Exploring the relationship between implicit self-esteem, paranoia, and trustworthiness judgements of faces: A systematic review and causal-interventionist study.

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A thesis submitted in partial fulfilment of the requirements for the award of Doctor of Clinical Psychology at the University of Sheffield

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Declaration

I declare that this thesis has been submitted for the Doctorate in Clinical Psychology at the University of Sheffield. It has not been submitted for any other degree or any other institution. The thesis is an original piece of work and all other work mentioned is referenced accordingly.

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Overall Abstract

Psychological theory and research has sought to explore paranoia, self-esteem, and trust extensively across clinical, social, behavioural, evolutionary, and neuropsychological fields. Understanding the role of these psychological mechanisms and the potential relationship between them is essential in order to develop psychological interventions for clinical practice. Research has found that negative self-esteem is associated with severe mental health difficulties such as depression and paranoia. In addition, paranoia is associated with mistrust and insecure attachment styles, which appear to interact with negative self-esteem. To contribute to our understanding of how psychological mechanisms may influence emotional and psychosocial functioning and the potential relationships between them, this research examined whether a novel evaluative conditioning paradigm would increase implicit self-esteem and implicit trust, and consequently reduce paranoia and depression.

Part I of this thesis presents a systematic review which aimed to explore the relationship between paranoia and trustworthiness judgments of faces. Eleven relevant articles were included in this review; conceptualisation and operationalisation of paranoia and trust were examined and the relationship between these two variables assessed. Overall, the findings of this review were mixed regarding conceptualisation and operationalisation of paranoia and trustworthiness judgments of faces and the relationship between them. Study design, quality, conceptualisation, and measurement of the key variables did not appear to influence whether a relationship was found. This review was limited by the small number of eligible studies and the heterogeneity between study quality, designs, and analysis, and consequently a meta-analytic review was not possible. Future research is needed using consistent study designs, conceptualisations, and measures of paranoia and trust to further explore the relationship between the variables of interest and provide opportunities for a meta-

analytic review. Future research would also benefit from incorporating additional measures of mood e.g., depression and anxiety, to control for potential confounding variables.

Part II of this thesis presents an experimental causal-interventionist study which aimed to investigate whether a novel evaluative conditioning task would improve implicit self-esteem and trust and therefore decrease paranoia and depression. An analogue sample of 211 participants was randomly allocated into either the experimental evaluative conditioning task or an equivalent control conditioning task. Baseline trait measures of psychological difficulties and attachment were collected in addition to pre- and post- measures of implicit and explicit self-esteem, paranoia, trust, and attachment. Although the evaluative conditioning paradigm did improve implicit self-esteem, this did not result in improved trustworthiness judgements or decrease subclinical paranoia or depression. There was a marginal increase in explicit self-esteem for both the experimental and control conditions. Following the evaluative conditioning paradigm, attachment anxiety unexpectedly deteriorated. The study's findings that increasing implicit self-esteem did not improve trustworthiness judgements or reduce paranoia or depression contrasts with psychological research and theory. Consequently, replication to confirm the findings of this study in future research is necessary. In addition, future studies should seek to test this paradigm with a clinical sample. The limitations of this study are discussed, alongside clinical implications and recommendations for future research.

Acknowledgements

"Every person on this earth is full of great possibilities that can be realized through imagination, effort, and perseverance" – Scott Barry Kaufmann

When I reflect on the journey of this research process effort and perseverance have never felt so powerfully familiar. However, this work would also not exist without imagination, passion, and the whole-hearted support from some very inspiring individuals.

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Section One: Literature Review

The relationship between paranoia and judgements of trustworthiness of faces: A systematic review.

Abstract

Objectives

It is plausible that there is a relationship between paranoia and trustworthiness judgments of faces, but the evidence pertaining to this hypothesis has not been systematically reviewed and synthesised. This review explores the relationship between paranoia and trustworthiness judgements of faces.

Method

A systematic review of studies was completed following SWiM guidelines. SCOPUS, PsychINFO, and MEDLINE databases were searched, and titles, abstracts and full papers screened against inclusion and exclusion criteria. This review also examined whether conceptualisation and operationalisation of paranoia and trust, study design, and study quality influenced whether a relationship was established between the variables of interest.

Results

Eleven papers were included in the review. Overall, findings were mixed regarding the existence of a relationship between paranoia and trustworthiness judgements of faces. The review determined that conceptualisation and assessment of paranoia and trust did not influence whether a relationship was identified between the two variables. Moreover, study design and quality did not appear to influence whether a relationship was found.

Conclusions

This systematic review was the first to examine the relationship between paranoia and trustworthiness judgments of faces. Findings were generally mixed, meaning an established relationship between the two variables could not be adequately confirmed. More research is required, using consistent conceptualisations and measures of paranoia and trust to further explore the relationship. Future research should include measures of mood and other psychological variables to control for potential confounding variables.

Practitioner Points

1. Mental health services should consider the impact of paranoia and trust on service users accessing clinical interventions. Trust serves as an essential component within the development of a strong therapeutic alliance and satisfaction with treatment.
2. Higher trust in clinicians is associated with fewer symptoms, increased engagement in beneficial health behaviours, and a higher overall quality of life.
3. Mental health services should consider measuring trust and therapeutic alliance alongside routine outcome measures for psychological difficulties, to help increase engagement in psychological interventions.

Keywords: Paranoia, Mistrust, Trustworthiness, Faces

The relationship between paranoia and judgements of trustworthiness of faces: A systematic review

Paranoia and trustworthiness have been studied widely across the different fields of psychology, including: clinical, social, behavioural, evolutionary, and neuropsychological. It is likely that there is a relationship between paranoia and trustworthiness judgments of faces; however, this does not appear to have been examined within previous review literature. This systematic review explores the concepts and measurement of paranoia and trustworthiness and the relationship between them.

The nature of paranoia

Paranoia is the experience of exaggerated or unrealistic ideas that others wish us harm and that this harm is intended (Freeman, 2007; Freeman & Garety, 2000; Raihani & Bell, 2019). The notion that harm will occur and the attribution of intention are thought to be the two key elements of a persecutory belief: the primary defining feature of paranoia (Raihani & Bell, 2019). Researchers argue that we should understand paranoid thinking as a heuristic which individuals use to manage the uncertainty experienced during times of increased stress or threat (Corcoran, Cummins, & Rowse et al., 2006, Freeman & Freeman, 2008; Preti & Cella, 2010). Paranoid thinking is considered to be dimensional in nature (Bentall, Corcoran, Howard et al., 2001; Freeman, 2007; Garety & Hemsley, 1994; Preti & Cella, 2010) and is activated by a range of psychological difficulties and distress, such as: depression, anxiety, hypomania, anger, fear, shame, and guilt (Bentall, Rowse, & Shyrane et al., 2009;

Freeman, 2007; Goodwin & Jamison, 1990; Johnson, Horwath, & Weissman, 1991; Van Os, Verdoux, Maurice-Tison et al., 1999).

Paranoia is often associated with complex mental health difficulties including: schizophrenia, personality disorders, delusional disorder, bipolar disorder and PTSD (Freeman, 2007; Hamner, Freuch, Ulmer et al., 1999; Sartorius et al., 1986). Psychological literature indicates that paranoia is also widely experienced amongst the general population at varying levels of frequency and severity (Elahi, Perez, Algorta et al., 2017; Bentall et al., 2001; Freeman et al., 2005; Peters, Joseph, & Garety, 1999; Raihani & Bell, 2019; Spain, Sin, & Freeman, 2016). The experience of paranoia is purported to have implications for an individual's ability to trust others (Raihani & Bell, 2019; Spain et al., 2016).

Research indicates that paranoia is best understood on a continuum with normal experience, with delusions in psychosis at the severe end (Bentall et al., 2001; Chapman & Chapman, 1980; Freeman, 2007; Johns, 2005; Peters, Joseph, & Garety, 1999; Van Os & Verdoux, 2003). Freeman (2007) states that a thorough understanding of subclinical paranoia is essential to inform our understanding of severe clinical experiences of paranoia. Paranoia can have a significant impact on an individual's emotional and psychosocial functioning including increased likelihood of major depression, anxiety disorders, alcohol use, suicidal ideation, work loss, and marital distress (Freeman, 2007; Olfson et al., 2002). Therefore, gaining a greater understanding of paranoia is important in understanding individual experiences.

Incidence and prevalence of paranoia

The incidence and prevalence of paranoia has been examined in several research papers (Eaton, Romanoski, Anthony et al., 1991; Freeman et al., 2005; Johns et al., 2004; Olfson et al., 2002; Ostling & Skoog, 2002; Van Os, Hansseen, Bijil et al., 2000).

A review by Freeman (2006) concluded that the rate of delusional beliefs (paranoia) in the general population is higher than that of clinical psychotic disorders. In a systematic review by Freeman (2007) it was reported that an estimated 10 - 15% of the general population regularly experience paranoid thoughts, which is in accordance with Johns et al.'s (2004) findings. Meanwhile, Van Os et al., (2000) and Poulton et al., (2000) found prevalence rates of persecutory delusions (paranoia) of around 7.5 - 8.7% in non clinical populations. Recent research has indicated experiences of paranoia may be increasing within modern society, due to a range of factors, such as urbanisation, disproportionate media coverage of danger, and other social factors, e.g. fear of crime, migration, and victimisation (Freeman, 2008). In clinical diagnoses such as schizophrenia, unipolar depression, and bipolar disorder, the prevalence of paranoia has been identified as 50% (Sartorius et al. (1986), 15% (Johnson, Horwath & Weisman, 1991), and 28% (Goodwin & Jamison, 1990), respectively. In addition, paranoia is thought to be commonly experienced in paranoid personality disorder and delusional disorder, and in some cases of PTSD (Freeman, 2007).

Models of paranoia

Currently there are two dominant psychological models which have sought to explain paranoia; the cognitive model (Freeman, 2007), and the defensive model (Bentall et al., 2001). The defensive model, based on the Attribution-Self-Representation Cycle (ASRC) by Bentall et al. (2001), hypothesises that paranoia represents an attributional defence against low self-esteem reaching an individual's consciousness by making external-personal (other blaming) attributions for negative events, rather than internal attributions or external-situational attributions. The model argues that individuals with persecutory delusions (paranoia) likely have a discrepancy between their implicit (unconscious) and explicit (conscious) self-esteem (thought to be

higher) in addition to a tendency to make external-personal attributions for negative events (Murphy, 2017). In contrast, rather than serve as a defensive function, the threat anticipation cognitive model proposed by Freeman (2007) suggests paranoia arises from an interaction of emotional processes, anomalous experiences and reasoning biases of which the individual is conscious.

The nature of trust

Trust has been widely studied and defined differently across disciplines (Thielmann & Hilbig, 2015); however, there are some aspects where there is agreement. Mayer, Davis, & Schoorman's (1995) definition highlights the following three components: 1) uncertainty and risk on the part of the trustor, 2) expectation that the trustee will act in the trustor's interest, and 3) that the trustor will accept personal vulnerability. Trust is a key element in social interactions influencing both interpersonal and group behaviours (Thielmann & Hilbig, 2015; Golembiewski & McConkie, 1975). Research indicates trust is vital to social, emotional, and economic wellbeing (Thielmann & Hillbig, 2015; Poulin & Haase, 2015; Rempel, Holmes, & Zanna, 1985; Zak & Knack, 2001; Prevost, Brodeur, Onishi et al., 2015). Importantly, trust serves as a social judgement which enables individuals to develop adaptive behaviour, particularly when encountering unknown individuals (Kirk, Gilmour, Dudley et al., 2013). Research by Willis and Todorov (2006) found an individual's face presents such a significant source of information that individuals are able to make trustworthiness judgements after exposure as brief as 100 milliseconds.

Mistrust has been identified as a distinct construct that is qualitatively different to the absence of trust (Cho, 2006; Lewicki, McAllister, & Bies, 1998; Kramer, 1999). Mistrust is defined as "an active expectation" of a negative outcome with regard to individual welfare (Cho, 2006, p 26; Ross, 2011). Robinson et al. (1991) contend that

mistrust is characterised by fear, suspicion and cynicism. Furthermore, Ross (2011, p288) describes mistrust as a "cognitive habit" of perceiving actions of others as "unsupportive, self-seeking, dishonest" and "exploitative." Mistrust has been identified as a key factor which is synonymous with paranoia, with Blaney (2016) citing it as one of the core cognitive-perceptual biases alongside referentiality and intentionality. Whilst trust is considered a key facet in social interactions (Thielmann & Hilbig, 2015), mistrust is associated with separation and alienation from others (Ross, 2011).

Paranoia and trustworthiness judgements

Paranoia is thought to influence trustworthiness judgements. Whilst healthy individuals can accurately detect trustworthiness/untrustworthiness in faces, those with a paranoid ideation seem less consistent in their ability to do so (Martinez, Agostini, Al-Suhibani et al., 2020). Swets, Dawes, & Monahan (2000) propose a behavioural decision-making framework known as Signal Detection Theory (SDT), which can be used to evaluate how people make decisions about the trustworthiness or untrustworthiness of faces. Within this framework, accuracy of judgement is influenced by response bias and sensitivity (Stanislaw and Todorov, 1999). With face perception, response bias is thought to have evolved as an adaptive strategy designed to minimise the chances of making more costly decision errors (Haselton & Nettle, 2006; Martinez et al., 2020). Consequently, response bias may lead to a broader attribution of untrustworthiness (threat) and narrower attribution of trustworthiness (non-threat) (Haselton & Buss, 2000; Martinez et al., 2020). This was evidenced in Westermann and Lincoln's (2010) study, where anxious participants with higher paranoia demonstrated a more liberal response bias in trustworthiness judgments.

The relationship between trustworthiness judgements and paranoia

Currently, the relationship between paranoia and trustworthiness judgements of faces is not well understood, and further research is needed to explore whether a relationship exists and what the nature of this relationship is.

Aims

This systematic review aims to explore the relationship between paranoia and trustworthiness judgements of faces in clinical and non-clinical populations.

Method

The Synthesis without meta-analysis (SWiM, Campbell et al., 2020) reporting guidelines were used to inform the structure of this review. An initial broad search of online databases and PROSPERO was conducted, and no previous reviews had been registered/ completed on this topic area.

Protocol

This systematic review was undertaken following a predefined protocol (Appendix 1).

Search Strategy

Online databases SCOPUS, PsychINFO, and MEDLINE (via OvidSP) were systematically searched for eligible literature between August and September 2020. Using an iterative process, search terms were identified and finalised through the initial searches. The search terms were organised using the PICO framework (Population/ Intervention/ Comparator/ Outcome; Methley et al., 2014). Boolean operators AND and OR were used to combine the applicable elements "Population" and "Outcome" into the search terms. Eleven search terms were included in the final search across title, abstract and keyword domains (Table 1).

Table 1

Search terms used in the systematic literature search

	Specific search terms
Population	"paranoi*" "paranoid beliefs" "paranoid delusions" "persecutory delusions"
Outcome	"Mistrust" "Interpersonal mistrust" "Distrust" "Mistrust bias" "Trust*" "Interpersonal trust" "Suspiciousness"

During the systematic literature search, studies were firstly screened by title for inclusion and exclusion, and secondly by abstract. All duplicate papers were removed from the database searches during this stage. Full text articles were screened for eligibility against the inclusion and exclusion criteria (Table 2). Two reviewers independently screened all the papers from the systematic searches, discussing and negotiating any discrepancies in their final paper selections. Backward citation searches yielded no further eligible articles, whilst a forward citation search identified one further paper eligible for inclusion.

Table 2

Inclusion and Exclusion criteria

Inclusion criteria	Exclusion criteria
Adults aged 18 years or over with reported clinical experiences of paranoid beliefs/ delusions (i.e. paranoid schizophrenia)	Adults with organic impairments (i.e. dementia), and adolescents and children under 18 years of age.
Adults aged 18 years or over with reported subclinical experiences of paranoid beliefs/ delusions.	Adults with neurodevelopmental disorders i.e. learning disabilities, ASD, ADHD/ADD.
Studies available in English language.	
Included measure of paranoia and trustworthiness judgments of faces.	Adults with chronic long-term physical health conditions.
Studies available in published journals only.	Adolescents and children under 18 years of age.

Quality Appraisal

The methodological quality of the included studies was systematically appraised. Given the small number of eligible studies identified in this area, no studies were excluded based on their quality appraisal score. The designs of the included studies were all quantitative in nature, including experimental (n = 2), quasi-experimental (n = 6), and cross-sectional (n = 3) designs. Accordingly, the Effective Public Health Practice Project (EPHPP) quality assessment tool for quantitative studies (Appendix 2) was used. The EPHPP has been deemed universally relevant to all health related topics and offers a scientific approach to quality assessment rather than assigning arbitrary results to studies under review (Effective Public Healthcare Panacea Project, 2021).

