to ensure the

recruitment process is informed by both ethical protocol and what works best for the

service and clients.

Empowerment has been linked to recovery (Patel et al., 2017), as such I was sure
to make the benefits of our research clear to reduce paternalism. The immediate
benefits were re-imbursement for their time/expertise, refunding travel and being
able to try VR. Anecdotally there was a lot of positive feedback from clients
regarding the VR experience which we fed-back to services. A potential long-term
benefit for the participant was engaging in meaningful activity as a valued expert on
their experience to help develop the services they use. To emphasise this, we gave
each participant the option of leaving a contact email address to be updated on the
research findings to know what they contributed to.

Patel et al.’s (2017) study reported of the 20% approached for research, 65% of
people consented. The need to generate and ask more names them necessary for our
target was pivotal. Despite our efforts, at the beginning there was a high rate of care-
coordinators not approaching clients for consent (January 2019-April 2019 no
referrals). It became apparent that one day every two weeks or week was not a
consistent enough presence, particularly as care-coordinators are involved with
assertive outreach and crisis response and often are out in the community. Being at
the service for multiple days in a row was needed to follow a suggested name
through the process of consent and contact. This could be achieved when research
days were taken or over public holidays, however due to the demands of the doctoral
course we had limited extra time available to spend in services.
We used a VR system that is less intrusive compared to a portable head-set, however the draw back was that participants had to travel to UCL in central London from their boroughs. At times this journey could be over an hour on public transport, which was a barrier for recruitment. Perhaps the use of head-sets could help in research and in clinical settings by removing the anxiety of traveling to an unknown location to use it.

Furthermore, whilst meeting the participant at the service for screening before testing had benefits in helping particularly anxious clients feel more at ease to travel to UCL for the study, some care-coordinators were gate keeping referrals who they assumed would not be reliable to attend multiple appointments. To maximise autonomy and be flexible for different people’s preferences, we revised our recruitment strategy, in line with ethics, to offer screening via the phone or on the same day as testing if the participant was comfortable with this. This resulted in more successful testing, yet the numbers were still low.

1.1.4 Consistent Presence

On average, for every ten names we identified with care-coordinators as potentially meeting inclusion criteria, one would be successfully tested. To address this, we considered including assistant psychologists (APs) within services to help with recruitment. APs are embedded in teams and can listen in team meetings for anyone matching the presentation required for the project. My research partner and I had re-visited our time line and assessed how far behind target we were. We met with our supervisor to share the need for additional resources and revised our recruitment target to 30 participants, a number achievable in the time we had left. We agreed to expand recruitment to NELFT (November 2019), where our supervisor
knew the team, and include APs in the recruitment process (January 2020). This greatly increased our recruitment, testing seven people in eight weeks.

This had been something we had wanted to introduce earlier in the process, however our relative inexperience perhaps held us back from pushing this in meetings with our supervisor. In terms of personal development, reflecting on this was an opportunity to feel empowered to trust myself to raise and address issues. Often as a trainee we can feel limited by our position and rely on our supervisors who know so much more. Yet through the process of training and support from my thesis supervisor, I have learned to trust my own expertise and find my own academic voice. In total, from the 133 names identified, 74% were approached for consent, a much higher rate than the 20% previously reported (Patel et al., 2017). A contributor of this, I believe, was the inclusion of APs in the latter stages of recruitment.

1.1.5 Accepting the Unexpected

During our study there were several unpredicted incidents that affected recruitment. One of which was the strikes at UCL for teachers’ pensions. I feel the ability for unions to strike to address systemic issues is an important right. During the strikes the computer assisted virtual environment (CAVE) was closed. For one month (November-December 2019) and portions of February 2020, participants could not be tested. Two participants had already been screened and dropped out in the time delay. It was not helpful to recruit people during this time as the long wait often meant they were lost to the project. Furthermore, the VR license expired in January 2020, which resulted in the CAVE being closed for two weeks whilst it was updated.
Finally, in 2020 we were all impacted by the emergence of COVID-19 and the necessary measures taken to curb its transmission. We had a further six weeks of recruitment planned however, as social distancing was encouraged and face to face contact was halted by mid-March, we had to end recruitment early. Recruitment ended at the point we had responded to many of the barriers and were successfully testing participants at a much faster rate. This was disappointing, yet necessary to curb the transmission of COVID-19 (Department of Health and Social Care, 2020). Practicing radical acceptance of the factors in life we have no control over was a technique I used to help manage the unpredicted end to our study.

1.2 Complexity of Psychosis

In both the meta-analysis and empirical paper, I was exploring the multi-faceted disorder of psychosis. Models have agreed upon a multifactorial approach to the development and maintenance of psychosis, that considers the interplay of genetic vulnerability, trauma, cognitive biases, attachment and emotions (Bentall et al., 2001; Garety et al., 2001). As psychosis represents clusters of different experiences, within research a symptom specific focus has been favoured. Within the meta-analysis this approach was taken by separating measures of specific symptoms into separate domains to compare. Unfortunately, due to the low number of studies across the psychosis spectrum for each symptom, a meta-analysis could only be conducted for paranoia. It limited the ability to infer specificity of person beliefs across symptoms from the meta-analysis.

Within both the empirical paper and meta-analysis, several decisions had to be made to guide the research. For example, within the empirical paper, the impact of childhood trauma exposure on persecutory delusions and paranoia was the focus.
Person beliefs were the mechanism chosen to explore this relationship, the focus on just one of many mechanisms limits the ability to understand how factors that contribute to psychosis interact. Similarly, when planning the meta-analysis I cycled through various questions within the belief’s domain; do I want to look at confounding factors that affect beliefs (mood, anxiety, attachment, experience of psychosis itself), should I include multiple belief concepts (relational, meta-cognitive, self-esteem). The decision was guided by a period of scoping searches of the literature and finding absence of sufficient research to look at some of these questions. It was also guided by noticing both a variation in the literature to which belief concept was being referred to under that term, and a gap in previous reviews for evaluative beliefs that considered both self and other-beliefs and positive evaluations. As such, I decided to use the meta-analysis to narrow the focus within belief research. This went on to inform the inclusion of positive beliefs in the empirical paper.

Decisions made in research can represent researcher degrees of freedom (Simmons et al., 2011). If these are made from the outcomes of preliminary statistical analysis, for example ending recruitment once significant results are found, the chance of type one errors are increased. To counteract this, a power analysis was conducted for the empirical paper to determine the sample size ahead of the research, this also was planned to reduce the chance of type two errors by ensuring the research was sufficiently powered. Planned analyses were made before conducting both the meta-analysis and empirical paper and the effects of confounding variables were woven through the discussion and limitation. Yet there is a need for conclusions/inferences to be made tentatively until future research can explore these
findings alongside other inter-related belief concepts and mechanistic factors to better understand the direction of their relationships and influence on psychosis.

1.3 Trauma

Throughout both chapters there has been a theme of the effect of childhood trauma. Trauma and its sequelae has been an interest of mine throughout training, reinforced through the placements I have had. My first-year placement was in a drug and alcohol service. Many of the clients I saw had a trauma history and were experiencing psychosis alongside chronic drug misuse. This placement impressed upon me the need for a trauma informed approach to all services, rather than seeing these as separate symptoms. Trauma focused approaches meet the client at what is causing the most distress, shifting the focus from ‘what is wrong with you’, to ‘what happened to you’ and ‘how have you coped/survived?’. For my final year I was successful in my request for a year placement in a specialist trauma service. My clinical work influenced me to pursue research in this area, particularly the association of experiencing childhood trauma and developing psychosis, with flashbacks and psychotic delusions and hallucinations sharing common features (Lindley, Carlson & Sheikh, 2000). What I did not expect was for this research to have such an effect on my clinical practice. It highlighted the importance of being explicit with clients about the difficulty in trusting a therapist following interpersonal abuse. Studying trust through subjective ratings and safety behaviours influenced an extra awareness in my clinical practice of how I set up and used the therapeutic space and the non-verbal interpersonal distance kept between us. Furthermore, the role of positive beliefs was an unexpected finding of both the meta-analysis and the empirical paper. I now take more time building the richer narrative of how a client
survived and reclaimed life post trauma and what specific positive beliefs that elicits about the self and other people.

As two of the key variables for this thesis were looking at difficult topics, efforts were made to ensure the participant felt comfortable and in control with disclosing anything about their trauma history or person beliefs. We informed participants when discussing the study that there would be two questionnaires on these topics and on the day, we reminded participants they could withdraw at any point and not answer questions if they did not want to. When completing the measures, we gave them the choice of reading through the questions alone or going through them with us. As both my research partner and I were on placement in trauma specialist services, we were trained in grounding exercises to support a participant if they became distressed. However, this was not needed by any of the participants in spite of 82% of the sample reporting a history of childhood trauma.

One area not studied in this thesis was experiencing trauma in later life, particularly for those with a history of childhood abuse. Women who have experienced abuse/neglect when children are seven times more likely to be raped as adults, those who witness domestic violence are more likely to be in a violent relationship (Van der Kolk, 2014). Perhaps experiencing childhood trauma and adult traumatic life events could greatly increase stress in a system already sensitive to stress, contributing to psychosis development (Kraan et al., 2015). Increasing the literature around adult experiences of trauma as well as childhood would be helpful to truly adopt a trauma informed approach to care. Particularly as people with psychosis are at a greater risk of experiencing trauma through stigma, discrimination or hospitalisation at a point of crisis (Swan et al., 2017).
1.4 Methodological considerations

The CTQ was chosen to capture participants experience of childhood abuse. It is well validated and widely used (Bernstein & Fink, 1992). The self-report format can increase the likelihood of trauma disclosure, having more privacy than an interview (Beirnstein et al., 1994). This can also help with social desirability biases or effects of shame impeding disclosure. Yet it comes with its own limitations, the CTQ does not capture victimisation events like bullying or witnessing domestic violence. Furthermore there is no information about the perpetrator, when studying interpersonal violence information about who the perpetrator was to the victim (family member, friend, stranger) can be useful to understand the type of abuse suffered and the meaning-making the person may have been left with. The Trauma and Life-events Checklist (TALE, Carr, Hardy & Fornells-Ambrojo et al., 2018) was specifically designed to measure trauma relevant to psychosis and that is impacting the individual. It is a comprehensive assessment of life time trauma, including psychosis-related trauma, and its impact (Carr et al., 2018).

The use of retrospective recall for measuring childhood trauma has been criticised, particularly if experiencing a mental health condition, like psychosis, that may impact cognitive recall (Morgan & Fisher, 2007). Furthermore, it may be difficult to recall trauma at an early age, where memories may be fragmented or repressed. However, self-report of trauma has been found to be reliable and stable over time (Fisher et al., 2011) and encouragingly, the CTQ has been found to correlate with prospective measures of exposure to violence throughout childhood (Liebschuts et al., 2018).

In both the meta-analysis and the empirical paper, studies used correlational, retrospective designs which limits the ability to infer causality between the variables.
studied. Whilst group differences were found in person beliefs between people with psychosis and non-clinical populations, this could mean beliefs have a causal role, that they have been impacted by another feature shared in the population (mood, severity of illness) or that the experience of psychosis itself has impacted the beliefs held.

I had not conducted a meta-analysis before, as a personal goal I wanted to leave the course knowing how to conduct one as a useful research tool for the future. It was a steep learning curve, one I am glad I undertook, however it highlighted to me the benefits of working in teams for meta-analyses. The ability to have multiple raters for papers during the screening and multiple coders for the quality analysis of the papers included, would create a more methodologically sound meta-analysis which was less susceptible to bias.

Finally, during recruitment female participants were identified by care coordinators, highlighting the loss of focusing on only one gender. A limitation of the empirical paper was the inclusion of only males, due to the reported evidence of less sense of presence in females and potential gender differences in the appraisal of the male avatar. As a female researcher, with a female supervisor and research partner, this had been a difficult decision. When researching with one gender we run the risk of creating a gendered phenotype of the variable under consideration. A future recommendation would be to include females to determine whether there are gender differences in sense of presence and appraisal of the male avatar.

1.5 Conclusion

Undertaking a piece of research whilst balancing the demands of placement and academic submissions throughout the course was a challenge. It was ambitious
to begin a project with a clinical population, one that I am glad I undertook. Although the recruitment process was difficult, the facilitators to recruitment we discovered and implemented make me better prepared for continuing research in the future. Although balancing the course and recruitment at times felt unachievable, it has strengthened the ability to conduct research in the service I graduate to.

Although underpowered, I think this study has generated some interesting avenues to pursue, particularly in the role of positive beliefs, resilience and safety within the therapeutic relationship. I think VR has exciting avenues for therapy. Whilst distance as a safety behaviour was less pronounced in my findings, the positive affect and positive beliefs activated make me wonder if VR may provide a safe place to put some therapeutic techniques into action. Often, we think how to bridge the gap to bring the therapy room into real life, perhaps this is a step in that direction.
References


Department of health and Social Care (2020). Coronavirus action plan: a guide to what you can expect across the UK. Retrieved From:


Appendices
Appendix 1: Database-specific search term formatting
Search Strategy used in Embase and PsychInfo:

((Psychosis/) OR (schizophrenia OR delus* OR persecut* OR hallucinat* OR psycho*).mp [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh])

AND

((Schema*/).mp [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] OR (“early maladaptive schema” OR “evaluative beliefs” OR self-schema OR (other NEAR schema)).mp [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh])

Additional Filters Psychinfo
- English language
- Not authored book
- Start of database up to and including 25/11/2019

Additional Filters Embasse
- English Language
- Start of database up to and including 25/11/2019

Search Strategy used in Web of Science:

TOPIC: ((psychosis or schizophrenia or delus* or persecut* or hallucination)) AND TOPIC:(schema* or "early maladaptive schema*" or "evaluative beliefs" or self-schema* or other NEAR schema*)

TOPIC= search within the title, abstract, keywords and keywords plus.