The EPHPP appraises health research on a variety of components including: study design, analysis, withdrawals and dropouts, data collection practices, selection bias, intervention integrity, blinding as part of a controlled trial, and confounders. Each component of the EPHPP is individually assessed and given a rating of "strong", "moderate", or "weak." A global rating of "strong," "moderate," or "weak" is then assigned to a reviewed study based on the total number of each component ratings. Studies with no weak component ratings will be assigned a global rating of "strong," studies with one weak component rating will be given a global rating of "moderate," and two or more weak component ratings would result in a "weak" global rating. The EPHPP has adequate content and construct validity and inter-rater reliability (Thomas, Ciliska, Dobbins et al., 2004; Longden et al., 2020).

To assess inter-rater reliability, a researcher with the necessary research skills conducted an independent assessment of quality on all (100%, N = 11) included studies in this systematic review. The second rater was blind to the first rater's scoring. Cohen's kappa coefficient (Cohen, 1960) was used to ascertain inter-rater reliability and resulted

in almost perfect agreement between both researchers (K = .81, p < .001). Discrepancies in ratings were resolved through discussion.

Data selection and extraction

The following characteristics were extracted from eligible studies: author, year, country, study design, population characteristics (sample size, nature of sample: subclinical or clinical, and gender of participants), independent variables (IV), dependent variables (DV), and conclusions. All information was collated in a database which was subsequently interpreted and synthesised. To increase reliability of data included for this review, two independent researchers extracted data from all papers (n= 11). A consensus meeting was held to discuss any discrepancies and to agree data for inclusion in the review.

Effect sizes

Cohen's *d* effect sizes (Cohen, 1988) were calculated using extracted means and Standard Deviations (SDs) for studies where an effect size was not reported. An online calculator was used to obtain the Cohen's *d* effect sizes (https://memory.psych.mun.ca/models/stats/effect_size). For studies which reported an effect size other than Cohen's *d*, a conversion calculator was used (https://www.escal.site/). Effect sizes were interpreted in line with those outlined in Cohen's (1988) paper, where $d = 0.2$ constitutes a small effect, $d = 0.5$ a medium effect, and $d = 0.8$ a large effect.

Results

The process and outcome of the systematic literature search can be seen in the PRISMA diagram (Moher, Liberati, Tetzlaff et al., 2009) (figure 1). The search yielded a total of 3853 results. 550 articles were identified as duplicates in Mendeley software and were removed. This left a total of 3303 papers for screening. A review of the titles and

abstracts of articles led to the exclusion of 3273 papers. In total 30 full text articles were examined for eligibility, with 20 being excluded due to not assessing trustworthiness judgments of faces (n=13) or not directly assessing the relationship between trustworthiness judgments and paranoia (n = 7). The remaining 10 articles for inclusion had their reference lists assessed in a backward citation search, with 0 additional articles being identified. A forward citation search of the remaining 10 articles yielded 1 further relevant article for inclusion.

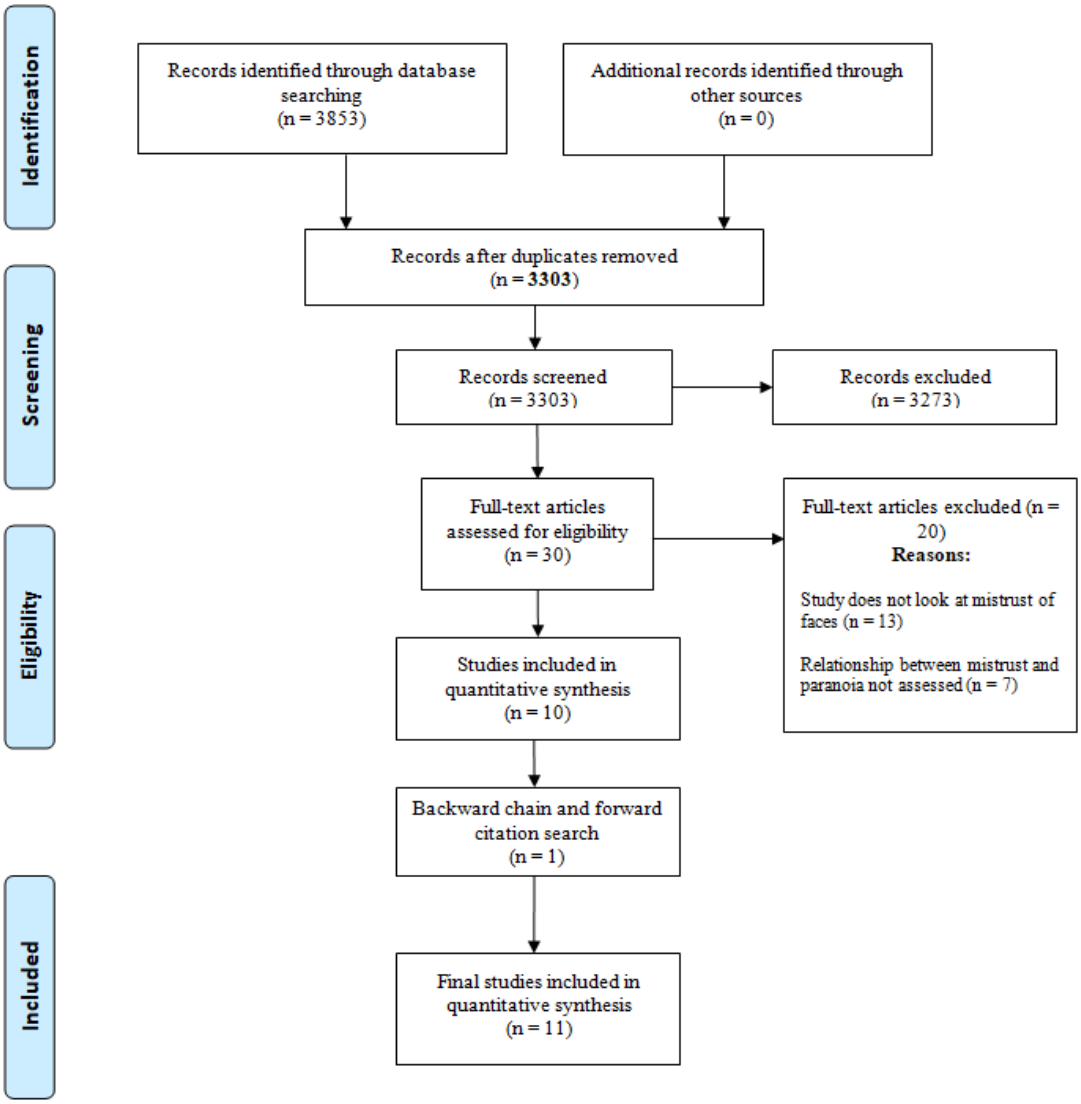

Figure 1. PRISMA diagram describing search strategy

Table 3. Summary of studies in this review

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Hillman et al. (2017) Germany	Experimental	*N* = 50 Non-Clinical HP Group: 75% Female LP Group: 64% Female	PCHL Face trustworthiness ratings (Radboud faces database)	Arousal	Gaze Direction	Non-clinical participants with LP or HP completed the PCHL before rating the trustworthiness of neutral faces under a stress and non-stress condition.	There was no main effect of group or condition on trustworthiness ratings.	Partial eta squared = .001 Calculated Cohen's d = 0.063	No sig. r.ship found	M
Kirk et al. (2013) UK	Quasi-experimental	*N = 48* Non-Clinical HP Group: 88% Female LP Group: 90.5% Female	PS Trustworthiness task (Computer generated faces based on Karolinska faces)	Group membership	Trustworthiness	Non-clinical students completed the PS screening questionnaire. A subsection of participants with HP and LP then rated the trustworthiness of unfamiliar faces designed to appear trustworthy, of average trust, or untrustworthy.	HP scorers rated faces as significantly less trustworthy overall than LP scorers. HP scorers may have a social judgement bias towards lower estimations of trust.	Calculated Cohen's d (from M/SD) = 0.52	Negative r.ship	W

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Martinez et al. (2020) UK	Cross-sectional	*N* = 1508 Non-clinical 50.7% Female	PaDs- R RQ SERS Facial trust detection task (Oosterhof & Todorov, 2008) Bias & Sensitivity	Insecure attachment	Paranoia *Mediation variable: Mistrust*	A nationally representative sample of non-clinical participants completed the PaDs-R, RQ, & SERS before completing a facial trust detection task. Outcomes were analysed using signal detection analysis which provided measures of bias and sensitivity.	Indirect effects through bias towards mistrust in the relationship between attachment anxiety and avoidance and attachment anxiety and paranoia were observed. Indirect effect through negative self-esteem on the relationship between attachment anxiety and paranoia was observed. Trust judgements and negative self-esteem were not associated.	Pearsons R -.20 Calculated Cohen's d = -0.408	Negative r.ship	M
Buck et al. (2016) USA	Cross-sectional	*N* = 220 Clinical only 62.7% Male	PANSS PS Trustworthiness task (Adolphs et al. 1998)	Paranoia	Trustworthiness	Clinical participants completed a battery of questionnaires over two sessions separated by 2-4 week intervals.	A heightened propensity to trust was negatively associated with self-reported paranoia.	Reported Pearson's r = -.28 Calculated Cohen's d = -.58	Negative r.ship	S

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Haut et al. (2010) USA	Quasi-experimental	*N* = 22(Sch) *N* = 43 (Ctol) Clinical & Non Sch group: 59% Female Ctol group: 54% Male	SAPS Trustworthiness ratings (AR face database, Martinez & Benavente)	Group membership	Trustworthiness	Clinical participants rated 96 faces with neutral expressions on eight characteristics including trustworthiness.	Persecutory delusions did not predict trustworthiness ratings.	Reported Fishers' Z=.0118 Calculated Cohen's d = 0.024	No sig. r.ship found	S
Hooker et al. (2011) USA	Experimental	*N* = 23 (Sch) *N* = 35 (Ctol) Clinical & Non Sch group: 91.3% Male Ctol group: 62.9% Male	PANSS Modified Trustworthiness task (Adolphs, Tranel, & Damasio, 1998)	Group membership (Between) Priming (neutral ,positive, negative; within)	Trustworthiness	Clinical and non-clinical (control) participants undertook a social judgement task where they rated the trustworthiness of unfamiliar faces after being presented with a neutral, Negative Affective Prime (NAP), or Positive Affective Prime (PAP).	Correlational analysis demonstrated trust ratings following the NAP were significantly related to suspiciousness/persecution. Participants with schizophrenia with higher level of suspiciousness/ persecution were more likely to rate faces as less trustworthy after the NAP. The relationship between trust ratings after the NAP and the positive symptom cluster was in the predicted direction but did not reach significance.	Neutral prime – Pearson's r = .026 Calculated Cohens' d = 0.052	No sig. r.ship found	S

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Pinkham, Hopfinger, Ruparel & Penn (2008a) USA	Quasi-experimental	*N* = 12 (Np-sch) *N* = 12 (P-sch) *N* = 12 (Ctol) Clinical & Non 100% Male	PANSS (P6 Suspiciousness) PS Abbreviated Trust/ Approachability task (Adolphs et al 1998)	Group Membership	Trustworthiness	An fMRI study assessed neural activation based on blood oxygenation level in three groups (Np-sch, P-sch, & Ctol) whilst they rated faces as trustworthy or untrustworthy.	Unlike the other groups, the P-sch group did not show neural sensitivity to threatening stimuli, with no modulation of neural activity seen for untrustworthy faces compared to trustworthy faces. The reduced neural activation observed in trust evaluations for individuals in the P-sch group is specific to untrustworthy faces. Individuals in the P-sch group had a greater tendency to rate a face as untrustworthy.	Calculated Cohen's d = 1.01	Negative r.ship	S
Pinkham et al. (2008b) USA	Quasi-experimental	*N* = 12 (Np-sch) *N* =12 (P-sch) *N = 12* (ASD) *N* = 12 (Ctol) Clinical & Non 100% Male	PANSS (P6 Suspiciousness) PS Abbreviated Trust/Approachability task (Adolphs et al, 1998)	Group Membership	Trustworthiness	An fMRI study assessed neural activation of discrete brain regions in social cognitive and face processing. Four groups (Np-sch, P-sch, ASD, Ctol) made trustworthiness judgements of faces whilst neural activation was measured.	Faces were rated untrustworthy more often by individuals in the P-sch group than those in the C'tol & NP-sch groups. Neural activation is reduced in individuals with P-sch and ASD during a complex social cognition task (trustworthiness judgements). Social cognitive impairment appears to be subserved by deficit specific neural abnormalities.	Cohen's F .443 Calculated Cohen's d is .886		M

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Trémeau et al. (2016) USA	Cross-sectional	*N* = 81 (Sch) *N* = 62 (Ctol) Clinical & Non Sch group: 72% Male Ctol group: 61% Male	PANSS (Suspiciousness) Trustworthiness task (Karolinska faces)	Group Membership	First face impression	Clinical and non-clinical (control) participants were asked to rate 30 neutral faces on ten different traits including trustworthiness.	Clinical participants rated positive and negative traits higher than controls and had more ambivalence in their ratings. Suspiciousness did not correlate with judgements of trustworthiness.	Spearman's rho = 0.07. ρ	No sig. r.ship found	S
Prevost et al (2015) Canada	Quasi-experimental	*N* = 13 (P-sch) *N* = 14 (Ctol) Clinical & Non P-sch group: 53.8% Male Ctol group: 64.2% Male	PS Trust in Strangers Scale (Naef & Schupp) Trust task (RMET Baron-Cohen, Wheelright, Hill, Ruste, & Plumb, 2001)	Group Membership	Trustworthiness	Clinical and non-clinical participants undertook ToM judgements and rated the trustworthiness of strangers. Assessments of propensity to trust and paranoid beliefs were completed.	Differences in and correlations between paranoia and trust scores were investigated. Healthy participants had lower scores on the PS than paranoid patients and they tended to judge others as more trustworthy than the paranoid patients. However, the groups did not differ on trust scale scores. Paranoia and trust were not correlated for either group. SAPS scores in paranoid patients did not correlate with trust score or judgement of trustworthiness.	Calculated Cohen's d (from M/SD) 0.55	No sig. r.ship found	S

Author Year and Country	Study Design	Population	Relevant Measures used	IV	DV	Procedure	Outcome (Main finding)	Effect size(s) *d*	Direction of effect or association	Quality
Sutherland et al. (2020) UK/ Australia	Quasi-experimental	*N* = 24 (Sch) *N* = 24 (Ctol) Clinical & Non 58.3% Male 41.6% Female	Trust Facial Impressions (Hooper et al. 2018) Trust game (Bainbridge, Isola, & Oliva, 2013) PDI Persecution sub-score	Group Membership	Trust game	Clinical and non-clinical controls undertook trust games followed by a trustworthiness of faces task.	Both groups had similar explicit facial trustworthiness impressions. There was no main effect or interaction with group. Thus the clinical group did not show lower overall trust, agreeing with the main trustworthiness impressions task. Unlike controls, clinical participants' financial decisions in the trust game were not guided by partner fairness and they were less able to differentiate between fair and unfair behaviours in game partners.	N^2p = <0.01 Calculated Cohen's d = <.201	No sig. r.ship found	S

Note. T1/2/3/4 = Time 1,2, 3, 4; HP = High Paranoia; LP = Low Paranoia; Sch = Schizophrenia group***;*** Ctol = Control group***;*** Np-sch = Non-paranoid schizophrenia; P-sch = Paranoid schizophrenia; ASD = Autism Spectrum Disorder***;*** fMRI = functional magnetic resonance imaging***;*** ToM = Theory of Mind***;*** VAS = Visual Analogue Scales; PCHL = Paranoia Checklist (Freeman et al., 2005)***;*** PS = Paranoia Scale (Fenigstein & Vanable, 1992)***;*** SERS = Self-esteem Rating Scale (Lecomte et al., 2006)***;*** PaDS-R = Persecutory & Deservedness Scale (Melo et al., 2009)***;*** RQ = Relationship Questionnaire (Bartholomew & Horowitz, 1991)***;*** PANSS = Positive And Negative Syndrome Scale (Kay, Fiszbein, & Opler, 1987)***;*** SAPS = Scale for Assessment of Positive Symptoms (Andreasen , 1983b)***;*** PDI = Peters Delusion Inventory (Peters, Joseph, Day, & Garety, 2004)

Study Characteristics

Study design. The eleven studies included in this systematic review utilised a range of study designs and methodologies. Six studies were quasi-experimental designs, two studies used experimental designs, and three were cross-sectional designs. The majority of the included studies had been published within the last decade (N = 8) with most published within the last 5 years (N = 5). The remaining studies were published in 2010 (N = 1) and 2008 (N = 2). Full details of the included studies methods, characteristics, main findings, and effect sizes are in table 3.

Setting. All studies were undertaken in developed countries from North America, Europe, and Oceania. Six studies were conducted in the USA (Buck, Pinkham, Harvey et al., 2016; Haut & MacDonald, 2010; Hooker et al., 2011; Pinkham, Hopfinger, Ruparel et al., 2008a; Pinkham, Hopfinger, Pelphrey et al., 2008b; Tremeau et al., 2016). Two studies were completed solely in the UK (Kirk et al., 2013; Martinez, Agostini, Al-Suhibani et al., 2020), and one study was completed across the UK and Australia (Sutherland et al., 2020). One study was undertaken in Germany (Hillman, Ascone, Kemkensteffen, et al., 2017), and one study was conducted in Canada (Prevost et al., 2015).