Additional filters for Web of Science:
- English language
- Start of database until 25/11/2019
Appendix 2: Quality Assessment Tool
The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields. This was adapted to be more specific to the systematic review were removed. These have been replaced with questions 6 (that was taken from Appraisal Tool for Cross-Sectional Studies), and question 7 and 8, which look at the validity of evaluative belief measure and psychosis symptom measures separately.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes (2)</th>
<th>Partial (1)</th>
<th>No (0)</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Question/objective sufficiently described?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Study design evident and appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Method of subject and comparison group selection described and appropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Subject and comparison group characteristics sufficiently described</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Subject and group comparison groups similar and treated the same</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Were the risk factor and outcome variables measured appropriate to the aims of the study?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Was the Evaluative belief measure valid/appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Was the psychosis symptom measure valid/appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Sample size appropriate?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Analytic methods described/justified and appropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Some estimate of variance reported in main results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Controlled for confounding factors?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Results reported in sufficient detail?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Conclusions supported by the results?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3: Individual QAS Scores for the Included Studies.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Design</th>
<th>Sample</th>
<th>Measures</th>
<th>Analysis</th>
<th>Report</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appiah-Kusi et al., 2017</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Bedford et al., 2012</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Collett et al., 2016</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Cowan et al., 2019</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Haarmans et al, 2018</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kinderman et al., 1994</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Author, year</td>
<td>Design</td>
<td>Sample</td>
<td>Measures</td>
<td>Analysis</td>
<td>Report</td>
<td>Total</td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
<td>--------</td>
<td>----------</td>
<td>----------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>Q. clarity</td>
<td>Study clarity</td>
<td>Recruitment method</td>
<td>Treatment sites</td>
<td>Groups treated the same</td>
<td>Sample size</td>
</tr>
<tr>
<td>MacKinnon et al., 2011</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Peters et al., 2016</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Valiente et al, 2014a</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Vazquez et al., 2008</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Carol &amp; Mittal., 2015</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fowler et al, 2006</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Stowkowy et al., 2016</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Author, year</td>
<td>Design clarity</td>
<td>Sample clarity</td>
<td>Recruitment method</td>
<td>Character sites</td>
<td>Groups treated the same</td>
<td>Sample size</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Valiente et al., 2014b</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Vorontsova et al., 2013</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Association Only Studies**

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Design clarity</th>
<th>Sample clarity</th>
<th>Recruitment method</th>
<th>Character sites</th>
<th>Groups treated the same</th>
<th>Sample size</th>
<th>Variables appropriate</th>
<th>Evaluative beliefs</th>
<th>Psychosis symptoms</th>
<th>Analysis clarity</th>
<th>Variance</th>
<th>Confounding factors</th>
<th>Sufficient results</th>
<th>Conclusion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addington &amp; Tran, 2009</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>n/a</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>18/26</td>
</tr>
<tr>
<td>Bright et al., 2018</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>23/26</td>
</tr>
<tr>
<td>Freeman et al., 2013</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>23/26</td>
</tr>
<tr>
<td>Freeman et al., 2019</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>23/26</td>
</tr>
<tr>
<td>Galbraith et al., 2014</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>22/26</td>
</tr>
<tr>
<td>Author, year</td>
<td>Design</td>
<td>Sample</td>
<td>Measures</td>
<td>Analysis</td>
<td>Report</td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
<td>--------</td>
<td>----------</td>
<td>----------</td>
<td>--------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gracie et al., 2007</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>20/26</td>
<td></td>
</tr>
<tr>
<td>Lamster et al., 2017</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>23/26</td>
<td></td>
</tr>
<tr>
<td>Morrison et al., 2015</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>24/26</td>
<td></td>
</tr>
<tr>
<td>Muller et al., 2018</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>20/26</td>
<td></td>
</tr>
<tr>
<td>Oliver et al., 2012</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>n/a</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>19/26</td>
</tr>
<tr>
<td>Smith et al., 2006</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>24/26</td>
<td></td>
</tr>
<tr>
<td>Taylor et al., 2014</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>n/a</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>21/26</td>
</tr>
</tbody>
</table>

Key: Alternate rows shaded grey to ease reading.
Appendix 4: Sensitivity Analysis for Group Comparison Meta-Analysis, the Psychosis Subgroup Analyses
**Negative Self-Evaluations Comparison**

When Bedford et al. (2012) was removed from the comparison the between study variance decreased to 58% and heterogeneity remained significant ($Q (df = 9) = 21.64, p = .01$).

**Positive self-evaluations comparison**

Removing Fowler et al (2006) reduced between study variance to 62%, heterogeneity remained significant $Q (df = 7) = 18.22, p < .01$. When Collett et al. (2016) was removed the between study variance remained high at 67% and heterogeneity remained significant $Q(df = 7) = 21.48, p < .01$. 
Appendix 5: Summary of Joint Project and Each Researcher’s Contribution
The Virtual Reality Paradigm

The current study used a virtual reality (VR) paradigm which has been used in previous doctoral projects. It was originally developed and used in a doctoral thesis conducted by Dr Maikke Elenbaas (2013). Following this, the VR scene has been used by other cohorts of trainees under the supervision of Dr Miriam Fornells-Ambrojo. Gail Wingham & Hannah Reidy (2016) used it with a clinical population studying variables of attachment and social connectedness. Emilie Bourke & Hayley Dolan (2018) used it with a non-clinical sample and studied trauma and attachment.

The present study focus

The present study was a joint thesis, where the data was collected by two trainees with different focus for each thesis. It was conducted by Melissa Hoban (the author) and Kate Watchorn (fellow UCL D.Clin.Psy trainee) under the supervision of Dr. Miriam Fornells-Ambrojo.

The project used a clinical population of people experiencing paranoia in psychosis. The current thesis focussed on associations between childhood trauma, schematic person beliefs and trust and trusting behaviour. KW’s thesis focused on the influence of attachment and interpersonal contingency on subjective trust and objective trusting behaviour.

Contribution

Ethical approval had already been attained, and an amendment was jointly sought for an extension in recruitment. Both researchers jointly submitted risk assessment and GDPR forms. Recruitment, screening participants, testing at the CAVE and data entry were shared endeavours between the joint researchers.
Initially, both researchers organised and delivered presentations at early intervention psychosis services to promote the study and allow the service to meet the research team. After which, the NHS sites were split between the researchers to continue recruitment and testing. The current researcher was responsible for Brent, Kingston & Richmond and NELFT, whilst KW was responsible for Wandsworth, Harrow & Hillington, and Kensington & Chelsea EIS.

As the project already had ethical approval, the measures used to assess the variables were chosen from the existing ethically approved protocol by MH and KW respectively for their project hypotheses. This was to prevent any delays that may occur from submitting substantial ethical amendments. Both MH and KW jointly agreed on any redundant measures to drop from the testing battery to streamline efficient data collection and reduce the burden of the measure pack on the participant. All decisions were approved by Dr. Miriam Fornells-Ambrojo.