Population. The 11 included studies had a total of 2251 participants, of which 1196 were male. The sample sizes ranged from 27 – 1508 participants. Three studies recruited non-clinical samples only whilst one cross-sectional study included a clinical cohort only. The remaining seven studies recruited clinical and non-clinical control groups.

Quality Assessment

The findings of the quality appraisal are presented in Appendix 3. The majority of included studies were found to have “strong” quality (N = 7). Several studies were of

"moderate" quality (N = 3) and one study was of "weak" quality.

Experimental studies. Following consultation with the independent raters, the study by Hillman et al (2017) was deemed to be of "moderate" quality, with confounding variables being strongly controlled for and minimal withdrawals and drop-outs. The sample demographic was deemed not likely representative of the target population, since this was a student population. Consequently, the sample may be subject to selection bias. Hooker et al.'s (2011) study was of "strong" quality, with confounding variables strongly controlled for and study design and data analysis deemed to be of "moderate" quality. The study included a clinical population which was compared with well-matched healthy controls. Neither experimental studies provided details on whether blinding procedures had been used.

Quasi-experimental studies. The majority of the quasi-experimental studies (N = 4) were of "strong" quality (Haut & MacDonald, 2010; Pinkham et al., 2008a; Prevost et al., 2015; Sutherland et al., 2020). All four of these studies strongly controlled for confounding variables, with the study by Prevost et al. (2015) using "strong" data collection methods. Study designs for these four studies were of "moderate" quality with participant samples deemed "somewhat likely" to be representative of the target population. The quasi-experimental study by Pinkham et al. (2008b) was of "moderate" quality as a result of a rating of "weak" on the selection bias sub-category, due to inadequate sample demographic details being available. This study strongly controlled for confounding variables and had "moderate" quality study design and data collection methods. Finally, Kirk et al.'s (2013) quasi-experimental study was of "weak" quality due to poor control of confounding variables, missing information on withdrawals and drop-outs, and missing information on the sample demographics which could increase the risk of selection bias.

Cross-sectional studies. The study by Buck et al. (2016) was of "strong"

quality, with minimal withdrawal and drop-outs and confounding variables strongly controlled for. Study design, data collection methods, selection bias, and blinding all had a rating of "moderate". The study by Martinez et al. (2020) was of "moderate quality" due to one sub-category rating of "weak" regarding the study's design. Data collection methods were of "strong" quality in this study, with confounding variables strongly controlled for. The study by Tremeau et al. (2016) was of "strong" quality. Data collection methods were of "strong" quality with confounding variables strongly controlled for. Study design, blinding, withdrawal and drop-outs, and selection bias were all rated "moderate" in the quality appraisal of this study.

Main Findings

The concept of paranoia. Paranoia has been conceptualised in a variety of ways within the studies included. Some papers have used diagnostic definitions from the DSM-V (2013) (Prevost et al., 2015; Martinez et al., 2020), whilst others have focused on definitions from psychological literature (Haut & MacDonald, 2010; & Kirk et al., 2013; Sutherland et al., 2020). Six studies did not explicitly define paranoia (Buck et al., 2016; Pinkham et al., 2008a; Pinkham et al., 2008b; Hillman et al., 2017; Hooker et al., 2011; & Treameu et al., 2016). The majority of studies appear to agree that paranoia is best understood on a continuum with normal experiences (Hillman et al., 2017; Hooker et al., 2011; Kirk et al., 2013; Martinez et al., 2020; Pinkham et al., 2008).

The included studies have utilised a range of validated measures to operationalise paranoia including clinical measures of psychosis, and state and trait measures of paranoia. Five studies assessed participants using the Positive and Negative Syndrome Scale (PANSS, Kay, Fiszbein, & Opler, 1987), clinical measure of psychosis (Buck et al., 2016; Hooker et al., 2011; Pinkham et al., 2008a; Pinkham et al., 2008b; Tremeau et al., 2016). Two studies assessed participants using the Scale for Assessment

of Positive Symptoms (SAPS, Andreasen, 1983b**)** (Haut et al., 2010; Sutherland et al., 2020). Five studies utilised the Paranoia Scale (Fenigstein & Vanable, 1992) to measure trait paranoia (Kirk et al., 2013; Buck et al., 2016; Pinkham et al., 2008a; Pinkham et al., 2008b; Prevost et al., 2015). One study used the Persecutory and Deservedness Scale Revised (PaDS-R, Melo et al., 2009) to measure trait paranoia (Martinez et al., 2020). The study by Sutherland et al. (2020) measured trait paranoia using the Peters Delusions Inventory (PDI, Peters, Joseph, Day, & Garety, 2004). Finally, the study by Hillman et al. (2017) was the only paper to assess state paranoia using the Paranoia Checklist (PCHL, Freeman et al., 2005).

The concept of trustworthiness. The conceptualisation of trustworthiness does not appear to have been widely defined within many of the included papers; only three papers offer a clear definition (Hooker et al., 2011; Kirk et al., 2013; Prevost et al., 2015). In contrast, the assessment of trustworthiness appears to have been clearly outlined in most papers with validated measures described. The majority of studies (N= 9) asked participants to rate trustworthiness of photographs of real human faces or features. Two studies asked participants to make trustworthiness judgements of computer generated images of faces (Kirk et al., 2013; Martinez et al., 2020).

Of the studies which used photographs of real human faces, three studies used an abbreviated or adapted version of the Adolphs et al. (1998) Trustworthiness/ approachability task (Hooker et al., 2011; Pinkham et al., 2008a; Pinkham et al., 2008b). The study by Buck et al. (2016) used the full Adolphs et al. (1998) trustworthiness/ approachability, task which involves rating black and white images of males and females from diverse ethnic backgrounds on a six-point scale: - 3 (strongly distrust) to + 3 (strongly trust).

Four studies used varying databases of colour photographs of real human faces (Hillman et al., 2017; Haut & MacDonald, 2010; Tremeau et al., 1998; Sutherland et al., 2020). The study by Hillman et al. (2017) asked participants to rate the trustworthiness of neutral face expressions from the Radboud faces database (Langer et al., 2010) on a five-point Likert scale. Haut and MacDonald (2010) asked participants to rate trustworthiness on a five-point Likert scale of faces with neutral expressions from the AR face database (Martinez & Benavente, 1998). Tremeau et al. (2016) used neutral faces from the Karolinska faces data set (Lundqvist et al., 1998) to assess trustworthiness on a five-point Likert scale. Meanwhile Sutherland et al. (2020) asked participants to rate trustworthiness of Caucasian female faces on a nine-point Likert scale.

The study by Prevost et al. (2015) asked participants to rate the trustworthiness of the stimuli from the "Reading the Mind in the Eyes Test" (RMET; Bainbridge, Isola, & Olivia, 2013) using a ten-point Likert scale. Here participants are exposed to only a partial section of the face (the eyes) which should convey a range of different expressions.

The study by Kirk et al. (2013) utilised computer generated faces and required participants to make trustworthiness judgements using a six-point Likert scale. Similarly, Martinez et al. (2020) used computer generated faces from the trustworthiness data set created by Oosterhof & Todorov (2008), asking participants to rate trustworthiness on a seven-point Likert scale.

The relationship between paranoia and trustworthiness judgments. Overall, the existence of a relationship between paranoia and trustworthiness judgments differed across the studies included in this review. Five studies identified a relationship between paranoia and trustworthiness (Buck et al., 2016; Kirk et al., 2013; Martinez et al., 2020;

Pinkham et al., 2008a; Pinkham et al., 2008b), whilst the remaining six studies found no relationship (Haut & MacDonald., 2010; Hillman et al., 2017; Hooker et al., 2011; Prevost et al., 2015; Sutherland et al., 2020; Tremeu et al., 2016). Of those studies which found a relationship, three were quasi-experimental and seeking to assess the relationship through hypothesis testing (Kirk et al., 2013; Pinkham et al., 2008a; Pinkham et al., 2008b). The two remaining studies used cross-sectional designs examining a correlational relationship (Buck et al., 2016; Martinez et al., 2020).

Five of the six studies which did not find a relationship, utilised either a quasi-experimental (Haut & MacDonald., 2010; Prevost et al., 2015; Sutherland et al., 2020) or experimental design (Hillman et al., 2017; Hooker et al., 2011), with the remaining study using a cross-sectional design (Tremeau et al., 2016). Hillman et al. (2016) found no significant main effect of group (clinical versus non-clinical): F (1, 48) = .054, p = .409, or condition (high versus low paranoia): F(1,48) = .644, p = .213, indicating a lack of relationship between paranoia and trustworthiness. Moreover, Sutherland et al. (2020) found no main or interaction effect when comparing clinical and non-clinical groups: F (1, 46) = <0.27, p = .60, indicating that the clinical population did not show lower overall trust. Haut and MacDonald (2010) found that persecutory delusions did not predict trustworthiness ratings: r (63) = 0.018, p = .061, indicating that higher paranoia does not predict lower trustworthiness ratings. Hooker et al. (2010) found no association between trust and paranoia within the neutral priming condition: T (56) = 0.94, p = 0.35, d = 0.25. Tremeau et al. (2015) also found that suspiciousness did not significantly correlate with trust: (ρ = 0.07, p = 0.53). Finally, Prevost et al. (2015) found no significant difference between paranoid patients and healthy controls on trust scale scores P = > .05 (CI = -0.1 – 1.9), nor did they find correlations between paranoia and trust for either group. Overall, these findings suggested there is not a significant relationship between paranoia and trustworthiness of faces.

Within the studies which identified a relationship between paranoia and trustworthiness, all demonstrated a negative relationship, using different statistical analyses. For the quasi-experimental studies, Kirk et al. (2013), Pinkham et al. (2008a), and Pinkham et al. (2008b) found that individuals with higher levels of paranoia rated faces as less trustworthy or untrustworthy more than those with low or no paranoia. In the study by Kirk et al. (2013) a 2 x 3 ANOVA found a significant main effect of paranoid ideation and trustworthiness ratings ($F(1,46) = 7.45$, $p < .01$), with those in the high paranoia group giving lower trust ratings overall ($\bar{x} = 2.83$, SD = .55) compared with individuals in the low paranoia group ($\bar{x}$ 3.16, SD = .49). The effect size calculation revealed a medium effect $d = 0.52$. Using a one-way ANOVA on behavioural ratings of trustworthiness, the study by Pinkham et al. (2008a) found a significant between group difference (control versus ASD versus non-paranoid schizophrenia versus paranoid schizophrenia): $F(3, 44)=2.87$, $p=.047$ with an effect size calculation revealing a large effect $d = 1.01$. Similarly, Pinkham et al. (2008b) found a significant between group difference (control versus non-paranoid schizophrenia versus paranoid schizophrenia): $F(2,33) = 4.58$, $P = .018$ with an effect size calculation revealing a large effect $d = .886$.

The two cross-sectional studies by Buck et al. (2016) and Martinez et al. (2020) both found a negative association between high paranoia and trustworthiness ratings of faces. In the study by Buck et al. (2016), a greater tendency to trust on the Trustworthiness task was negatively associated with self-reported paranoia: $r(218) = -.28$, $p < .001$ with an effect size calculation revealing a medium effect $d = -.58$. Using a regression analysis, Martinez et al. (2020) found that a stronger response bias towards trustworthiness predicted lower paranoia scores $b = -.16$ 95%-CI $[-0.21, -0.11]$, $t(1,118) = -6.36$, $p < .001$ with an effect size calculation revealing a small effect $d = -.408$.

Of the studies which found a relationship between paranoia and trustworthiness, two studies had a large effect size (Pinkham et al., 2008a; Pinkham et al., 2008b). Two studies demonstrated a medium effect size (Buck et al., 2016; Kirk et al., 2013), and one study had a small effect size (Martinez et al., 2020). For the studies that did not find a relationship between paranoia and trustworthiness, two had a small effect size: Haut & MacDonald, (2010) d = .024 and Sutherland et al., (2020) d = <.201. Three studies had a medium effect size; Hillman et al., (2017) d = .063, Hooker et al., (2011) d = .052 and Prevost et al., (2015) d = .55. The study by Treameu et al. (2016) used non-parametric analysis and had a strong Spearman's rho effect size of ρ = .07.

Methodological considerations. Given the findings were mixed, there was some further investigation into whether there were any methodological considerations to explain this variance. This review looked at study quality, operationalisation of the key measures, and study design, and found no clear patterns between these factors and study outcomes. Specifically, high or moderate quality studies did not necessarily determine a relationship between paranoia and trustworthiness. Neither conceptualisation of paranoia using diagnostic definitions or research informed definitions, nor the measures used to operationalise paranoia seemed to contribute to a relationship being found between paranoia and trustworthiness judgements. Similarly the trustworthiness measures used to operationalise trustworthiness judgments of faces did not seem to determine whether a relationship was found.

The study designs selected in the included studies in this review revealed mixed findings in the identification of a relationship between paranoia and trustworthiness judgments. The two experimental studies by Hillman et al. (2017) and Hooker et al. (2011) did not find a significant relationship between paranoia and trustworthiness. In contrast, three quasi-experimental studies (Kirk et al., 2013; Pinkham et al., 2008a;

Pinkham et al., 2008b) found a significant negative relationship between paranoia and trustworthiness judgments, and three quasi-experimental studies found no relationship (Haut & MacDonald, 2010; Prevost et al., 2015; and Sutherland et al., 2020). Both cross-sectional studies found a negative relationship between paranoia and trustworthiness judgments (Buck et al., 2016; Martinez et al., 2020). Finally the cross-sectional study by Tremeau et al. (2016) found no relationship between paranoia and trustworthiness. Accordingly, given that the findings and study designs are mixed, there may be other factors beyond the scope of this review which warrant further investigation in order to better understand the relationship between paranoia and trustworthiness judgements of faces. Further research which ascertains more consistent data on paranoia and trustworthiness, such as a meta-analytic review may be needed and would allow for more rigorous analysis.

Discussion

This systematic review aimed to investigate the relationship between paranoia and trustworthiness judgments of faces. A total of 11 papers were examined in the review. Quality appraisal using the EPHPP (EPHPP, https://merst.ca/ephpp/) tool found that the majority of studies were "strong quality," three studies were "moderate quality," and one study was "weak quality". Paranoia was not consistently conceptualised within the literature, with six studies providing no definition and the remaining studies using a variety of diagnostic definitions or definitions outlined within the psychological literature. Paranoia was assessed using well validated measures across all studies. Only one study sought to assess state paranoia whilst the remaining studies included measures of trait paranoia. The conceptualisation of trustworthiness was not widely defined across the literature, with only three papers providing a clear definition. Trustworthiness of faces was assessed using a range of measures, some of which had been adapted, abbreviated, or had been created as novel tasks.

The findings of this review indicate that the existence of a relationship between paranoia and trustworthiness judgements of faces remains unclear. The majority of studies did not find a significant relationship between the two variables of interest. Of those studies which did identify a relationship, the direction was found to be negative for all studies. Overall the mixed findings indicate that it is not possible to confirm whether or not a relationship between paranoia and trustworthiness judgments of faces exists.

There are many possible reasons why the findings of this review were mixed regarding the relationship between paranoia and trustworthiness judgements of faces. This systematic review looked at the conceptualisation of paranoia to explore whether this influenced whether a relationship between the two variables of interest was identified. Diagnostic definitions, research informed definitions, and the absence of a clear definition were examined, and there were no clear patterns found between a clear conceptualisation and a relationship being identified. Similarly, this review looked at the conceptualisation of trustworthiness, including the absence or presence of a clear definition, and found no pattern between this and whether a relationship was found between paranoia and trustworthiness judgements of faces.

This heterogeneity in conceptualisations of paranoia and trustworthiness may account for differences between studies with regard to the relationship found between these two variables. At the individual level, Onen (2016) argues that "inappropriate conceptualisation," or "misconceptualisation," may result in something else being studied and reported on, beyond what a researcher purports to have studied. For those studies where conceptualisations are absent, it is not possible to ascertain whether they have meaningfully answered the question regarding whether a relationship between paranoia and trustworthiness judgements of faces exists, as there is no working

agreement about what these concepts are and therefore what its outcome could mean (Onen, 2016). Sequeira (2014) proposes five phases in the process of conceptualisation: 1) forming concepts, 2) definition, 3) indicator selection, 4) operationalisation, and 5) observations (or measurements). These phases work in a cyclical pattern through a process of explication, where researchers seek to move from definition to measurement and back to definition (Sequeira, 2014). Within the studies included in this review, this cyclical process of explication regarding the conceptualisation of paranoia and trustworthiness does not appear to have been described or followed. Consequently, not only is there a risk that the concepts may not be easily understood by the reader, but also the inadequate conceptualisation may have implications on the accuracy of measurement of these two variables and therefore on interpretation of outcomes.

As previously discussed, the operationalisation of paranoia and trustworthiness judgements of faces regarding the assessment/measurement of these concepts was reasonably described within the included studies. Overall the majority of studies reported using well validated measures of paranoia and trustworthiness of faces, and were able to reflect on their observations of these measurements in relation to outcomes. However, it is important to treat the outcomes of the included studies with caution due to the issues previously discussed in the explication of the conceptualisation of paranoia and trustworthiness of faces (Sequeira, 2014).