Whilst the researchers differed on their focus, they shared the same dependent variables of subjective trust and objective trusting behaviour. Furthermore some measures used for descriptives, to characterise the sample (e.g. Paranoia Scale; Fenigstein & Vanable, 1992) or measures used to determine immersion in the VR scenario (e.g. Sense of Presence Questionnaire; Slater et al., 1998) were utilised by both researchers. The measures specific to this thesis and its experimental hypotheses were The Childhood Trauma Questionnaire (Beirnstein et al., 1994) and the Brief Core Schema Scale (Fowler et al., 2006). All of the data analysis and write up of the current thesis was conducted independently, supervised by Dr. Miriam Fornells-Ambrojo.
References


Appendix 6: Full Report of Power Analysis
<table>
<thead>
<tr>
<th>Power Analysis</th>
<th>Overall model</th>
<th>Effect size</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlational Analysis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA and ST</td>
<td>$r = 0.418$</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>EN and ST</td>
<td>$r = 0.353$</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>NO and ST</td>
<td>$r = 0.539$</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td><strong>Mediation Analysis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA, NBO, ST</td>
<td>$F(2, 67) = 17.11, \ r^2 = 0.34$</td>
<td>0.52</td>
<td>26</td>
</tr>
<tr>
<td>EN, NBO, ST</td>
<td>$F(2, 67) = 16.29, \ r^2 = 0.33$</td>
<td>0.49</td>
<td>27</td>
</tr>
<tr>
<td>PN, NBO, ST</td>
<td>$F(2, 67) = 14.21, \ r^2 = 0.30$</td>
<td>0.43</td>
<td>30</td>
</tr>
<tr>
<td>SA, NBS, OT</td>
<td>$F(2, 67) = 10.95, \ r^2 = 0.25$</td>
<td>0.33</td>
<td>37</td>
</tr>
<tr>
<td>EN, NBS, OT</td>
<td>$F(2, 67) = 6.34, \ r^2 = 0.16$</td>
<td>0.19</td>
<td>62</td>
</tr>
</tbody>
</table>
Appendix 7: Green et al., Paranoid Thoughts Scale (Green et al., 2008)
GPTS

**Participant no:**

Instructions: Please read each of the statements carefully. They refer to thoughts and feelings you may have had about others over the last month. Think about the last month and indicate the extent of these feelings from 1 (Not at all) to 5 (Totally).

Please complete both **Part A** and **Part B**.

(N.B. Please do not rate items according to any experiences you may have had under the influence of drugs.)

### Part A

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I spent time thinking about friends gossiping about me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I often heard people referring to me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. I have been upset by friends and colleagues judging me critically</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. People definitely laughed at me behind my back</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I have been thinking a lot about people avoiding me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. People have been dropping hints for me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I believed that certain people were not what they seemed</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. People talking about me behind my back upset me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I was convinced that people were singling me out</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I was certain that people have followed me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Certain people were hostile towards me personally</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. People have been checking up on me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. I was stressed out by people watching me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. I was frustrated by people laughing at me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. I was worried by people’s undue interest in me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. It was hard to stop thinking about people talking about me behind my back</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
## Part B

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Certain individuals have had it in for me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. I have definitely been persecuted</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. People have intended me harm</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. People wanted me to feel threatened, so they stared at me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. I was sure certain people did things in order to annoy me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. I was convinced there was a conspiracy against me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. I was sure someone wanted to hurt me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. I was distressed by people wanting to harm me in some way</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. I was preoccupied with thoughts of people trying to upset me deliberately</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. I couldn’t stop thinking about people wanting to confuse me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. I was distressed by being persecuted</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. I was annoyed because others wanted to deliberately upset me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. The thought that people were persecuting me played on my mind</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. It was difficult to stop thinking about people wanting to make me feel bad</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. People have been hostile towards me on purpose</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. I was angry that someone wanted to hurt me</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix 8: Participant Information Sheet
PARTICIPANT INFORMATION SHEET

PROJECT TITLE: UNDERSTANDING SOCIAL INTERACTIONS IN CLINICAL POPULATIONS: AN EVALUATION OF A VIRTUAL FLATMATE

We would like to invite you to take part in a study looking at people’s reactions to virtual environments. This project is part of two Doctoral research projects. Please take time to read the following information carefully and ask us if there is anything that is not clear to you or if you would like more information. Alternatively, one of our team will go through the information sheet with you and answer any questions you have.

Why have I been invited to take part in the study?
You have been invited to take part in the study because we are looking for volunteers who are 18 years old or above. We are specifically looking for individuals who are currently involved with community mental health services. We hope to involve 60 participants for this study.

Do I have to take part?
It is up to you to decide whether or not to take part. We will describe the study and go through this information sheet with you. If you do decide to take part you will be given this information sheet to keep, and be asked to sign a consent form. In this consent form, we will ask to have access your medical notes. This is only because it would be helpful for the research team to look at relevant sections of your medical notes if your care coordinator is not able to access this information on our behalf. This is optional and your participation does not depend on it. If you do consent to take part in the study, you will be free to withdraw at any time, without giving a reason. This will not affect the standard of care you receive.

What will happen if I decide to take part?
If you decide to take part in this study, we will invite you to visit our virtual reality suite at University College London for a one-off appointment. We expect that this appointment will take a maximum of 2 hours and you will be reimbursed for your time. Our researchers can meet you on any part of your journey to assist you with travelling to the location.

The main thing you will be asked to do will be to explore a virtual environment. Brief questionnaires will be used to assess how realistic the environment is. You will be asked to complete the following steps:

Part 1 - Questionnaires: Prior to entering the virtual environment you will be invited to complete a set of measures. These include a brief questionnaire asking about past traumatic experiences and measures asking about your views about other people. You are under no obligation to answer any questions that you do not wish to. Furthermore, the researchers will be on hand to support you with any concerns that may arise for you as you complete the questionnaires.
Part 2 - Virtual Reality:
- After completion of the questionnaires, you will be given instructions in the use of the virtual reality room.
- We will invite you to wear glasses that produce three-dimensional images so that you can enter the virtual reality room.
- The virtual reality room will represent a flat share. You will be invited to remain in the student flat for 3 minutes and interact with a virtual flatmate character.
- There will be a researcher directly outside the virtual reality suite at all times to ensure that you feel comfortable during the scenario.
- During your time in the virtual environment, your interaction with the virtual flatmate character will be video-recorded by an unobtrusive camera in the ceiling. This camera will help us review how you and the virtual character move around the room. The video footage will not be shown to anyone outside the research team and will be destroyed when the research project has been completed.

Part 3 – Questionnaires: Following the virtual reality exercise, we will ask you to complete some final questionnaires about your feelings at that time and to provide feedback on the quality of the virtual interaction with a flatmate avatar.

Part 4 – Interview: A researcher will guide you through a brief interview that asks you to imagine future scenarios. Specifically, this interview will ask you to imagine how you might interact with the flatmate avatar if you moved into the flat share you saw in virtual reality (described above in Part 2). As with all the questionnaires in the study, there are no ‘right’ or ‘wrong’ answers in this interview.

Will I be paid for my participation?
All participants will be paid £12.50 to thank them for their time. Any travel expenses will be reimbursed.

Are there any disadvantages to taking part?
There have been various reported side effects of using virtual reality equipment. When people use virtual reality systems they occasionally experience ‘flashbacks’ or a degree of nausea. If at any time you wish to stop taking part in the study for these or any other reasons, please just say so and we will stop the scenario.

There has been some research that suggests that people using virtual reality might experience some disturbance in their vision afterwards. This research shows that the visual disturbance is sometimes still there after 30 minutes, but no long-term studies are known to our research team. It is advised that you do not drive a car, motorcycle, or operate complicated machinery in the 4 hours following the virtual reality scenario.

With any type of video equipment there is a possibility that an epileptic episode may be generated. This, for example, has been reported for computer video games. If you have epilepsy, please tell us. We would not want you to take part in study in this case.

It is important for you to understand that you are not required to discuss anything that you do not want to and you should discuss only the things which you feel are relevant. If at any time
you feel upset, please raise it with one of the researchers immediately. You could ask them to move on to another subject or end the testing altogether. We will help you to manage these feelings by using relaxation strategies commonly used to reduce distress (e.g. involving breathing or muscle relaxation) at the end of the meeting. If necessary, the researcher will seek further support for you through your services and you will be provided with contact details for the researcher and mental health professionals involved in your care.

What are the possible benefits of taking part?
We cannot promise the study will help you personally, but the information we get from the research will help improve understanding of social interactions for people under the care of mental health services. This could help inform better practices and treatments for service users in the future.

What if there is a problem?
If you wish to complain, or have concerns about any aspect of the way you have been approached or treated by members of staff during your participation in the research, National Health Service or UCL complaints mechanisms are available to you. Please ask your researcher or doctor if you would like more information on this. In the unlikely event that you are harmed by taking part in this study, compensation may be available.

If you suspect that the harm is the result of the Sponsor’s (University College London) or the hospital’s negligence, then you may be able to claim compensation. After discussing with your research doctor, please make the claim in writing to Dr Miriam Fernells-Ambrojo who is the Chief Investigator for the research and is based at the Department of Clinical, Educational and Health Psychology, University College London. The Chief Investigator will then pass the claim to the Sponsor’s Insurers, via the Sponsor’s office. You may have to bear the costs of the legal action initially, and you should consult a lawyer about this.

Will my taking part in the study be kept confidential?
All the information obtained will be kept strictly confidential and you will not be identified. This is done by allocating you an anonymous participant number under which to collect data in the experiment. All data will be collected and stored in accordance with the Data Protection Act 1998.

What will happen if I don’t want to carry on with the study?
If you withdraw from the study, we will destroy all your identifiable information e.g. name, contact number, care coordinator etc. However, we may use non-identifiable data that we have collected up until your withdrawal (e.g. data from questionnaires that are assigned an anonymous participant number).

What will happen to the results of the research study?
The results of the research will be analysed in order to complete a Doctorate in Clinical Psychology and the findings will be published in a scientific journal and may be presented at conferences. You will not be identified in any report or publication. Please inform the researchers Kate Watchorn or Melissa Hoban if you would like a copy of the study’s findings.

Who is organising this study?
The research is being organised and funded by UCL.
Information Sheet
Version 5: 16.02.17

Who has reviewed the study?
All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. The study has been reviewed and given favourable opinion by Camberwell St Giles Research Ethics Committee.

Thank you for considering taking part and taking the time to read this information sheet.

Research Team Members:
Melissa Hoban, Trainee Clinical Psychologist, Department of Clinical, Educational and Health Psychology, University College London. Email: m.hoban.17@ucl.ac.uk Tel: 07538124739
Kate Watchorn, Trainee Clinical Psychologist, Department of Clinical, Educational and Health Psychology, University College London. Email: kate.watchorn.17@ucl.ac.uk Tel: 07903242881
Dr Miriam Formells-Ambrojo, Lecturer in Clinical Psychology, Department of Clinical, Educational and Health Psychology, University College London. Email: Miriam.formells-ambrojo@ucl.ac.uk
Appendix 9: Participant Consent Form
CONSENT FORM

PROJECT TITLE: UNDERSTANDING SOCIAL INTERACTIONS IN CLINICAL POPULATIONS: AN EVALUATION OF A VIRTUAL FLATMATE

Name of Researchers: Melissa Hoban & Kate Watchorn

Thank you for your interest in taking part in this research. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to take part. You will be given a copy of this Consent Form to keep and refer to at any time.

1. I confirm that I have read and understand the information sheet dated 16.02.17 (Version 4) for the above study. I have had the opportunity to ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

3. I understand that if I decide to withdraw from the study, any identifiable data collected up to this point will be destroyed but non-identifiable data may be used for the research.

4. I understand that I must not take part in the study if I have epilepsy.

5. I understand that the information I have submitted will be published as a report and I will be sent a copy if I request this. Confidentiality and anonymity will be maintained and it will not be possible to identify me from any publications.

6. I understand that data collected during the study may be locked at by individuals from University College London, from regulatory authorities such as external auditors checking how the research is being run, or from the NHS Trust where it is relevant to my taking part in the research. I give permission for these individuals to have access to my records.

7. Optional: I understand that relevant sections of my medical notes may be required to be locked at by the research team should my care coordinator not be able to access this information on the researcher’s behalf. I give permission for the research to have access to my medical notes, only for the duration that I am involved in the research.

8. I agree that the research project named above has been explained to me to my satisfaction and I agree to take part in this study.

Name of Participant: ____________________________________________
Signature: ______________________________________________________
Date: __________

Name of researcher taking consent: ________________________________
Signature: ______________________________________________________
Date: __________

When completed: 1 for participant, 1 for researcher, 1 for documenting in medical notes
Appendix 10: Prompt Sheet for the VR Scene
1. What do you like about flat sharing?

2. How do you choose flatmates?

3. What makes a good flatmate?

4. What’s the best thing about this flat?
Appendix 11: Full Conversation with the Avatar
A=Avatar
P=Participant

A: Hi my name is Mark thanks for coming. What’s your name?

P: (Tells avatar their name)

A: Thanks, OK I’m ready!

P: What do you like about flat sharing?

A: I enjoy meeting new people... I have made new friends this way... Its great getting to know them, have a laugh... mhm... and it helps to keep the cost of living low so you can live in a better area!

P: What do you ask potential flatmates before going ahead?

A: Well, I always meet them in person and get a sense of what they are like... I ask them what they are looking for in a shared flat, what is a typical day like for them, what music they like, if they smoke, if they are lazy about house chores... mhm... If they like having friends around... Oh, yeah it is also good to ask them what has been their best and worst experience of flat sharing!

P: In your experience... who makes a great flatmate?

A: Mhm... good question... don’t know... I’m trying to think... someone how is easygoing, friendly and fun but who also can give you space... it is also good to have something in common with them, like love for sport, or music... It’s hard to answer because I think it really depends on the person... I’ve got on with people who were completely different from me, sometimes it just works.

P: What is the best thing about your flat?

A: The terrace and the view! Come and have a look! (moves to the window)

A: It’s amazing to have all this outside space, in the summer we practically live outside! We have great BBQs....

(Phone rings – avatar answers and speaks discreetly on the phone)

A: Hello? Okay... yeah I can be there! Okay bye.

A: Oh, sorry but I need to go now... anyway thank you for coming and maybe we can continue the interview some other time?

P: (Answers)

SCENARIO ENDS
Appendix 12: Participant Demographic Details Form
Participant Information

Participant name: .................................................................
Participant ID (to be completed by researcher): ............
Age: .......................  
Gender: .................................................................
Ethnicity: .................................................................
Occupation: ........................................................................
History of epilepsy: ...........................................................