Systematically reviewing studies which have used different conceptualisations and operationalisation of paranoia and trustworthiness is challenging, as the data may be less consistent for direct comparison. It is unclear whether the included studies are measuring paranoia and trustworthiness of faces in the same way as each other, and there is no clear pattern between the absence or presence of conceptualisation and the effect sizes found within the literature. The heterogeneity in the measurement of these

concepts meant that it was not possible to undertake a meta-analysis in this review, and indicates that further research is needed with more consistent data for this type of analysis in the future.

This review found significant variation in study quality. This did not appear to have an impact on detecting a significant relationship between paranoia and trustworthiness judgments of faces. Consequently, studies with higher quality did not necessarily result in detecting significant findings. Reviewing studies of varying quality impacts the ability to compare results and draw meaningful conclusions regarding the relationship between the two variables of interest.

The study designs in the included studies were examined to explore whether those with stronger quality designs, such as experimental and quasi-experimental studies, were more likely to establish the presence of a relationship between paranoia and trustworthiness judgments of faces. Both studies which used an experimental design did not identify a relationship (Hillman et al., 2017; Hooker et al., 2011). Similarly three quasi-experimental studies did not establish a relationship between paranoia and trustworthiness judgements of faces (Haut & MacDonald, 2010; Prevost et al., 2015; Sutherland et al., 2020).

The majority of studies (N = 10) did not report undertaking a power calculation, and many included small sample sizes. This is likely to have affected their power to determine whether a significant effect exists. It is possible that the absence of a relationship in some studies may be due to small sample sizes and lack of power. Two cross-sectional studies had larger sample sizes and detected a significant relationship between paranoia and trustworthiness judgements of faces (Buck et al., 2016; Martinez et al., 2020). Therefore, studies with greater power may have had an increased chance of detecting a significant effect.

There was significant heterogeneity between studies regarding the use of both clinical and non-clinical populations. Three studies assessed the relationship in non-clinical populations only (Hillman et al., 2017; Kirk et al., 2013; Martinez et al., 2020). One study assessed clinical populations only, using a cross-sectional design (Buck et al., 2016). Finally, seven studies sought to compare clinical populations with healthy controls (Haut & MacDonald., 2010; Hooker et al., 2011; Pinkham et al., 2008a; Pinkham et al., 2008b; Tremeau et al., 2016; Prevost et al., 2015; Sutherland et al., 2020). This impacts the ability to compare results between studies and therefore to draw conclusions regarding the relationship between paranoia and trustworthiness judgments of faces.

The majority of studies did not utilise measures of mood and other psychological difficulties, and were therefore unable to consider these as potential confounding variables. It is feasible that comorbidities with other psychological and relational difficulties may influence an individual's experiences of paranoia and trustworthiness judgments, as well as the relationship between these. Future research should aim to include measures of mood and other psychological difficulties, such as anxiety and attachment insecurity, in order to assess the impact of these variables on paranoia and trustworthiness judgments of faces.

In the context of Signal Detection Theory (SDT; Swets et al., 2000), response bias may lead to a wider attribution of untrustworthiness (threat) and narrower attribution for trustworthiness (non-threat) or vice versa (Haselton & Buss, 2000; Martinez et al., 2020). Psychological research has indicated that employing a liberal response bias towards untrustworthy stimuli may serve as an evolutionary adaptive strategy designed to "reduce more costly outcomes" when faced with uncertain and complex environments, e.g. by perceiving a non-trustworthy face as trustworthy (Haselton & Buss, 2000; Haselton & Nettle, 2006). Furthermore, studies have shown

that individuals experiencing paranoia appear to demonstrate a liberal response bias when detecting different emotions and threat in studies on face perception (Westermann & Lincoln, 2010; Tsoi et al., 2008). The mixed findings regarding the relationship between paranoia and trustworthiness judgements of faces in this review may be connected to the use of raw judgement of trustworthiness within data analysis. An alternative approach, taken by Martinez et al. (2020), is to consider judgements of trust within a signal detection framework in which they can be analysed in terms of response bias and sensitivity. Future research may benefit from using signal detection analysis to disambiguate any future data.

In contrast to SDT, neuropsychological research indicates that individuals with higher paranoia, such as those within clinical populations, appear to demonstrate more conservative judgements when detecting threat in judgements of faces (Chambon, Baudouin, Franck, 2006; Combs, Michael, & Penn, 2006). These judgements may be indicative of a global cognitive deficit in facial emotion processing, particularly in individuals with schizophrenia (Chambon et al., 2006). Several studies have suggested that a conservative response bias may indicate deficits in Theory of Mind (ToM), including understanding the emotions, thoughts, intentions, and mental states of others (Frith, 2004; Mehl, Rief, Lullmann, & Lincoln, 2010). It is possible that the mixed findings in this review regarding the existence of a relationship between paranoia and trustworthiness judgements of faces could potentially be explained by a conservative response bias.

A conservative response bias may alternatively be explained by Mogg, Bradley, Miles, & Dixon's (2004) vigilance-avoidance model, which describes a cognitive bias which presents in anxiety. The vigilance-avoidance model proposes that, after early exposure to threat cues, individuals experiencing anxiety seek to strategically divert their attention away from threat as part of an avoidant emotion regulation strategy, in

order to reduce the anxiety experienced. Previous research has indicated that adults and young people experiencing increased vigilance to threat as a result of anxiety may demonstrate some avoidant attentional patterns in the latter stages of stimuli exposure or in real world settings (Bogels and Mansell, 2004; Price, Allen, Silk et al. 2016). Accordingly, measuring anxiety as potential mediating variable influencing individuals' judgements of faces may be of value.

Overall it is conceivable that the mixed findings regarding the relationship between paranoia and trustworthiness judgements in this review may be reflective of differing response biases. The literature discussed here has sought to explore the differing psychological theories which may underpin these biases, including defensive (Martinez et al., 2020), cognitive (Westermann & Lincoln, 2010), and neuropsychological (Chambon et al., 2006) models. Understanding the competing explanations offered by these psychological theories may help further our understanding around what leads to trustworthiness from a decision making perspective. Future reviews should seek to explore the role of response biases in trustworthiness judgments of faces in individuals with subclinical and/or clinical paranoia.

Critique and implications for future research

The current review has several strengths regarding its methodology. Papers were independently screened and data extracted by two researchers. Both researchers consulted regarding which studies met inclusion and exclusion criteria. This is a recommendation of good practice from the SIGN checklist (Shea et al., 2007) for systematic review and meta-analysis. Study quality was also independently rated by two researchers, with high interrater reliability increasing rigour of the review.

The findings within this review should be interpreted with caution due to the limitations of the studies included. The heterogeneity between studies regarding study

design, analysis, and quality, present challenges in reliably synthesising the relationship between paranoia and trustworthiness judgements of faces. Furthermore, the heterogeneity between the studies regarding the use of clinical and non-clinical samples and the measurement and conceptualisation of paranoia meant that a meta-analysis was not viable. In addition, due to the small number of studies a meta-analysis was not appropriate because there would not be enough studies which could be clustered for sub-group analysis. Although a meta-analysis was not possible, this systematic review synthesised the effect sizes of the included studies. Reviewing individual effect sizes is of value, as this enables the reader to determine the magnitude of an effect and decide whether it is clinically relevant (Aarts, van den Akker, & Winkens, 2014). In addition, reporting effect sizes is useful in determining sample sizes for future research (Aarts et al., 2014)

The evidence base examining the relationship between paranoia and trustworthiness judgements of faces remains small, presenting further challenges for drawing meaningful conclusions. Future research should seek to use consistent conceptualisations and measures of paranoia and trustworthiness of faces to enable more direct comparisons of studies. Use of consistent measures would make comparison across studies more viable. Many of the included studies in this review did not screen for mood or other mental health difficulties which may influence paranoia. Therefore future studies should seek to include measures of mood to control for this as a potential confounding variable. In addition, all studies included in this review were conducted in developed countries with Western cultures which may limit the generalisability of the findings to countries with non-Western cultures.

Only three studies included in this review sought to examine the relationship between paranoia and trustworthiness judgements of faces in non-clinical samples only.

Undertaking research with non-clinical samples using an analogue model may be of value. Campbell and Mark (2015) state that analogue designs allow for conceptual and theoretical explication. Furthermore, analogue studies enable researchers to test hypotheses whilst implementing a higher degree of experimental control that allows for variables of interest to be isolated and stronger causal conclusions to be made (Campbell & Mark, 2015).

Clinical implications

Several of the studies included in this review indicated that a negative relationship exists between paranoia and trustworthiness judgements of faces. This indicates that paranoia may adversely effect trustworthiness judgements of others. Paranoia, even at the subclinical level, is still associated with distress, social isolation, and feelings of powerlessness (Freeman et al., 2005). Trust meanwhile is considered to be essential to social, emotional, and economic wellbeing (Thielmann & Hillbig, 2015; Poulin & Haase, 2015; Rempel, Holmes, & Zanna, 1985; Zak & Knack, 2001; Prevost, Brodeur, Onishi et al., 2015). Due to the potential relationship between paranoia and trustworthiness judgments of faces, clinical interventions which seek to decrease paranoia are necessary. By decreasing paranoia it may be possible to increase trust, which is thought to be imperative for successful development across the life span (Poulin & Haase, 2015).

In the field of clinical psychology, trust serves as an essential component within the development of a strong therapeutic alliance and relationship (Cromer, Denneson, Pisciotta et al., 2017). Numerous studies have found that a strong therapeutic relationship and alliance between service user and clinician can improve health outcomes (Birkhauer, Gaab, Kossowsky et al., 2017; Crits-Christoph, Rieger, Gaines et al., 2019; Cromer, Denneson, Pisciotta et al., 2017; Fletcher-Tomenius & Vossler,

2009). A study by Goldsmith, Lewis, Dunn et al. (2015) found that the therapeutic alliance is causal in determining symptomatic outcome in CBT for psychosis. In addition, research has indicated that when service users have higher trust with clinicians they report experiencing fewer symptoms, increased engagement in beneficial health behaviours, and a higher overall quality of life (Birkhauer, Gaab, Kossowsky et al., 2017). Increased trust in clinicians has also been found to be associated with increased satisfaction with treatment (Birkhauer, Gaab, Kossowsky et al., 2017). Given that increased trust appears to be central to therapeutic relationships, mental health outcomes, and intervention satisfaction, understanding the potential impact of psychological difficulties such as paranoia on the development of trust seems critical in providing effective assessment and treatment within mental health services.

Conclusion

This systematic review has been the first review to look at the relationship between paranoia and trustworthiness judgements of faces. The findings regarding this relationship were generally mixed, therefore an established relationship between the two variables cannot be confirmed within the scope of this review. Conceptualisation and operationalisation of paranoia and trustworthiness of faces were examined to determine whether these processes influenced the existence of a relationship. However, no patterns were identified between these factors and a relationship between paranoia and trustworthiness judgements of faces. The use of different study designs was explored in relation to the two variables of interest. No clear patterns were found in relation to study designs and outcomes. Similarly the effect of study quality did not appear to influence whether a relationship between paranoia and trustworthiness judgements of faces was identified. The heterogeneity between studies means that firm conclusions cannot be drawn from reviewing the current literature base. However this review contributes

significantly to the current evidence base examining a relationship between paranoia and trustworthiness judgements of faces, providing directions for future research and implications for clinical practice.

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Appendix 1: Systematic Review Protocol

Review Title: The relationship between paranoia and mistrust: A systematic review.

Anticipated start date: 18/08/2020

Anticipated completion date: 28/02/2021

Named contact: Miss Gina Willis

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Organisation affiliation of the review: University of Sheffield

Review team member, role and their organisational affiliations:

Miss Gina Willis, Lead researcher, University of Sheffield

Mr Anton Martinez, Independent researcher for literature searches and quality assessment, University of Sheffield

Professor Richard Bentall, Lead research supervisor, University of Sheffield

Dr Georgina Rowse, Co-supervisor

Funding sources/ sponsors: University of Sheffield

Conflict of interest: None

Review question:

Population: Individuals with experiences of clinical or subclinical paranoia

Intervention: N/A

Comparison: Non-clinical

Outcome: Mistrust (e.g. interpersonal, perceptual).

Aim: To explore the relationship between paranoia and trustworthiness judgements of faces in clinical and non-clinical populations.

Searches:

Bibliographic databases: PsychINFO, MEDLINE, Scopus

Forward citation and backward chain searches of eligible studies.

Search dates: From: 28/08/20 To: 04/09/20

Restrictions: English language papers only, Publication dates - From: 01/01/1980 To: 30/09/2020

Condition or domain being studies:

Mental health. Clinical Psychology. Paranoia. Paranoid delusions.

Participants/population:

Inclusion criteria: adults aged 18 years or over with reported experiences of paranoid beliefs/ delusions in clinical (i.e. paranoid schizophrenia) and subclinical populations.

Exclusion criteria: Adults with organic impairments (i.e. dementia), neurodevelopmental disorders (i.e. learning disabilities, ASD, ADHD/ADD), and chronic long-term physical health conditions. Adolescents and children under 18 years of age will also be excluded.

Intervention(s), exposure(s):

This review will be focussing on the association between mistrust and paranoia. For this purpose we will be looking at studies which have employed: experimental designs, quasi-experimental design (non-clinical control versus paranoid group), and cross-sectional design (studies measuring paranoia and mistrust).

Comparator(s)/ control:

Comparator/control: non-clinical control group or low paranoia group.

Types of study to be included:

Included design: Quasi-experimental designs, cross-sectional designs, and experimental designs.

Excluded designs: Clinical case reports, qualitative studies.

Main outcome(s):

The main outcome is mistrust, we expect that individuals with paranoia will report higher levels of mistrust operationalised as face perception or measured with self-report instruments/ questionnaires.

Measures of effect:

This review will look at measures of effect for our main outcome: for correlational studies I will look at correlation coefficients, r squared, or odds ratios. For comparative studies I will look at either Cohen's d or Eta squared (or partial eta squared) effect sizes. Where possible all effect sizes will be converted into Cohen's d effect sizes.

Additional outcomes:

Conceptualisation and operationalisation: This review will examine how the included papers have conceptualised and operationalised the variables of interest (paranoia and mistrust) and the impact of these on the relationship between paranoia and mistrust.

Study quality: This review will assess whether study quality influences the identification of a relationship between paranoia and mistrust.

Data extraction (selection and coding):

Study selection:

1. Two independent reviewers will conduct the study searches and include studies based on the eligibility criteria.
2. Disagreements will be resolved by team discussions around the eligibility criteria and design of the studies.
3. The software for recording decisions will be Microsoft Excel.

Date extraction:

1. We will extract the: year of publication, sample size of the study (N=), demographics of the sample (gender, country of origin, clinical or non), design, dependent and independent variables, measurements used, and statistics (measurement of association: effect size, direction of relationship).
2. Two independent reviewers will extract and check received data.
3. Microsoft Excel will be used to record the data.
4. Where possible in case of missing data contact will be made with the study authors to request the missing information.
5. Mendeley will be used as the data extraction and management software.

Risk of bias (quality) assessment:

The Effective Public Health Practice Project (2020) quality assessment tool for quantitative studies will be used to appraise the quality of the included studies. The components assessed will include: selection bias, study design, confounders, blinding, data collection methods, withdrawal and drop out, and analysis. This will be done by two independent reviewers and disagreements resolved by discussion meetings with the wider research team.

Strategy for data synthesis:

The search terms for this review will be organised using the PICO framework (Population/Intervention/Comparator/Outcome) (Methley et al., 2014). Synthesis without meta-analysis (SWiM, Campbell et al., 2020) reporting guidelines will be used to inform the synthesis of data and structure of this review.

This review will synthesise the following data: study characteristics (study design, setting, population, and measures), quality assessment of included studies,

conceptualisation of paranoia and mistrust, operationalisation of paranoia and mistrust, and the relationship between paranoia and mistrust (correlation or effect).

Analysis of subgroups or subsets:

1. Analysis of subgroups: clinical groups versus subclinical groups experiencing paranoia, or those with low subclinical paranoia versus high subclinical paranoia.
2. A test of interaction between groups will be used as the planned analytical approach.

Type and method of review: Systematic review.

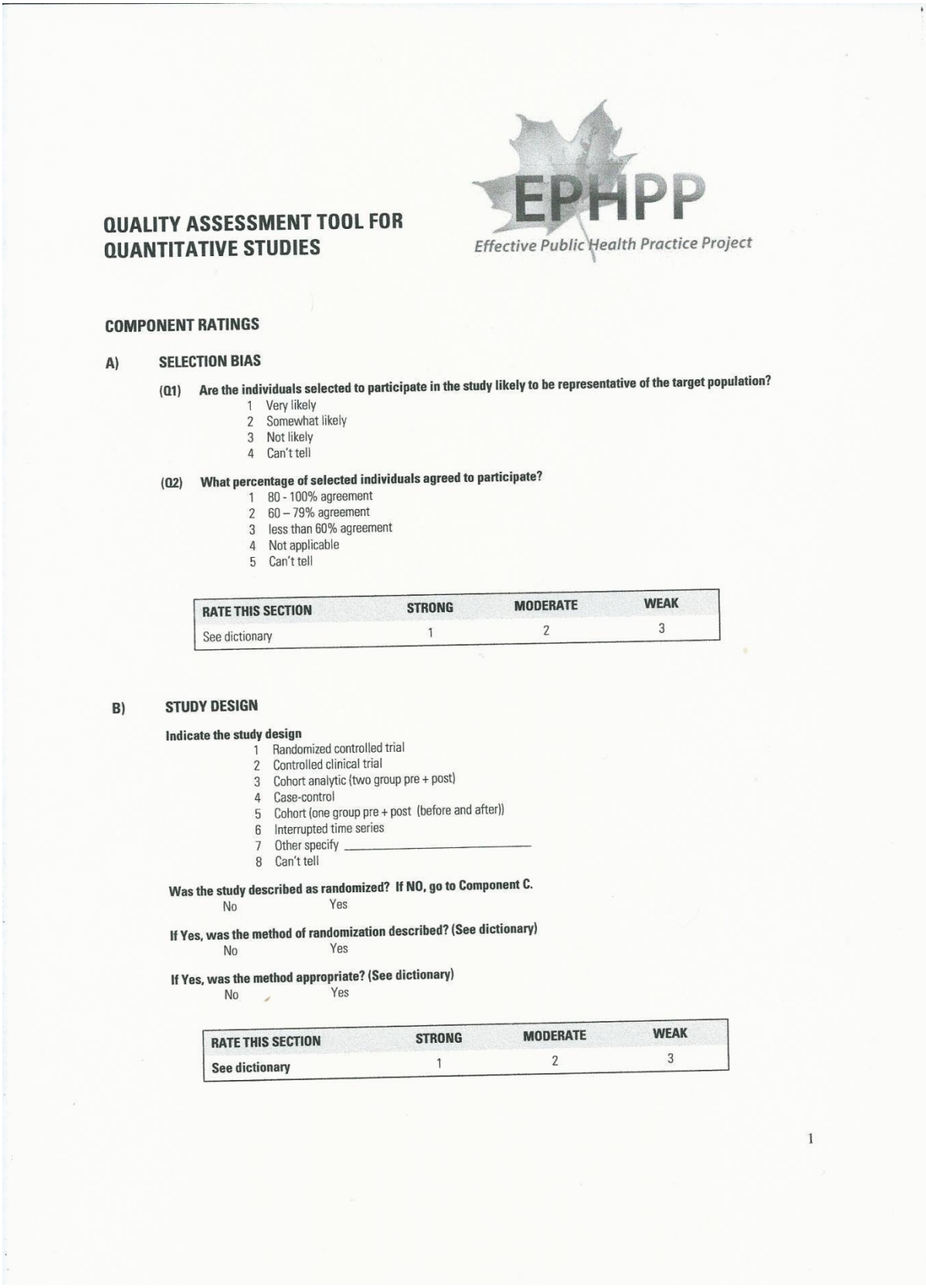
Health area of the review: Mental health and behavioural conditions.

Language: English language.

Country review is being conducted in: England

Keywords: Paranoia; Mistrust; Interpersonal mistrust; Psychosis; Paranoid delusions; Paranoid beliefs.

Appendix 2: Effective Public Health Practice Project Quality Assessment Tool for Quantitative studies



QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

EPHPP
Effective Public Health Practice Project

COMPONENT RATINGS

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

1 Very likely
2 Somewhat likely
3 Not likely
4 Can't tell

(Q2) What percentage of selected individuals agreed to participate?

1 80 - 100% agreement
2 60 – 79% agreement
3 less than 60% agreement
4 Not applicable
5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

B) STUDY DESIGN

Indicate the study design

1 Randomized controlled trial
2 Controlled clinical trial
3 Cohort analytic (two group pre + post)
4 Case-control
5 Cohort (one group pre + post (before and after))
6 Interrupted time series
7 Other specify _____
8 Can't tell

Was the study described as randomized? If NO, go to Component C.

No Yes

If Yes, was the method of randomization described? (See dictionary)

No Yes

If Yes, was the method appropriate? (See dictionary)

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

1

C) CONFOUNDERS

(Q1) Were there important differences between groups prior to the intervention?

1 Yes
2 No
3 Can't tell

The following are examples of confounders:

1 Race
2 Sex
3 Marital status/family
4 Age
5 SES (income or class)
6 Education
7 Health status
8 Pre-intervention score on outcome measure

(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?

1 80 – 100% (most)
2 60 – 79% (some)
3 Less than 60% (few or none)
4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

D) BLINDING

(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?

1 Yes
2 No
3 Can't tell

(Q2) Were the study participants aware of the research question?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown to be valid?

1 Yes
2 No
3 Can't tell

(Q2) Were data collection tools shown to be reliable?

1 Yes
2 No
3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

F) WITHDRAWALS AND DROP-OUTS

(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?

1 Yes
2 No
3 Can't tell
4 Not Applicable (i.e. one time surveys or interviews)

(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell
5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

G) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

1 80 -100%
2 60 - 79%
3 less than 60%
4 Can't tell

(Q2) Was the consistency of the intervention measured?

1 Yes
2 No
3 Can't tell

(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?

4 Yes
5 No
6 Can't tell

H) ANALYSES

(Q1) Indicate the unit of allocation (circle one)

community organization/institution practice/office individual

(Q2) Indicate the unit of analysis (circle one)

community organization/institution practice/office individual

(Q3) Are the statistical methods appropriate for the study design?

1 Yes
2 No
3 Can't tell

(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

1 Yes
2 No
3 Can't tell

GLOBAL RATING

COMPONENT RATINGS
Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

A	SELECTION BIAS	STRONG	MODERATE	WEAK	
		1	2	3	
B	STUDY DESIGN	STRONG	MODERATE	WEAK	
		1	2	3	
C	CONFOUNDERS	STRONG	MODERATE	WEAK	
		1	2	3	
D	BLINDING	STRONG	MODERATE	WEAK	
		1	2	3	
E	DATA COLLECTION METHOD	STRONG	MODERATE	WEAK	
		1	2	3	
F	WITHDRAWALS AND DROPOUTS	STRONG	MODERATE	WEAK	
		1	2	3	Not Applicable

GLOBAL RATING FOR THIS PAPER (circle one):

1	STRONG	(no WEAK ratings)
2	MODERATE	(one WEAK rating)
3	WEAK	(two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No Yes

If yes, indicate the reason for the discrepancy

1	Oversight
2	Differences in interpretation of criteria
3	Differences in interpretation of study

Final decision of both reviewers (circle one):

1	**STRONG**
2	**MODERATE**
3	**WEAK**

Appendix 3: Quality assessment table

Study Year	Selection bias			Study design					Confounders			Blinding			Data collection methods			Withdrawal & drop out			Intervention integrity			Analyses				Final Global rating		
	Q1	Q2	Rating	Q1	Q2	Q3	Q4	Rating	Q1	Q2	Rating	Q1	Q2	Rating	Q1	Q2	Rating	Q1	Q2	Rating	Q1	Q2	Q3	Q1	Q2	Q3	Q4	S	M	W
Hillman et al. (2017)	3	1	3	3	1	n/a	n/a	2	1	1	1	1	2	2	1	1	1	1	1	1	4	1	3	4	4	1	3		X	
Kirk et al. (2013)	3	5	3	3	1	n/a	n/a	2	1	3	3	3	3	2	1	1	1	2	4	3	4	3	6	4	4	1	3			X
Martinez et al. (2020)	2	2	2	7	1	n/a	n/a	3	2	n/a	1	1	2	2	1	1	1	1	2	2	4	3	6	4	4	1	3		X	
Buck et al. (2016)	2	1	2	6	1	n/a	n/a	2	2	n/a	1	3	3	2	1	3	2	1	1	1	4	3	6	4	4	1	1	X		
Haut & MacDonald. (2010)	2	5	2	4	1	n/a	n/a	2	2	n/a	1	3	3	2	1	3	2	4	5	2	4	3	6	4	4	1	1	X		
Hooker et al. (2011)	2	4	2	4	1	n/a	n/a	2	1	1	1	3	3	2	1	3	2	4	5	2	4	3	6	4	4	1	1	X		
Pinkham et al.	2	4	2	4	1	n/	n/	2	1	1	1	3	3	2	1	3	2	4	5	2	4	3	6	4	4	1	1	X		

(2008a)						a	a																						
Pinkham et al. (2008b)	4	4	3	4	1	n/a	n/a	2	1	1	1	3	3	2	1	3	2	4	5	2	4	3	6	4	4	1	1		X
Tremeau et al. (2016)	2	4	2	4	1	n/a	n/a	2	1	1	1	3	3	2	1	1	1	4	5	2	4	3	6	4	4	1	1	X	
Prevost et al. (2015)	2	4	2	4	1	n/a	n/a	2	1	1	1	3	3	2	1	1	1	4	5	2	4	3	6	4	4	1	1	X	
Sutherland et al. (2020)	2	4	2	4	1	n/a	n/a	2	2	n/a	1	3	3	2	1	3	2	4	5	2	4	3	2	4	4	1	1	X	

Note. 1 = Rating of strong; 2 = Rating of moderate; 3 = Rating of weak

Section 2: Research Report

Testing the effect of associative conditioning on trust and implicit self-esteem

Abstract

Objectives

Research shows that negative self-esteem is associated with severe mental health difficulties such as depression and paranoia. Paranoia has also been associated with mistrust and insecure attachment styles, which are thought to interact with negative self-esteem. This study aimed to explore whether an evaluative conditioning paradigm would increase implicit self-esteem and trust and therefore decrease paranoia and depression experiences.

Method

This analogue study used a pre- and post-experimental design. 211 participants were randomly allocated to either the experimental evaluative conditioning intervention or the control condition, with an equivalent classical conditioning task via the online Gorilla platform. Baseline trait measures of psychological difficulties and attachment were completed alongside pre- and post- measures of implicit and explicit self-esteem, paranoia, trust, and attachment.

Results

The evaluative conditioning paradigm was found to improve implicit self-esteem, although this did not decrease subclinical paranoia and depression or improve trustworthiness judgements of faces. Explicit self-esteem appeared to marginally increase for both the experimental and control conditions. Unexpectedly, attachment anxiety deteriorated following the evaluative conditioning paradigm.

Conclusion

Contrary to psychological research and theory, this study suggests that increasing implicit self-esteem does not reduce paranoia and depression or improve trustworthiness

judgements of faces. Future research is necessary to replicate the findings of this study and to ascertain whether these remain when tested with a clinical sample. Clinical implications and suggestions for future research are discussed alongside the strengths and limitations of this study.

Key words: implicit self-esteem, paranoia, evaluative conditioning, trust.

Practitioner points

- Implicit conditioning interventions are currently under-researched and not well understood, despite associative processes impacting many areas of human psychology and functioning.
- Further research is needed to test the efficacy of implicit conditioning interventions and the role they may play in different psychological mechanisms before practice based research can be translated into clinical practice.

Introduction

The experience of paranoia has been described as holding exaggerated or unrealistic ideas that others wish us harm intentionally, and is thought to serve as a heuristic to manage uncertainty during increased stress or threat (Corcoran, Cummins, & Rowse et al., 2006; Freeman, 2007; Freeman & Freeman, 2008; Freeman & Garety, 2000; Raihani & Bell, 2019; Preti & Cella, 2010). Paranoia may be activated by various psychological difficulties and distress and is associated with complex mental health difficulties (Bentall, Rowse, & Shyrane et al., 2009; Freeman, 2007). Paranoia symptoms have been particularly linked to, and are thought to be maintained by, impaired self-esteem (Bentall, Rowse, Kindermann, et al., 2008; Freeman & Garety, 2014; Kesting & Lincoln, 2013; Lopez, Valiente, Varese et al.,2018; Thewissen, Bentall, Lecomte et al., 2008; Udachina, Thewissen, Myin-Germeys et al., 2009; Valiente, Cantero, Vazquez, et al., 2011; Vorontsova, Garety, & Freeman, 2013). Research has also shown that subclinical paranoia is associated with perceptions of distrust towards unfamiliar faces (Kirk, Gilmore, and Dudley, 2013).

Self-esteem is the evaluative process by which an individual understands their own attributes, capabilities, and worth (Hayes & Stratton, 2012; Hahn & Gawronski, 2015). Our evaluations of ourselves can be influenced by our own internal working models of self and others, including our attachment style development (Bowlby, 1980; Sitko, Varese, Sellwood, Hammon, & Bentall, 2016).

Self-esteem is disaggregated into two types: implicit and explicit (Greenwald & Banaji, 1995; Grumm, Nestler, & von Collani, 2009). Explicit self-esteem is thought to be conscious and deliberative (Grumm, et al., 2009) and is measured using brief self-report questionnaires (Lopez et al., 2018). Current recommended interventions such as CBT for mental health issues tend to work at the explicit level (Lopez et al., 2018).

Implicit self-esteem meanwhile, is considered to be an automatic process of self-evaluation (Dijksterhuis, 2004; Greenwald and Farnham, 2000) based around self-associated and self-dissociated objects (Greenwald & Banaji, 1995) that must be assessed indirectly. The current reliable and valid measures of implicit self-esteem (Bosson, Swann, & Pennebaker, 2000) are the Name Letter preference Task (NLT; Nuttin, 1985) and the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). At present there are no widely used clinical interventions which currently target the psychological mechanisms behind implicit self-esteem and trust.

There are a number of definitions of trust. Mayer, Davis, & Schoorman (1995) identify three components: 1) uncertainty and risk on the part of the trustor, 2) expectation that the trustee will act in the trustor's interest, and 3) that the trustor will accept personal vulnerability. Each day, individuals encounter numerous people where judgements of trustworthiness must be made rapidly without effortful deliberation (Sutcliffe, Dunbar, Binder, & Arrow, 2012). Trustworthiness of others based on facial appearance alone has been found to be judged automatically, which can have important implications on social outcomes ranging from electoral success to sentencing decisions (Oosterhof and Todorov, 2008; Todorov, Pakrashi, and Oosterhof, 2009). A recent study by Tso et al. (2015) found that paranoid patients had heightened sensitivity to threat-related facial cues. Research has shown that paranoia is associated with the perception that unfamiliar faces are untrustworthy in subclinical samples (Kirk, Gilmore, and Dudley, 2013). These findings indicate that making trustworthiness judgments when briefly exposed to novel faces may be an implicit process which is affected in paranoia. Furthermore, a study in a large general population sample found that a bias towards mistrust mediated the association between insecure attachment styles and paranoia (Martinez, Rowse, & Milne et al., 2020).

It has been suggested that trust or mistrust may arise from attachment insecurity

(Berry, Barrowclough, & Wearden 2007; Fett et al., 2016; Fonagy, Gergely, and Target, 2007). Attachment is the "deep and enduring emotional bond that connects one person to another across time and space" (Ainsworth, 1973; Bowlby, 1969). The internalised representations we hold with our primary caregivers help form our working models of self and others which guide our interpersonal behaviour (Bowlby, 1980; Shaver & Mikulincer, 2005). Our attachment styles are present throughout our life course and may be secure or insecure depending on our early developmental experiences. Research has indicated that attachment styles can fluctuate during adulthood (Davila, Burge, & Hammen, 1997; Pinquart, Feubner, & Ahnert, 2013; Zhang & Labouvie-Vief, 2004). Insecure attachment styles can negatively affect emotional and physiological development, which can persist into later life and impact psychosocial functioning (Bretherton, 1985; Bretherton, 1992; Gerhardt, 2004; Kobak and Sceery, 1988). The association between insecure attachment styles and psychological difficulties such as paranoia and low mood have been found to be mediated by negative self-esteem in a number of cross-sectional studies (Lee & Hankin, 2009; Roberts, Gotlib, & Kassel, 1996; Pickering, Simpson, & Bentall 2008; Ringer et al., 2014; Wickham, Sitko, & Bentall, 2015).

Research has found that self-esteem is related to recovery in psychosis (Lysaker, Ringer, Maxwell, McGuire, & Lecomte, 2010). Specifically, impaired self-esteem has been associated with more severe positive symptoms (Bentall et al., 2008; Kesting & Lincoln, 2013; Smith et al., 2006). Additionally, it has also been identified as a mediator in the impact of positive symptoms in subjective recovery and as an overall determinant in recovery (Morrison et al., 2013). Meta-analyses and longitudinal studies have consistently found that low self-esteem contributes to depression through the vulnerability model which may result from interpersonal and intrapersonal psychological pathways (Sowislo & Orth, 2013). Research has found a theoretical link

between reassurance seeking, negative feedback seeking, and rumination, with low self-esteem and depression (Evraire & Dozois, 2011; Kuster, Orth, & Meier, 2012; Sowislo & Orth, 2013).