Please circle responses to below

1a) Have you ever had a diagnosed mental health difficulty?
   • Yes
   • No
   • Prefer not to say

1b) If you answered yes to question 1a), please specify which mental health difficulty you have experienced: ........................................................................
   • Prefer not to say
   • Not applicable

1b) If you answered yes to question 1a), is this mental health difficulty current?
   • Yes
   • No
   • Prefer not to say
   • Not applicable

2a) Have you previously lived in a shared flat?
   • Yes
   • No

2b) If you answered yes to question 2a), overall would you describe this experience as:
   • Mainly positive
   • Mainly negative
   • Neutral

2c) Have you had any previous experience of using Virtual Reality technology?
   • Yes
   • No
Appendix 13: Childhood Trauma Questionnaire
<table>
<thead>
<tr>
<th>When I was growing up ...</th>
<th>Never True</th>
<th>Rarely True</th>
<th>Sometimes True</th>
<th>Often True</th>
<th>Very Often True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I didn't have enough to eat.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I knew that there was someone to take care of me and protect me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. People in my family called me things like &quot;stupid,&quot; &quot;lazy,&quot; or &quot;ugly.&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. My parents were too drunk or high to take care of the family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. There was someone in my family who helped me feel that I was important or special.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I had to wear dirty clothes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I felt loved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I thought that my parents wished I had never been born.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. There was nothing I wanted to change about my family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. People in my family hit me so hard that it left me with bruises or marks.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I was punished with a belt, a board, a cord, or some other hard object.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. People in my family looked out for each other.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. People in my family said hurtful or insulting things to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I believe that I was physically abused.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I had the perfect childhood.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. I felt that someone in my family hated me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. People in my family felt close to each other.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Someone tried to touch me in a sexual way, or tried to make me touch them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. I had the best family in the world.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Someone tried to make me do sexual things or watch sexual things.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Someone molested me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I believe that I was emotionally abused.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. There was someone to take me to the doctor if I needed it.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I believe that I was sexually abused.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. My family was a source of strength and support.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 14: Items for Each Abuse Type on the Childhood Trauma Questionnaire
Table A.1. Childhood Trauma Questionnaire Items by Scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Items</th>
</tr>
</thead>
</table>
| **Emotional Abuse**        | 3. People in my family called me things like “stupid,” “lazy,” or “ugly.”  
8. I thought that my parents wished I had never been born.  
14. People in my family said hurtful or insulting things to me.  
18. I felt that someone in my family hated me.  
25. I believe that I was emotionally abused.                                                                                                                                 |
| **Physical Abuse**         | 9. I got hit so hard by someone in my family that I had to see a doctor or go to the hospital.  
11. People in my family hit me so hard that it left me with bruises or marks.  
12. I was punished with a belt, a board, a cord, or some other hard object.  
15. I believe that I was physically abused.  
17. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor.                                                                                                                                 |
| **Sexual Abuse**           | 20. Someone tried to touch me in a sexual way or tried to make me touch them.  
21. Someone threatened to hurt me or tell lies about me unless I did something sexual with them.  
23. Someone tried to make me do sexual things or watch sexual things.  
24. Someone molested me.  
27. I believe that I was sexually abused.                                                                                                                                 |
| **Emotional Neglect**      | 5. There was someone in my family who helped me feel that I was important or special (R).  
7. I felt loved (R).  
13. People in my family looked out for each other (R).  
19. People in my family felt close to each other (R).  
28. My family was a source of strength and support (R).                                                                                                                                 |
| **Physical Neglect**       | 1. I didn’t have enough to eat.  
2. I knew that there was someone to take care of me and protect me (R).  
4. My parents were too drunk or high to take care of the family.  
6. I had to wear dirty clothes.  
26. There was someone to take me to the doctor if I needed it (R).                                                                                                                                 |
| **Minimization/Denial**    | 10. There was nothing I wanted to change about my family.  
16. I had the perfect childhood.  
20. I had the best family in the world.                                                                                                                                                                    |

*Note.* (R) indicates a reverse-scored item.
Appendix 15: The Brief Core Schema Scale (Fowler et al., 2006)
THE BRIEF CORE SCHEMA SCALES: BELIEFS ABOUT SELF AND OTHERS
This questionnaire lists beliefs that people can hold about themselves and other people. Please indicate whether you hold each belief (NO or YES). If you hold the belief then please indicate how strongly you hold it by circling a number (1-4). Try to judge the beliefs on how you have generally, over time, viewed yourself and others. Do not spend too long on each belief. There are no right or wrong answers and the first response to each belief is usually the most accurate.

<table>
<thead>
<tr>
<th>MYSELF</th>
<th>NO</th>
<th>YES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am unloved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am worthless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am weak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am vulnerable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am bad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am a failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am respectful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am valuable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am talented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am successful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am interesting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTHER PEOPLE</th>
<th>NO</th>
<th>YES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other people are hostile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are harsh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are unforgiving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are bad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are devious</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are nasty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are fair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are good</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are trustworthy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are accepting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are supportive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people are truthful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 16: Paranoia Scale (Fenigstein & Vanable, 1992)
**Paranoia Scale (Fenigstein and Vanable 1992)**

Please rate how applicable each belief is to you by selecting a number between 1 (not at all applicable to me) and 5 (extremely applicable to me).

| 1 | Someone has it in for me | 1 | 2 | 3 | 4 | 5 |
| 2 | I sometimes feel as if I'm being followed | 1 | 2 | 3 | 4 | 5 |
| 3 | I believe that I have often been punished without cause | 1 | 2 | 3 | 4 | 5 |
| 4 | Some people have tried to steal my ideas and take credit for them | 1 | 2 | 3 | 4 | 5 |
| 5 | My parents and family find more fault with me than they should | 1 | 2 | 3 | 4 | 5 |
| 6 | No one really cares much what happens to you | 1 | 2 | 3 | 4 | 5 |
| 7 | I am sure I get a raw deal from life | 1 | 2 | 3 | 4 | 5 |
| 8 | Most people will use somewhat unfair means to gain profit or advantage, rather than lose it | 1 | 2 | 3 | 4 | 5 |
| 9 | I often wonder what hidden reason another person may have for doing something nice for you | 1 | 2 | 3 | 4 | 5 |
| 10 | It is safer to trust no one | 1 | 2 | 3 | 4 | 5 |
| 11 | I have often felt that strangers were looking at me critically | 1 | 2 | 3 | 4 | 5 |
| 12 | Most people make friends because friends are likely to be useful to them | 1 | 2 | 3 | 4 | 5 |
| 13 | Someone has been trying to influence my mind | 1 | 2 | 3 | 4 | 5 |
| 14 | I am sure I have been talked about behind my back | 1 | 2 | 3 | 4 | 5 |
| 15 | Most people inwardly dislike putting themselves out to help other people | 1 | 2 | 3 | 4 | 5 |
| 16 | I tend to be on my guard with people who are somewhat more friendly than expected | 1 | 2 | 3 | 4 | 5 |
| 17 | People have said insulting and unkind things about me | 1 | 2 | 3 | 4 | 5 |
| 18 | People often disappoint me | 1 | 2 | 3 | 4 | 5 |
| 19 | I am bothered by people outside, in cars, in stores, etc., watching me | 1 | 2 | 3 | 4 | 5 |
| 20 | I have often found people jealous of my good ideas just because they had not thought of them first | 1 | 2 | 3 | 4 | 5 |
Appendix 17: The Psychotic Symptoms Rating Scale – Delusions (PSYRATS-D; Haddock et al., 1999)
(PSYRATS-D; Haddock et al., 1999)

1. **Amount of preoccupation with delusions**
   1. 0 No delusions, or delusions which the subject thinks about less than once a week
   2. 1 Subject thinks about beliefs at least once a week
   3. 2 Subject thinks about beliefs at least once a day
   4. 3 Subject thinks about beliefs at least once an hour
   5. 4 Subject thinks about delusions continuously or almost continuously