Evaluative conditioning may be a paradigm that can improve implicit self-esteem and trust. Evaluative conditioning is a form of classical conditioning (Pavlov, 1941) that involves a change in our evaluative responses (judgments) to a conditioned stimulus as a result of repeated pairings to an unconditioned stimulus. Previous research by Baccus, Baldwin & Packer (2004) demonstrated an immediate increase in implicit self-esteem in a student sample using a computer based evaluative conditioning intervention in which self-relevant words were repeatedly paired with smiling faces (positive stimuli). More recently, a study by Lopez et al. (2018) using an Experience Sampling Method (ESM) found students with high paranoia levels saw a decrease in their subclinical psychotic symptoms following an evaluative conditioning task, but not a decrease in paranoia scores specifically. These findings in non-clinical participants show promise for testing the manipulation's effect in broader symptoms of mental health difficulties (e.g. low mood and paranoia) and possible underlying mechanisms (e.g. attachment and trust).

Due to the current literature base demonstrating varied results, it seems important to further explore the role of manipulating implicit self-esteem and trust and its impact on psychological difficulties. Assessing the utility of manipulating implicit self-esteem within an analogue sample is of value within the research process. Analogue study designs enable conceptual and theoretical explication, permitting researchers to assess hypotheses and exercise experimental control, allowing for variables of interest to be isolated and stronger causal inferences to be made (Campbell & Mark, 2015).

Currently there is no research which measures the effect of evaluative conditioning on both implicit self-esteem and trust. This study will contribute to the

evidence base on implicit self-esteem, trust, and psychological difficulties. This could help to determine possible novel therapeutic interventions for improving key psychological mechanisms thought to be linked with psychological difficulties. Using computer-generated avatar faces created by Oosterhof and Todorov (2008), the proposed study will explore whether perceptions of the trustworthiness of faces improves following an evaluative conditioning task which seeks to improve implicit self-esteem and trust.

The study also aims to explore the relationship between implicit and explicit self-esteem, trust, paranoia, attachment security, and mood. Insecure attachment has been found to be specifically associated with paranoia (Pickering et al., 2008; Sitko et al., 2014; Sitko et al., 2016; Wickham et al., 2015) and depression (Sowislo & Orth, 2013). Accordingly, we would expect that insecure attachment, and higher levels of paranoia and depression, would be associated with low implicit self-esteem and low trust at baseline.

Aims

1) To establish, as a replication, whether a brief online intervention can change implicit self-esteem.
2) To employ the manipulation of implicit self-esteem in a causal interventionist design to establish whether this has a positive impact on trust, paranoia and explicit self-esteem.
3) To explore whether insecure attachment is associated with low implicit self-esteem and low trust at baseline, and whether this predicts responsiveness to the evaluative conditioning task.

Hypotheses

1) Evaluative conditioning will improve implicit self-esteem and reduce paranoia and depression.
2) Evaluative conditioning will have a positive effect on trustworthiness judgements and explicit state measures of attachment and self-esteem.
3) Implicit self-esteem, attachment styles, and trust will be highly intercorrelated at baseline.

Method

Ethics

Ethical approval for this study was obtained from the University of Sheffield's Department of Psychology Research Ethics Committee (Appendix 1).

Service User Involvement

The original aim of this research was to examine the efficacy of the self-esteem paradigm with a clinical population of adults with psychosis. Accordingly the viability of engaging in the experiment process was explored thoroughly with a clinical Patient and Public Involvement (PPI) feedback group. The PPI group commented on all aspects of the procedure including the information sheet, Baccus evaluative conditioning task and the measures being used, thus providing support for the validity of this study.

Design

This non-clinical research study investigates proof of concept that evaluative conditioning can improve implicit self-esteem and trust and reduce experiences of paranoia and depression. A pre- and post- experimental design with a control condition was used. To address the study aims, a 2x2 mixed design repeated

measures ANOVA was conducted. The between-subjects variable was condition: either the evaluative conditioning task (Baccus, et al., 2004) or a neutral control equivalent. The within-subjects variable was time: measured at two levels, pre- and post -. The dependent variables were: implicit self-esteem, trustworthiness of faces, state attachment, state self-esteem, depression and paranoia.

Participants

Sample size calculation. An *a priori* power analysis was calculated using Cohen's tables (See Appendix 2; Cohen, 1992) to ascertain adequacy of sample size. Effect size assumptions were based on a pilot study by Martinez et al. (2020) which sought to explore a modified version of the evaluative conditioning paradigm by Baccus et al. (2004) which used threatening faces. This study found a medium effect size (*partial eta-squared = .09)*, according to Cohen's (1988) criteria. Therefore, we assumed a medium effect size (*d = .40)*, with an alpha = .05. Using two groups, a sample size of 99 per group is necessary to identify a significant effect of 80% power (Cohen, 1992).

Recruitment. Participants who met the inclusion criteria were recruited online via social media where they completed pre- and post- outcome measures and the evaluative conditioning/ control paradigm via Qualtrics and Gorilla software.

Inclusion and exclusion criteria. This study recruited adults aged 18 years and over who were fluent in English and from a non-clinical population. Participants who did not complete the questionnaire measures fully at time one or time two were excluded. Adults with physical disabilities or visual impairments, which would impede their use of a computer when engaging in the evaluative conditioning task, and adults with a learning disability or organic impairments, were excluded.

Measures

Trait Measures:

Persecutory and Deservedness Scale **(PaDS; Melo, Corcoran, Shryane, & Bentall, 2009)** (Appendix 3). The PaDS is a 10-item self-report measure with two subscales for persecutory ideation (P-subscale) and associated deservedness (D-subscale). The Persecution subscale is measured using a 5-point scale (1 = certainly false, 5 = certainly true), which is accompanied by a deservedness item scored on a 5 point scale (1 = not at all, 5 = very much). This measure is suitable for use with clinical and non-clinical samples (Melo, Corcoran, Shryane, & Bentall, 2009). In this study we only used the P- subscale, as the primary hypothesis was focused on experiences of paranoia specifically rather than deservedness..

Rosenberg Self-esteem Scale **(RSES; Rosenberg, 1965)** (Appendix 4). The RSES is a 10-item self-report measure of explicit self-esteem which is answered using a 4-point Likert Scale (strongly agree – strongly disagree). ***The Relationship Questionnaire*** **(RQ; Bartholomew & Horowitz, 1991) (**Appendix 5). The RQ was used to assess attachment style. Participants read four vignettes describing secure, fearful, preoccupied, and dismissing prototypical styles, and had to choose the one that described them best. They were asked to rate each vignette "*according to how well or poorly each description corresponds to [their] general relationship style*" on 7-point scales ranging from "Disagree strongly" to "Agree strongly". Scores on the four scales were used to compute higher order measures of attachment anxiety (negative model of self) and attachment avoidance (negative model of other), where higher scores indicate the presence of each type of attachment style.

Patient Health Questionnaire – 9 **(PHQ-9, Kroenke, Spitzer, & Williams, 2001).** The PHQ-9 is a nine-item self report measure of depression (Appendix 6) which is answered on a 4-point Likert scale based on how often participants experience a range of symptoms (0 = not at all, 3 = nearly everyday).

Pre- and Post- Measures:

Name and Letter Task **(NLT; Nuttin, 1985).** The NLT is a measure of implicit self-esteem, and functions on the basis that participants with high self-esteem are more likely to evaluate letters which form their own initials more positively compared to other letters in the alphabet. When participating in the NLT, participants are asked to rate the likability of an array of letters based on their gut reaction. Participants completed the NLT before and after the evaluative conditioning or control task. Several algorithms for computing NLT have been proposed. The I-algorithm was used because it has previously shown good reliability (Lebel and Gawronski, 2009). ***Trustworthiness of Faces Measure*** **(Todorov, Pakrashi, & Oosterhof, 2009).** The trustworthiness of faces measure is a single binary rating (yes or no) to measure whether an individual immediately perceives an image of a face as trustworthy or not. The images of faces were selected from a battery of faces generated by a validated computer model of face trustworthiness (Oosterhof & Todorov, 2008). Participants were asked to rate twenty trustworthy and twenty untrustworthy faces at each assessment point (pre – and post-). Separate scores were calculated for trustworthy and untrustworthy faces.

State Adult Attachment Measure (SAAM; Gillath, Hart, Noftle, & Stockdale 2009) (Appendix 7). The SAAM assesses momentary states of attachment security and insecurity in response to situational variables. It comprises 21 items in which participants have to rate the extent to which they agree or disagree with different statements based on how they currently feel, from 1 (*Strongly disagree)* to 7 (*Strongly*

agree). In this study the SAAM was used as a pre- and post- measurement of state attachment in order to explore the role of state attachment styles as a result of the experimental manipulation.

Brief-State Paranoia Checklist (Brief-PCHL, Schelier, Moritz, & Lincoln, 2016) (Appendix 8). The Brief-PCHL is a 3-item measure developed to assess the presence of paranoid thoughts. Items are rated on a 10-point Likert scale based on the degree to which paranoid thoughts are present currently (0 = Not at all, 10 = Very much). In this study the Brief-PCHL was used as a pre- and post- measurement of state paranoia.

State Self-Esteem Scale (SSES; Hetherton & Polivy, 1991) (Appendix 9). The SSES assesses an individual's state self-esteem at a given time point. The scale comprises 20 items which are subdivided into 3 components of self-esteem: performance self-esteem, social self-esteem, and appearance self-esteem. SSES items are rated using a 5-point Likert scale (1 = not at all, 2 = a little bit, 3 = somewhat, 4 = very much, 5 = extremely). ***Visual Analogue Mood Scale*** **(VAMS).** Visual Analogue Mood Scales based on those created by Machado, Thompson, and Brett (2019) were used to assess participants' mood. Participants were asked to rate three single word items on a scale of 0 – 100 (0 = Not at all, 100 = Extremely) including "Happy", "Sad", and "Energetic".

Measure Psychometrics

Table 1 shows the Chronbach's alpha coefficients for the scale reliability analysis conducted for this study and the reliability coefficients identified in previous literature.

Table 1.

Scale reliability of study measures.

	Scale reliability for current study	Scale reliability in literature
PaDS	α = .86	α = .84 Melo, Corcoran, Shryane, & Bentall, 2009
RSES	α = .9	α = .91 Sinclair et al., 2010
PHQ-9	α = .83	α =.89 Kroenke et al., 2001
NLT I-algorithm	α = 0.43	α =.56 Lebel and Gawronski, 2009
Trustworthy Faces	α = 0.93	α =.98 Todorov, Pakrashi, & Oosterhof, 2009
Untrustworthy Faces	α = 0.92	α =.98 Todorov, Pakrashi, & Oosterhof, 2009
SAAM attachment anxiety	α = 0.87	α =.84 Gillath *et al.*, 2009
SAAM attachment avoidance	α = 0.83	α =.83 Gillath *et al.*, 2009
SAAM attachment security	α = 0.92	α =.87 Gillath *et al.*, 2009
Brief-PCHL	α =0.81	α = .74 Schelier, Moritz, & Lincoln, 2016
SSES	α = 0.92	α = 0.92 Hetherton & Polivy, 1991

Note. α ≥ 0.9 = Excellent, 0.9 > α ≥ 0.8 = Good, 0.8 > α ≥ 0.7 = Acceptable, 0.7 > α ≥ 0.6 = Questionable, 0.6 > α ≥ 0.5 = Poor, 0.5 > α = Unacceptable.

Procedure

Figure 1 illustrates a visual representation of the full study procedure.

Prospective participants were recruited online via social media. All participants were given the study information sheet (Appendix 10) and completed an electronic consent form (Appendix 11). Participation in this study had to be completed virtually in one session.

Following completion of online questionnaires (trait measures and pre-measures) participants were randomly assigned, via Gorilla online psychological software (https://app.gorilla.sc), into either the control classical conditioning task or the experimental condition containing the evaluative conditioning task created by Baccus et

al., (2004). Participants answered some brief questions about themselves to provide the self-relevant information necessary to tailor the evaluative conditioning or control task, including first name, last name, month of birth, and city or town they consider their home. Control words comprised of less common first and last names, months, and cities which were different to the participant's self-relevant information.

Participants were instructed that they would see a word appear at random in one of four corners of the computer screen, which they were required to click on as quickly as possible. They were informed that an image would appear briefly following their mouse click on the previous word in that corner of the screen. This procedure was repeated for 240 trials, with self-relevant and non self-relevant words being displayed in a pseudorandom order (80 trials each). Those in the experimental condition with the evaluative conditioning paradigm had their self-relevant words consistently paired with the image of a smiling face. Individuals in the control conditioning task had their self-relevant and non self-relevant words paired with a random selection of smiling, angry, and neutral faces. All participants received an equal number of each type of emotional expression.

Upon completion of the experimental or control task, participants were asked to repeat the baseline pre-measures via Qualtrics, to provide post-intervention measure scores before receiving the debrief. Participation in the study took approximately 40 minutes to complete.

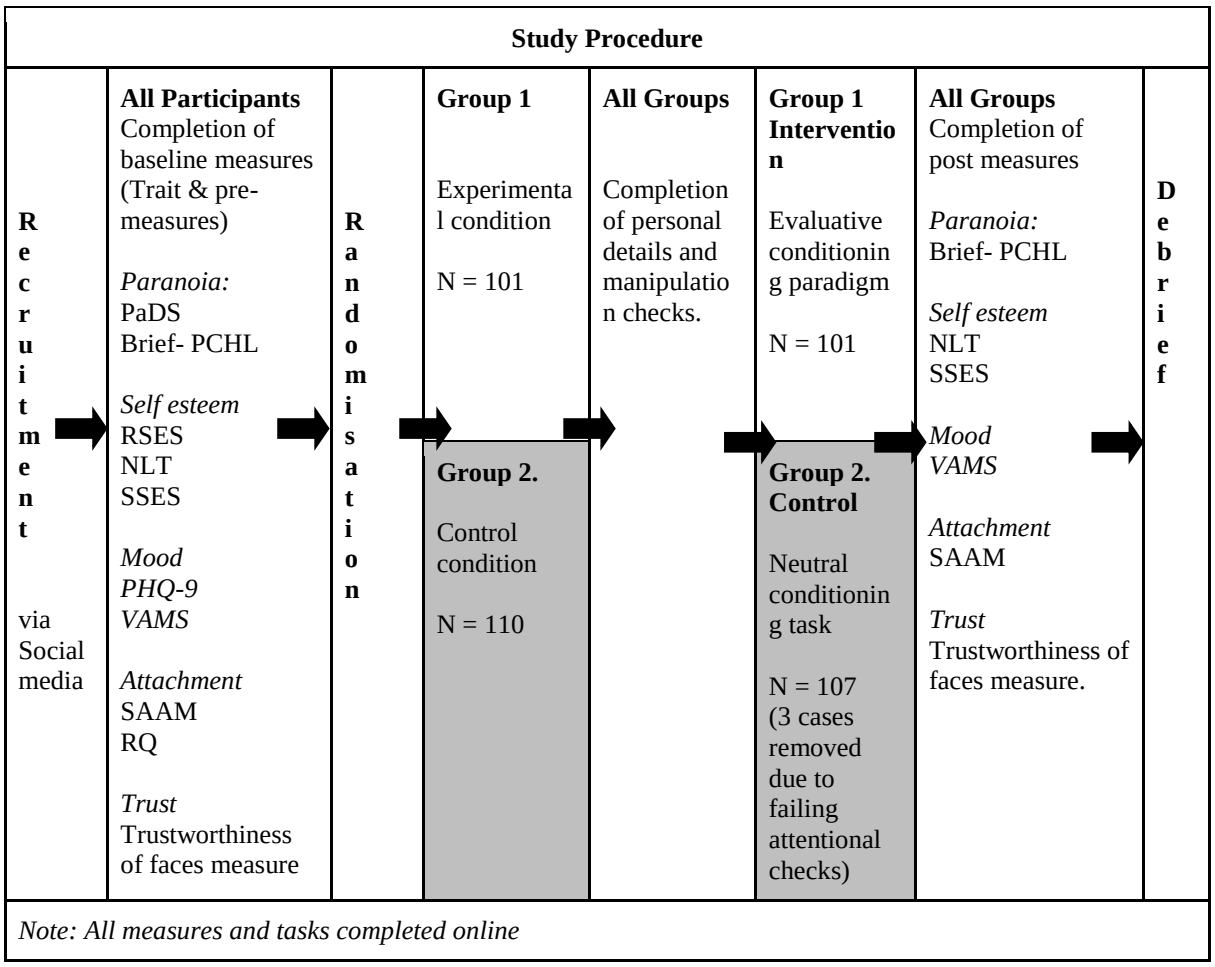


Figure 1. Study procedure diagram.

Analysis

All statistical analysis was conducted using IBM SPSS 26 software (SPSS Inc., 2019). Demographic data were collated and reported using descriptive statistics. To test for baseline differences between conditions on demographic characteristics, one-way ANOVAs for continuous data and Chi-square tests for categorical data were conducted. Pearson correlational analysis between all trait measures (PaDS, PHQ-9, RQ attachment anxiety [MOD_Self], RQ attachment avoidance [MOD_OTHER], and RSES) were undertaken to assess for any initial relationships between the variables.

One-way ANOVAs were used to assess for differences in trait outcome measure scores (PaDS, PHQ-9, RSES, RQ attachment anxiety, and RQ attachment avoidance) between groups at baseline. Two-way mixed repeated measures ANOVAs (group x

pre- vs post-) were conducted to assess for significant differences for each pre- and post- outcome variable (NLT, Trustworthiness of faces, SAAM, Brief PCHL, and VAMS) within the groups.

Quality Control

To ensure quality control within the data collected, a variety of ten attentional checks were included throughout the study procedure. Participants who did not correctly pass ≤ 25% of the attentional checks had their data withdrawn from the pre-post analysis when conducting repeated measures ANOVAs. This led to the removal of three participants' data from the control group in the final data analysis.

Results

This study recruited 211 participants in total, with 110 participants in the control group and 101 participants in the experimental condition. When analysing pre- and post- data, 3 participants were removed from the control condition due to failing the attentional checks, leaving a final total of 101 participants in the experimental group and 107 participants in the control group. The data of two participants' in the control group were also removed when analysing the pre- and post- implicit self-esteem (NLT) data due to missing data points (N = 105).

Demographics

Overall the sample was highly educated, with 37.9% (N = 80) of participants holding an undergraduate degree and 34.6% (N = 73%) having completed a postgraduate degree. The majority of participants listed their employment status as employed (65.9%, N = 139), with 21.8% (N = 46) identifying themselves as students. 67.3% (N = 142) of participants identified as female. The sample data on age were positively skewed, with a median and mode of 30 years of age and a mean age of 34.43 (SD = 12.59).

Table 2 presents the participant demographics for each condition (experimental and control). To evaluate the effectiveness of randomisation and to assess for potential demographic differences between the groups at baseline, a series of statistical tests were undertaken. A one-way between-subjects ANOVA revealed there was no significant effect of condition on age F (1, 207) =1.063, p=.304, $\eta 2$= .005. A series of Chi-square tests found no significant differences between the groups for gender ($\chi 2$ (1, 211) = .335, p = .56), education level ($\chi 2$ (6, 211) = 3.904, p = .69), or employment status ($\chi 2$(8,211) = 12.141, p = .14).

Table 2.

Demographics

Demographic variable	**Experimental** (N = 101)	**Control** (N= 110)	**Test statistic**	**Statistical significance**
Gender (number female)	66	76	$\chi 2$ = .335	p = .56
Mean age in years (SD)	33.48 (12.28)	35.28 (12.85)	F = 1.063	p = .304
Education level (number in each category)	O-Level/ GCSE or similar: 5 A-Level or similar: 7 Diploma: 13 Technical: 2 Undergraduate degree: 37 Postgraduate degree: 36 Other (specify): 1	O-Level/ GCSE or similar: 4 A-Level or similar: 12 Diploma: 8 Technical: 3 Undergraduate degree: 43 Postgraduate degree: 37 Other (specify): 3	$\chi 2$ = 3.904	p = .69
Employment status (number in each category)	Disabled: 0 Employed: 59 Unemployed: 2 Homemaker: 0 Retired: 5 Student: 29 Unpaid volunteer: 1 Other (specify): 3 Prefer not to say: 2	Disabled: 1 Employed: 80 Unemployed: 3 Homemaker: 1 Retired: 3 Student: 17 Unpaid volunteer: 0 Other (specify): 5 Prefer not to say: 0	$\chi 2$ = 12.141	p = .145

Table 3.
Bivariate Correlations of trait and state measures

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Paranoia: PaDS	-	.56**	-.27**	-.33**	-.63**	.71**	.23**	.53**	-.58**	-.61**	-.30**	.35**	-.21**	-.31**	.24**	-.11
2. Depression: PHQ-9		-	-.19**	-.15*	-.61**	.56**	.28**	.40**	-.45**	-.68**	-.47**	.52**	-.43**	-.19**	.17*	.03
3. Attachment Anx: RQ			-	.18**	.21**	-.21**	-.11	-.26**	.34**	.20**	.07	-.11	.10	.20**	.03	.08
4. Attachment Avoid: RQ				-	.24**	-.24**	.15*	-.60**	.43**	.24**	.15*	-.13	.14*	.22**	-.08	.12
5. Explicit Self-esteem: RSES					-	-.50**	-.34**	.47**	.50**	.82**	.42**	-.50**	.31**	.22**	-.19**	.00
6. State Paranoia: Brief PCHL						-	.19**	.46**	-.45**	-.56**	-28**	.35**	-.18**	-.23**	.20**	-.02
7. State Attachment Anx: SAAM							-	.15*	-.21**	-.28**	-.18**	.29**	-.13	-.06	.16*	.07
8. State Attachment Avoid: SAAM								-	-.62**	-.41**	-.31**	.24**	-.20**	-.31**	.17*	-.14
9. State Attachment Security: SAAM									-	.53**	.40**	-.35**	.26**	.19**	-.13	.08
10. State Explicit self-esteem: SSES										-	.42**	-.49**	.40**	.14*	-.20**	-.05
11. Mood: VAMS "Happy"											-	-.66**	.63**	.25**	-.25**	-.66**
12. Mood: VAMS "Sad"												-	-.45**	-.19**	.16*	-.08
13. Mood: VAMS "Energetic"													-	.11	-.12	.06
14. Trust Faces														-	-.32**	-.03
15. Mistrust Faces															-	.109
16. Implicit Self-esteem: NLT																-

Note. ***Correlation is significant at 0.01; * Correlation is significant at .05*

Note. PaDS-R = Persecutory & Deservedness Scale (Melo et al., 2009); PHQ-9 = Patient Health Questionnaire (Kroenke, Spitzer, & Williams, 2001); RQ = Relationship Questionnaire (Bartholomew & Horowitz, 1991); RSES = Rosenberg Self-esteem Scale (Rosenberg, 1965); Brief PCHL = Paranoia Checklist (Freeman et al., 2005); SAAM = State Adult Attachment Measure (Gillath, Hart, Noftle, & Stockdale 2009); SSES = State Self-Esteem Scale (Hetherton & Polivy, 1991); VAMS = Visual Analogue Mood Scale.

The correlations for the baseline trait and pre-state measures are presented in table 3. The correlational analysis identified numerous highly significant positive and highly significant negative associations between several trait and state measures. Contrary to the study hypothesis, implicit self-esteem was not correlated with trait attachment anxiety (r = .08, p = .25), trait attachment avoidance (r = .12, p = .08), state attachment anxiety (r = .07, p = .31), state attachment avoidance (r = -.14, p = .05), state attachment security (r = .08, p = .26), judgments of trustworthy faces (r = -.03, p = .62), or judgements of untrustworthy faces (r = .11, p = .11).

In line with hypothesis three, attachment styles were highly significantly positively correlated with judgements of trustworthy faces, as follows: trait attachment anxiety and judgements of trustworthy faces (r = .20, p = .004), trait attachment avoidance and judgements of trustworthy faces (r = .22, p = .001), and state attachment security and judgements of trustworthy faces (r = .19, p = .007). State attachment avoidance was highly significantly negatively correlated with judgements of trustworthy faces (r = -.31, p = .000). Finally, state attachment anxiety was significantly positively correlated with judgements of untrustworthy faces (r = .16, p = .02), and state attachment avoidance was significantly positively correlated with judgements of untrustworthy faces (r = .17, p = .01).

Table 4.

Baseline analysis of comparison between conditions on trait and pre-state measures

	Experimental Condition Mean (SD)	**Control Condition Mean (SD)**	**Statistical significance**
Trait Paranoia: PaDS	21.86 (8.60)	20.26 (7.57)	*p* = .15
Trait Depression: PHQ-9	15.41 (4.83)	14.64 (4.54)	*p* = .23
Trait Explicit Self-esteem: RSES	29.18 (6.08)	29.26 (5.28)	*p* = .91
Trait Attachment Anxiety: RQ	1.29 (2.68)	1.37 (2.89)	*p* = .82
Trait Attachment Avoidance: RQ	-.26 (4.38)	.86 (3.85)	*p* = .05
Implicit Self-esteem: NLT	.34 (1.28)	.80 (1.56)	*p* = .02*
State Attachment Anxiety: SAAM	27.98 (10.54)	27.69 (10.16)	*p* = .84
State Attachment Avoidance: SAAM	18.52 (9.75)	16.15 (6.64)	*p* = .04*
State Attachment Security: SAAM	39.87 (8.63)	40.60 (7.83)	*p* = .52
State Paranoia (Brief PCHL)	11.27 (6.02)	10.09 (5.01)	*p* = .12
State Explicit Self-esteem (SSES)	62.80 (13.68)	63.59 (14.42)	*p* = .68
Mood: VAMS "Happy"	59.57 (23.89)	61.77 (20.40)	*p* = .47
Mood: VAMS "Sad"	27.41 (26.33)	21.96 (20.31)	*p* = .09
Mood: VAMS "Energetic"	40.94 (25.31)	41.23 (24.94)	*p* = .93
Mistrust Faces	15.35 (5.12)	14.33 (5.74)	*p* = .18
Trustworthy Faces	15.72 (5.72)	17.17 (3. 995)	*p* = *.03**

To assess and control for differences in trait measures between the groups at baseline a series of one-way between group ANOVAs were undertaken. Here, condition was the independent variable and the different trait or pre-state measures were the dependent variables. No significant differences between the groups were identified for trait: paranoia F (1, 209) = 2.061, p=.15,η2= .010, depression F (1, 209) = 1.424, p=.23,η2= .007, explicit self-esteem F (1, 209) = .012, p=.91,η2=.00006, attachment anxiety F (1, 209) = .05, p=.82,η2=.0002, or attachment avoidance F (1, 209) = 3.907 , p=.05,η2=.018. Similarly, there were no significant baseline differences for state: attachment anxiety F (1, 209) = .04, p = .84, attachment security F (1, 209) = .41, p = .52, paranoia F (1, 209) = 2.39, p = 12, explicit self-esteem F (1, 209) = .17, p = .68, mood "happy" F (1, 209) = .52, p = .47, mood "sad" F (1, 209) = 2.85, p = .09, mood "energetic" F (1, 209) = .01, p = .93, and mistrust faces F (1, 209) = 1.84, p = .18.

Accordingly, it would appear that the randomisation procedure has been reasonably effective.

Baseline differences between the groups for implicit self-esteem, state attachment avoidance, and trustworthy faces were also assessed using between group ANOVAs. There was a significant difference between the groups for all three measures: implicit self-esteem F (1, 206) = 5.24, p = .02, state attachment avoidance F (1, 209) = 4.32, p = .04, and the measure of trustworthy faces F (2, 209) = 4.62, p = .03. However, none of these remain significant when a Bonferroni correction is applied: p < .003125.

Main Findings

Table 5 presents the findings from a series of two-way repeated measure ANOVAs for the pre- and post- outcome variables.

Table 5.

Repeated Measure ANOVAs pre- and post- measures

Variable	**Time**		**Time * Condition (interaction)**		**Between Groups Main effect**	
	F	*Sig.*	*F*	*Sig.*	*F*	*Sig.*
Implicit Self-esteem: NLT	9.04	.003**	6.04	.015*	1.24	.266
Explicit Self-esteem: SSES	.15	.70	.57	.45	.412	.522
Paranoia: PCHL	.31	.58	2.25	.13	3.82	.05
Trustworthy faces	1.19	.28	2.58	.11	6.93	.009**
Untrustworthy faces	22.89	.000**	.06	.80	1.12	.291
Mood: Happy VAMS	30.13	.000**	2.87	.09	.003	.957
Mood: Sad VAMS	1.13	.29	.09	.77	2.16	.143
Mood: Energetic VAMS	27.95	.000**	.01*	.90	.062	.804
Attachment Anxiety: SAAM	.08	.78	6.26	.01*	.461	.498
Attachment Avoidance: SAAM	2.33	.13	4.06	.04*	2.18	.14
Attachment Security: SAAM	.15	.70	.57	.45	.498	.481

Note. ** significant at p < 0.01 level. *****significant at p < .05 level

Implicit self-esteem. A repeated measures ANOVA was conducted using condition with two levels as the between-subjects factor and pre- and post- measurement as the within subject factor. There was a significant effect of time on implicit self-esteem, F(1, 207) = 9.04, p =.003, η_p^2 = .044 and a nonsignificant effect for condition F (1, 204) =

1.24, p = .266, η_p^2 = .006. A significant interaction effect of time by condition on implicit self-esteem was found, $F(1, 207) = 6.04$, p =.015, η_p^2 = .029, revealing that participants in the experimental condition reported higher levels of implicit self-esteem scores post-intervention than participants in the control condition.

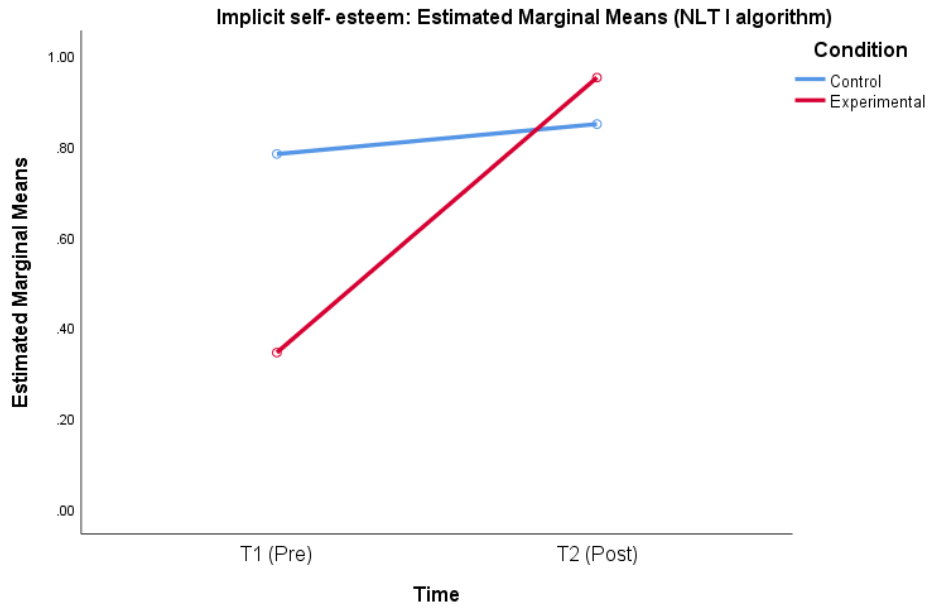


Figure 2. Interaction effect of time by condition on implicit self-esteem

Explicit self-esteem. A repeated measures ANOVA was conducted using condition with two levels as between subjects factor, and pre- and post- measurement as within subject factor. There was a significant effect of time on state self-esteem composite score, $F(1, 206) = 151.215$, p<.001, η_p^2 = .423, and a non-significant effect for condition F = (1, 206) = .412, p =.522. ,, η_p^2 = .002. A significant interaction effect of time by condition on state self-esteem was found, $F(1, 206)$ =4.798, p =.03, η_p^2 = .023. This reflects that overall, participants from both conditions had a significant increase from pre- intervention to post- intervention in their composite state self-esteem scores. However this result also shows that the control condition scored more highly than the experimental condition post-intervention.

Paranoia. A repeated measures ANOVA was conducted using condition with two levels as between subjects factor, and pre and post measurement as within subject factor. There was not a significant effect of time on composite state paranoia scores, $F(1, 206) = .308$, $p = .58$, $\eta_p^2 = .001$ and a non-significant effect for condition $F(1, 206) = 3.82$, $p = .05$, $\eta_p^2 = .018$. There was no significant interaction effect of time by condition on composite state paranoia scores, $F(1, 206) = 2.250$, $p = .13$, $\eta_p^2 = .011$. Accordingly, the experimental evaluative conditioning task did not appear to change paranoia. Consequently, the hypothesis that evaluative conditioning would improve implicit self-esteem and would reduce paranoia was not supported.

Trustworthy Faces. A repeated measures ANOVA was conducted using condition with two levels as between subjects factor and pre and post measurement as within subject factor. There was no significant effect of time on the ratings of trustworthy faces, $F(1, 206) = 1.186$, $p = .277$, $\eta_p^2 = .006$ which indicates that this appears to remain stable over time. There was a significant effect for condition on ratings of trustworthy faces $F = (1, 206) = 6.93$, $p = .009$, $\eta_p^2 = .033$, which may indicate that the two groups were not well matched on this measure, which may be further evidenced by the significant differences at baseline when a Bonferroni correction is not applied. There was no significant interaction effect of time by condition on the ratings of trustworthy faces, $F(1, 206) = 2.576$, $p = .111$, $\eta_p^2 = .012$. Consequently, the evaluative conditioning task does not appear to change ratings of trustworthy faces. Thus, the experimental hypothesis that evaluative conditioning would have a positive effect on trustworthiness judgements was not supported.

Untrustworthy Faces. A repeated measures ANOVA was conducted using condition with two levels as the between subjects factor and pre and post measurement as the within subject factor. There was a significant effect of time on the ratings of

untrustworthy faces, $F(1, 206) = 20.26$, $p<.001$, $\eta_p^2 = .088$ and a non-significant effect for condition $F = (1, 206) = 1.12$, $p = .291$, $\eta_p^2 = .005$. There was no significant interaction effect of time by condition on the ratings of trustworthy faces, $F(1, 206) = .171$, $p = .68$, $\eta_p^2 = .001$.