2. **Duration of preoccupation with delusions**
   1. 0 No delusions
   2. 1 Thoughts about beliefs last for a few seconds, fleeting thoughts
   3. 2 Thoughts about delusions last for several minutes
   4. 3 Thoughts about delusions last for at least 1 hour
   5. 4 Thoughts about beliefs usually last for hours at a time

3. **Conviction**
   1. 0 No conviction at all
   2. 1 Very little conviction in reality of beliefs, < 10%
   3. 2 Some doubts relating to conviction in beliefs, between 10-49%
   4. 3 Conviction in belief is very strong, between 50-99%
   5. 4 Conviction is 100%

4. **Amount of distress**
   1. 0 Beliefs never cause distress
   2. 1 Beliefs cause distress on the minority of occasions
   3. 2 Beliefs cause distress on < 50% of occasions
   4. 3 Beliefs cause distress on the majority of occasions when they occur between 50-99% of time
   5. 4 Beliefs always cause distress when they occur

5. **Intensity of distress**
   0 No distress
   1 Beliefs cause slight distress
   2 Beliefs cause moderate distress
   3 Beliefs cause marked distress
   4 Beliefs cause extreme distress, could not be worse

6. **Disruption to life caused by beliefs**
   0 No disruption to life, able to maintain independent living with no problems in daily living skills. Able to maintain social and family relationships (if present)
   1 Beliefs cause minimal amount of disruption to life, e.g. interferes with concentration although able to maintain daytime activity and social and family relationships and be able to maintain independent living without support
   2 Beliefs cause moderate amount of disruption to life causing some disturbance to daytime activity and/or family or social activities. The patient is not in hospital although may live in supported accommodation or receive additional help with daily living skills
   3 Beliefs cause severe disruption to life so that hospitalisation is usually necessary. The patient is able to maintain some daily activities, self-care and relationships while in hospital. The patient may be also be in supported accommodation but experiencing severe disruption of life in terms of activities, daily living skills and/or relationships
   4 Beliefs cause complete disruption of daily life requiring hospitalization. The patient is unable to maintain any daily activities and social relationships. Self-care is also severely disrupted
Appendix 18: Positive and Negative Affect Schedule (Watson et al., 1988)
Participant no:

This scale consists of a number of words that describe different feelings and emotions. Read each item and then tick the appropriate answer next to that word. Indicate to what extent you feel this way right now, that is, at the present moment.

<table>
<thead>
<tr>
<th></th>
<th>1 Very slightly or not at all</th>
<th>2 A little</th>
<th>3 Moderately</th>
<th>4 Quite a bit</th>
<th>5 Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excited</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guilty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hostile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enthusiastic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proud</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irritable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashamed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspired</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervous</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determined</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attentive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jittery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afraid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 19: Subjective Rating of Trust
How TRUSTWORTHY did Mark come across?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 20: Sense of Presence Questionnaire (Slater et al., 1998)
The following questions relate to your recent virtual reality experience. Please read each question and answer as you are instructed in each one.

1. Please rate the sense of actually being in the flat

Abnormal  1  2  3  4  5  6  7  Normal experience of being in a flat

2. To what extent were there times during the experience when the virtual flat became “reality” for you, and you almost forgot about the “real world” of the laboratory in which the whole experience was actually taking place?

At no time  1  2  3  4  5  6  7  Almost all the time

3. When you think back about your experience, do you think of the virtual flat more as “images that you saw”, or more as “somewhere you visited”?

Images that I saw  1  2  3  4  5  6  7  Somewhere that I visited

4. During the experience, which was strongest on the whole, your sense of being in the virtual flat, or being in the real world of the laboratory

Laboratory  1  2  3  4  5  6  7  Virtual flat

5. Consider your memory of being in the flat. How similar is the memory of the virtual reality experience to other memories of “real places” in terms of: visual quality, size, colour and how realistic and vivid it seems in your imagination?

Not at all  1  2  3  4  5  6  7  Very similar

6. During the experience, did you think to yourself that you were actually “just standing in a room wearing equipment” or did the virtual flat “overwhelm” you? The virtual flat overwhelmed me...

Not at all  1  2  3  4  5  6  7  All of the time
Appendix 21: Attention Checks
Please circle whether the following statements are true or false

1. One reason that Mark the virtual flatmate gave for why he likes flat sharing is that he has made new friends

   True    False

2. When asked who makes a good flatmate, Mark mentioned that the most important thing is that they are tidy.

   True    False
Appendix 22: Ethical Approval
10 August 2015

Dr. Miriam Fornells-Ambrojo  
Clinical Psychologist, Step Team  
South London and Maudsley NHS Foundation Trust  
Step Team, 12 Windsor Walk,  
Denmark Hill  
London  
SE5 8BB

Dear Dr. Fornells-Ambrojo

REC reference: 15/LO/1197
IRAS project ID: 172018

Thank you for your letter of 6th August 2015, responding to the Committee’s request for further information on the above research and submitting revised documentation.

The further information was considered in correspondence by a Sub-Committee of the REC at a meeting held on 10th August 2015. A list of the Sub-Committee members is attached.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact the REC Manager, Tina Cavalliere, nrescommittee.london-camberwellstgiles@nhs.net. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation.
as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at [http://www.rdforum.nhs.uk](http://www.rdforum.nhs.uk).

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from NRES. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites
The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see “Conditions of the favourable opinion” below).

Non-NHS sites

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copies of advertisement materials for research participants [Research Poster]</td>
<td>3</td>
<td>03 August 2015</td>
</tr>
<tr>
<td>Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Insurance Certificate]</td>
<td>1</td>
<td>12 June 2015</td>
</tr>
<tr>
<td>GP/Consultant information sheets or letters [HCP Information Sheet]</td>
<td>1</td>
<td>15 January 2015</td>
</tr>
<tr>
<td>Interview schedules or topic guides for participants [Qual Interview quiz]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>IRAS Checklist XML [Checklist_18062015]</td>
<td>18 June</td>
<td>2015</td>
</tr>
<tr>
<td>IRAS Checklist XML [Checklist_01072015]</td>
<td>01 June</td>
<td>2015</td>
</tr>
<tr>
<td>IRAS Checklist XML [Checklist_06082015]</td>
<td>06 August</td>
<td>2015</td>
</tr>
<tr>
<td>IRAS Checklist XML [Checklist_06082015]</td>
<td>06 August</td>
<td>2015</td>
</tr>
<tr>
<td>Non-validated questionnaire [Sense of Presence non-validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Non-validated questionnaire [TICR non-validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Non-validated questionnaire [Detection of Contingency and Attention Checks]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Non-validated questionnaire [Reading the Eyes non-validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Participant consent form [Participant consent form]</td>
<td>2</td>
<td>03 August 2015</td>
</tr>
<tr>
<td>Participant information sheet (PIS) [Participant Information Sheet]</td>
<td>3</td>
<td>03 August 2015</td>
</tr>
<tr>
<td>REC Application Form [REC_Form_18062015]</td>
<td>18 June</td>
<td>2015</td>
</tr>
<tr>
<td>REC Application Form [REC_Form_06082015]</td>
<td>06 August</td>
<td>2015</td>
</tr>
<tr>
<td>Research protocol or project proposal [Research Protocol]</td>
<td>3</td>
<td>06 May 2015</td>
</tr>
<tr>
<td>Summary CV for Chief Investigator (CI) [CI CV]</td>
<td>1</td>
<td>13 March 2015</td>
</tr>
<tr>
<td>Summary CV for student [CV Gall Wingham and Hannah Reity merged]</td>
<td>1</td>
<td>12 June 2015</td>
</tr>
<tr>
<td>Summary CV for supervisor (student research) [Chris Barker CV]</td>
<td>1</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Summary, synopsis or diagram (flowchart) of protocol in non technical language [Research Flow Chart]</td>
<td>1</td>
<td>01 April 2015</td>
</tr>
<tr>
<td>Validated questionnaire [RQ]</td>
<td>1</td>
<td>12 June 2015</td>
</tr>
<tr>
<td>Validated questionnaire [CAPE 42 Item]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Validated questionnaire [FAQ validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Validated questionnaire [FESF5-2013 validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Validated questionnaire [GPTS validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Validated questionnaire [PANAS Validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
<tr>
<td>Validated questionnaire [PSYRATS-D validated]</td>
<td>2</td>
<td>01 July 2015</td>
</tr>
</tbody>
</table>
Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:

http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at

http://www.hra.nhs.uk/hra-training/

15/LO/1197 Please quote this number on all correspondence

With the Committee’s best wishes for the success of this project.

Yours sincerely

Pp

Mr John Richardson
Chair

Email:nrescommittee.london-camberwellspires@nhs.net

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments

"After ethical review – guidance for researchers"

Copy to: Mr Dave Wilson
Mrs Angela Williams, NoCLOR
Appendix 23: Approval for Ethical Amendment
Dear Dr. Fornells-Ambrojo,

IRAS Project ID: 172018

Short Study Title: Using Virtual Reality to Investigate Psychological Factors in Paranoia

Date complete amendment submission received: 27 November 2018

Amendment No./ Sponsor Ref: Non-Substantial Amendment 2

Amendment Date: 25 October 2018

Amendment Type: Non-substantial

Outcome of HRA and HCRW Assessment
This email also constitutes HRA and HCRW Approval for the amendment, and you should not expect anything further.

Implementation date in NHS organisations in England and Wales
35 days from date amendment information, together with this email, is supplied to participating organisations (providing conditions are met)

For NHS/HSC R&D Office information

Thank you for submitting an amendment to your project. We have now categorised your amendment and please find this, as well as other relevant information, in the table above.

What should I do next?
Please read the information in IRAS, which provides you with information on how and when you can implement your amendment at NHS/HSC sites in each nation, and what actions you should take now.

If you have participating NHS/HSC organisations in any other UK nations please note that we will forward the amendment submission to the relevant national coordinating function(s).

If not already provided, please email to us any regulatory approvals (where applicable) once available.

When can I implement this amendment?
You may implement this amendment in line with the information in IRAS. Please note that you may only implement changes described in the amendment notice.

Who should I contact if I have further questions about this amendment?
If you have any questions about this amendment please contact the relevant national coordinating centre for advice:

- England – hra.amendments@nhs.net
- Northern Ireland – research.gateway@hscni.net
Scotland – nhsg.NRSPCC@nhs.net
Wales – research-permissions@wales.nhs.uk
Additional information on the management of amendments can be found in the IRAS guidance.

User Feedback
The Health Research Authority is continually striving to provide a high-quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/. Please do not hesitate to contact me if you require further information.

Kind regards
Richard Boyd

Health Research Authority
Ground Floor | Skipton House | 80 London Road | London | SE1 6LH
E.hra.amendments@nhs.net
W. www.hra.nhs.uk
Appendix 24: Normality Testing of Key Variables
<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>K-S Test</th>
<th>Outlier Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>p</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre-VR</td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>-1.477</td>
<td>.090</td>
<td>.148</td>
<td>.200</td>
</tr>
<tr>
<td>CTQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional Abuse</td>
<td>.499</td>
<td>.222</td>
<td>.212</td>
<td>.200</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td>3.798</td>
<td>3.169</td>
<td>.267</td>
<td>.001</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td>5.464</td>
<td>6.828</td>
<td>.325</td>
<td>.001</td>
</tr>
<tr>
<td>Emotional</td>
<td>1.699</td>
<td>.193</td>
<td>.124</td>
<td>.200</td>
</tr>
<tr>
<td>Neglect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Neglect</td>
<td>.862</td>
<td>-1.416</td>
<td>.211</td>
<td>.012</td>
</tr>
<tr>
<td>BCSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Self</td>
<td>.116</td>
<td>-1.349</td>
<td>.114</td>
<td>.200</td>
</tr>
<tr>
<td>Negative Self</td>
<td>1.153</td>
<td>-.258</td>
<td>.134</td>
<td>.200</td>
</tr>
<tr>
<td>Positive Other</td>
<td>-.033</td>
<td>-.491</td>
<td>.096</td>
<td>.200</td>
</tr>
<tr>
<td>Negative Other</td>
<td>.884</td>
<td>-.683</td>
<td>.147</td>
<td>.200</td>
</tr>
<tr>
<td>PANAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>-1.456</td>
<td>.404</td>
<td>.152</td>
<td>.200</td>
</tr>
<tr>
<td>Negative</td>
<td>4.576</td>
<td>7.666</td>
<td>.187</td>
<td>.044</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>During VR</td>
<td></td>
</tr>
<tr>
<td>Total no. Avatar Movements</td>
<td>.896</td>
<td>-.747</td>
<td>.297</td>
<td>.001</td>
</tr>
<tr>
<td>Interpersonal Distance</td>
<td>.582</td>
<td>-.027</td>
<td>.118</td>
<td>.200</td>
</tr>
<tr>
<td>PANAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>-3.004</td>
<td>1.166</td>
<td>.296</td>
<td>.001</td>
</tr>
<tr>
<td>Negative</td>
<td>1.257</td>
<td>1.182</td>
<td>.257</td>
<td>.001</td>
</tr>
<tr>
<td>Subjective Trust</td>
<td>-.972</td>
<td>-.633</td>
<td>.160</td>
<td>.172</td>
</tr>
</tbody>
</table>
Appendix 25: Guidelines for Classification of CTQ Score for Each Subscale
<table>
<thead>
<tr>
<th>Scale</th>
<th>Classification</th>
<th>None (or minimal)</th>
<th>Low (to Moderate)</th>
<th>Moderate (to severe)</th>
<th>Severe (to extreme)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Abuse</td>
<td></td>
<td>5-8</td>
<td>9-12</td>
<td>13-15</td>
<td>≥16</td>
</tr>
<tr>
<td>Physical Abuse</td>
<td></td>
<td>5-7</td>
<td>8-9</td>
<td>10-12</td>
<td>≥13</td>
</tr>
<tr>
<td>Sexual Abuse</td>
<td></td>
<td>5</td>
<td>6-7</td>
<td>8-12</td>
<td>≥13</td>
</tr>
<tr>
<td>Emotional Neglect</td>
<td></td>
<td>5-9</td>
<td>10-14</td>
<td>15-17</td>
<td>≥18</td>
</tr>
<tr>
<td>Physical Neglect</td>
<td></td>
<td>5-7</td>
<td>8-9</td>
<td>10-12</td>
<td>≥13</td>
</tr>
</tbody>
</table>