Mood: Happiness. A repeated measures ANOVA was conducted using condition with two levels as the between subjects factor, and pre and post measurement as the within subject factor. There was a significant effect of time on the happiness VAMS score, $F(1, 206) = 30.127$, $p<.001$, $\eta_p^2 = .128$ which decreased for both conditions between time 1 and time 2. There was no significant effect for condition on happiness VAMS scores $F = (1, 206) = .003$, $p = .957$, $\eta_p^2 = .000$. There was no significant interaction effect of time by condition on the happiness VAMS score, $F(1, 206) = 2.870$, $p = .09$, $\eta_p^2 = .014$. Accordingly, the experimental hypothesis was not supported; evaluative conditioning did not improve measures of mood.

Mood: Sadness. A repeated measures ANOVA was conducted using condition with two level as between-subjects factor and pre and post measurement as within subject factor. There was not a significant effect of time on the sad VAMS score, $F(1, 206) = 1.134$, $p.288$, $\eta_p^2 = .005$, and there was a non-significant effect for condition, $F = (1, 206) = 2.16$, $p = .143$, $\eta_p^2 = .010$. There was no significant interaction effect of time by condition on the sad VAMS score, $F(1, 206) = .09$, $p = .766$, $\eta_p^2 = .000$. Consequently, the experimental hypothesis was not supported; evaluative conditioning did not reduce depression.

Mood: Energetic. A repeated measures ANOVA was conducted using condition with two levels as between-subjects factor and pre and post measurement as within subject factor. There was a significant effect of time on the energetic VAMS score, $F(1, 206) = 27.95$, $p<.001$, $\eta_p^2 = .120$, which decreased for both conditions between time 1 and time

2. There was not a significant effect of condition on energetic VAMS scores F = (1, 206) = .062, p = .804, η_p^2 = .000. There was no significant interaction effect of time by condition on the energetic VAS score, F(1, 206) =.014, p =.90, η_p^2 = .000.

Attachment anxiety. A repeated measures ANOVA was conducted using condition with two levels as between subjects factor, and pre- and post- measurement as within subject factor. There was no significant effect of time on state attachment anxiety, F(1, 206) = .076, p =.783, η_p^2 = .000 and there was a non-significant effect for condition F = (1, 206) = .461, p = .50, η_p^2 = .002. A significant interaction effect of time by condition on state attachment anxiety was found, F(1, 206) = 6.263, p =.013, η_p^2 = .030, revealing that participants in the experimental condition reported higher levels of state attachment anxiety scores post intervention than participants in the control condition.

Attachment avoidance. A repeated measures ANOVA was conducted using condition with two levels as between-subjects factor and pre and post measurement as within subject factor. There was no significant effect of time on state attachment avoidance, F(1, 206) = 2.334, p =.13, η_p^2 = .011, and there was a non-significant effect for condition, F = (1, 206) = 2.18, p = .14, η_p^2 = .010. A marginal significant interaction effect of time by condition on state attachment avoidance was found, F(1, 206) = 4.056, p =.04, η_p^2 = .019. State attachment avoidance increases post-intervention for participants in the control condition, which is not found in the experimental condition.

Attachment security. A repeated measures ANOVA was conducted using condition with two levels as the between-subjects factor and pre and post measurement as the within subject factor. There was no significant effect of time on state attachment security, F(1, 206) = .146, p =.703, η_p^2 = .001, and there was a non-significant effect for

condition, F = (1, 206) = .498, p = .481,, η_p^2 = .002. There was no significant interaction effect of time by condition on state attachment security; F(1, 206) = .572, p =.45, η_p^2 = .003.

Discussion

Using an experimental design, this analogue study aimed to test a causal intervention investigating whether manipulating implicit self-esteem would reduce paranoia and depression in a non-clinical sample. It was hypothesised that evaluative conditioning would improve implicit self-esteem, trustworthiness judgements, explicit state measures of attachment and self-esteem, whilst decreasing psychological difficulties (paranoia and depression). The study used a large sample of 211 non-clinical participants and was therefore adequately powered to test the experimental hypotheses. Baseline differences for demographics and trait measures between the experimental and control groups were assessed to test the integrity of the randomisation procedure and no significant differences were found (following Bonferroni correction), indicating that the randomisation process was effective.

Overall the findings of this study were mixed and, in some cases, contrary to what were expected and the current evidence base (Lopez, et al., 2018; Bentall, Corcoran, Howard et al., 2001). A repeated measures ANOVA found that the evaluative conditioning task did improve implicit self-esteem. This finding seems to align with the findings by Baccus et al. (2004) that evaluative conditioning is an effective intervention in manipulating implicit self-esteem. However, increasing implicit self-esteem did not result in a reduction of state paranoia or depression in this study. Consequently, the hypothesis that improving implicit self-esteem would reduce paranoia and depression was not supported in this study.

Previous psychological literature and theory has suggested that implicit self-esteem and paranoia are connected (Baccus et al., 2004; Bentall, Corcoran, Howard et al., 2001; Lopez, et al., 2018). The defensive model, based on the Attributional-Self-Representation Cycle (ASRC) by Bentall, Corcoran, Howard et al. (2001), proposed a dynamic systems model of paranoia in which implicit self-esteem was considered to be the bedrock under which explicit self-esteem varied. The defensive model hypothesises that paranoia represents an attributional defence against low self-esteem reaching an individual's consciousness by making external-personal (other blaming) attributions for negative events, rather than internal attributions or external-situational attributions. Accordingly, it was thought that manipulating and improving implicit self-esteem could provide a useful intervention in which the experience of paranoia could be reduced. Research by Lopez et al. (2018), using a similar evaluative conditioning paradigm to the one used in this study, appeared to support this theory somewhat, identifying a marginal significant effect that increasing implicit self esteem decreases subclinical psychotic symptoms in students with high subclinical paranoia. However, the current research was not able to replicate the findings of Lopez et al.'s (2018) study.

Several studies have identified self-esteem as a psychological mechanism that appears to play a significant role in experiences of paranoia (Atherton, Antley, Evans et al., 2016; Freeman, Evans, Lister et al., 2014; Kesting, Bredenphol, Klenke et al., 2013). However, a meta-analytic review by Murphy, Bentall, Freeman et al. (2018) indicates that the evidence regarding paranoia serving as a defensive process designed to protect self-esteem is mixed, and in some cases of poor quality. One of the key recommendations of Murphy et al.,'s (2018) meta-analytic review was that controlled interventionist-causal trials were required to reliably experimentally test the impact of modifying implicit self-esteem on paranoia. The present study has sought to act on these recommendations by experimentally testing whether increasing implicit self-esteem

using an evaluative conditioning paradigm is associated with a decrease in paranoia in an interventionist-causal study. The findings of this study did not support the experimental hypothesis that increasing implicit self-esteem will reduce paranoia in a sample of non-clinical participants.

The findings of this study indicated that explicit self-esteem did increase from pre- to post-intervention for both conditions, although this effect was of marginal significance ($p = .03$). Further research which seeks to replicate this study is needed to confirm whether the findings identified here represent a true effect. If further research identified a true effect exists, then our understanding of the relationship between implicit and explicit self-esteem remains unclear and not in line with previous theory. Specifically, improving implicit self-esteem may not necessarily lead to an improvement in explicit self-esteem.

In line with psychological theory and the evidence base, trait explicit self-esteem was highly significantly negatively correlated with both trait paranoia and state paranoia (Udachina, Varese, Oorschot et al., 2012; Thewissen et al., 2008; Bentall et al., 2008; Murphy et al., 2018). Similarly, there was also a highly significant negative correlation between state self-esteem and both trait paranoia and state paranoia (Udachina, Varese, Oorschot et al., 2012; Thewissen et al., 2008; Bentall et al., 2008; Murphy et al., 2018). Interestingly, the baseline correlational analysis revealed that implicit and explicit self-esteem were not associated with one another ($r = - .00$, $p = .995$). Further research is needed to explore the connection between implicit and explicit processes.

The results of this study found that judgments of both trustworthy and untrustworthy faces did not change following the experimental evaluative conditioning task. Consequently the hypothesis that evaluative conditioning would have a positive effect on trustworthiness judgements was not supported. This appears to contrast with

psychological literature and theory which suggests improving implicit self-esteem may increase trustworthiness judgements. It is plausible that the evaluative conditioning intervention in this study was too brief to increase trustworthiness judgements of faces. A longer associative intervention for implicit self-esteem may potentially offer more scope to increase trustworthiness evaluations over time. It is important to note that despite the randomisation procedure, there were differences between the groups on the trustworthy faces measures which existed at baseline and persisted throughout. This indicates that perhaps the experimental and control group were not well matched on this particular measure.

As briefly mentioned, state measures of mood using Visual Analogue Mood Scales (VAMS) for "happy," "sad," and "energetic" did not significantly change post-intervention. Accordingly, the experimental hypothesis that improving implicit self-esteem would reduce depression was not supported. Interestingly, there was a significant effect of time for the happiness and energetic VAMS, which decreased for both conditions between time 1 (pre-) and time 2 (post-). It is plausible that the downward trend for both these measures may reflect potential fatigue experienced by all participants, given that both the evaluative conditioning task and the control classical conditioning task are likely to be cognitively effortful (Ashley, 2020).

State attachment anxiety was found to increase post-intervention, with participants in the experimental condition reporting higher levels of attachment anxiety following the evaluative conditioning task. It is plausible that pairing happy faces, which can be interpreted as signalling attachment figure availability and acceptance (Dewitte, 2011), with self-relevant information within the evaluative conditioning task, could potentially elicit an inhibitory attachment anxiety response. Research by Dewitte (2011), which measured attentional inhibition of emotional stimuli as a function of

attachment style using a Negative Affective Priming (NAP) task with photos of happy faces, found that attachment anxiety was associated with decreased inhibition of positive faces.

There was no significant effect of time on either state attachment avoidance or attachment security, indicating that both these factors remained stable over time. There was also no significant effect of time by condition on state attachment security, indicating that this was unaffected by the evaluative conditioning task. Interestingly, the repeated measures ANOVA on state attachment avoidance identified a marginal significant interaction effect of time by condition for participants in the control condition. Future research is needed to replicate the findings of this study to confirm whether the effect found here is a "true effect."

Limitations

Whilst this study provides an important contribution to our understanding of implicit self-esteem, there are a number of limitations to consider and therefore the findings need to be treated with caution. The sample demographics highlighted that the majority of participants were highly educated, employed, and aged between mid-20 – mid 30's. Consequently, the sample may not be representative of the general population, which has implications for the generalisability of these results. This study also did not collect ethnicity data and consequently it is not clear whether the sample is representative of the general population which may have implications for the generalisability of the results. Given this study was conducted in the UK, a developed country with a Western culture, and the inclusion criteria required participants who could speak English the study findings may also not be generalisable across different countries and cultures. Finally, levels of subclinical paranoia within the sample were low, which may make it difficult to detect an effect post-intervention.

This proof of concept study used a brief evaluative conditioning paradigm similar to that used by Lopez et al. (2018) with students with high subclinical paranoia where increasing implicit self-esteem had a marginal significant effect on subclinical psychotic symptoms but not on paranoia specifically. The present study did not find that increasing implicit self-esteem resulted in a reduction in subclinical paranoia. This may be due to the overall low levels of subclinical paranoia within the analogue sample. In addition, participants completed this study online from home due to the COVID-19 pandemic. Participating remotely in this way may have influenced individuals' engagement with the task, as it was not possible to control for environmental confounders. Replicating this study within a research laboratory setting would allow for more experimental control during participation.

This study found that state mood measures on "happiness" and "energetic" appeared to deteriorate post-intervention. Given that participation in this study took a minimum of 40 minutes to complete it is possible that there was a potential "fatigue effect" which influenced mood. Ashley (2020) highlights that greater time investment of research participation increases the likelihood that research fatigue will be experienced. Specifically, "the form and content of a study can make it psychologically and emotionally tiring for some or all participants" (Ashley, 2020). In addition, psychological and emotional exhaustion may develop more quickly when participants are bored or stressed (Ashley, 2020).

Recruitment for this research was conducted via social media on a voluntary basis. Consequently, in order to maximise data completeness participation was undertaken in one session remotely. Research by Dewitte and Houwer (2011), which used a Negative Affective Priming (NAP) task to assess automatic inhibitory responses towards specific and global attachment styles, recommends having an interval of a few

days between collection of pre- and post- measurement, in order to prevent "procedural artefacts" and "carry-over" effects impacting the interpretation of findings. Procedural artefacts may present a threat to the external validity of a study's conclusions (Lewis-Beck, Bryman, Futin et al., 2004). Accordingly, future research which seeks to replicate the present study should consider implementing an interval of a few days between pre- and post- measurement data collection.

Finally, this study did not include a measure of anxiety, and therefore did not control for this psychological difficulty as a potential confounding variable. Research has indicated that anxiety may be connected to experiences of paranoia and self-esteem (Freeman, 2007). Future research should seek to measure anxiety alongside paranoia, self-esteem, attachment, mood and trust to further explore how this may impact the relationship between these variables.

Clinical Implications

Current psychological theory and research has proposed that implicit self-esteem and paranoia are related (Bentall et al., 2001; Lopez, et al., 2018). Bentall et al.'s (2001) defensive model theorised that paranoia serves as an attributional defence against low self-esteem reaching an individual's consciousness. Consequently, it was hoped that manipulating implicit self-esteem could decrease experiences of paranoia. A meta-analytic review by Murphy et al. (2018) recommended the need for more controlled interventionist-causal trials to reliably experimentally test the effect of manipulating implicit self-esteem on paranoia. The current research sought to act on Murphy et al.'s (2018) recommendation, by undertaking a proof of concept experimental causal-interventionist study. The findings of this study do not empirically support current psychological theory that increasing implicit self-esteem will reduce paranoia. Consequently, we cannot conclude from the current data that integrating tasks such as

evaluative conditioning into clinical practice with individuals experiencing paranoia is of value at present.

Implicit conditioning interventions are currently under-researched and not well understood. Consequently, further research is needed to test their efficacy and identify the role they may play in different psychological mechanisms. The National Institute of Health (NIH) proposes a translational pipeline in which research moves from "bench to bedside" in a bi-directional process connecting from basic to human research and then to practice (Kleinman & Mold, 2009). Westfall, Mold, & Fagnan (2007) expanded this pipeline to distinguish practice and community based investigations from human research, thus implementing three translational steps before research translates into practice: basic research, human research, practice and community based research. Typically, it is uncommon for clinical psychology research to originate at the early phase of the translational pipeline of research. This may be because practice based research offers a more time efficient route in which to expediently develop, test, and provide new interventions (Westfall et al., 2007). However, undertaking research at the earlier stages of the translational pipeline may also be necessary in order to thoroughly understand and empirically test novel interventions in under-researched areas of human psychology such as implicit processes, which are theorised to potentially affect a range of psychological difficulties.

Conclusion

This proof of concept study aimed to investigate whether a brief evaluative conditioning paradigm would improve implicit self-esteem and reduce paranoia and depression. It was also hypothesised that evaluative conditioning would improve trustworthiness judgements of faces and explicit state measures of attachment and self-esteem. Whilst the evaluative conditioning paradigm was found to improve implicit self-esteem, this

did not result in a reduction in subclinical paranoia and depression. There was a marginal significant increase in explicit self-esteem for both the experimental and control conditions and therefore further research is needed to assess whether this finding represents a "true effect." The evaluative conditioning paradigm was not found to impact trustworthiness judgements of faces. Contrary to expectations, attachment anxiety was found to deteriorate following the evaluative conditioning paradigm. Attachment security was unaffected and was therefore found to remain stable over time. Attachment avoidance demonstrated a marginal deterioration for participants in the control group, which again warrants further investigation in future research to ascertain whether this represents a "true effect." The findings of this study need to be interpreted with caution due to its limitations. Nevertheless the rigour of the experimental design in testing a causal intervention on the impact of manipulating implicit self-esteem on psychological difficulties (paranoia and depression), attachment, and trust provides a significant contribution to the psychological literature. Specifically, the findings of this study appear to contradict previous psychological theory on the defensive model of paranoia which posited that increasing implicit self-esteem could provide a useful intervention in which paranoia could be reduced.

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Appendices

Appendix 1. University of Sheffield Ethical Approval letter

The University Of Sheffield.

Downloaded: 31/05/2021
Approved: 22/09/2020

Georgina Willis
Registration number: 170149318
Psychology
Programme: Clinical Psychology

Dear Georgina

PROJECT TITLE: Can associative evaluative conditioning change implicit trust and implicit self esteem
APPLICATION: Reference Number 036253

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 22/09/2020 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 036253 (form submission date: 10/09/2020); (expected project end date: 31/10/2020).
- Participant information sheet 1089225 version 1 (24/03/2021).
- Participant information sheet 1083144 version 1 (14/10/2020).
- Participant information sheet 1082122 version 2 (10/09/2020).
- Participant consent form 1082123 version 2 (10/09/2020).

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Department Of Psychology Research Ethics Committee
Ethics Administrator
Psychology

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

Appendix 2. Cohen's *d* power calculation table

Power Tables for Effect Size r

(from Cohen 1988, pg. 102)

two-tailed α = .05 or one-tailed α = .025

	r								
Power	**.10**	**.20**	**.30**	**.40**	**.50**	**.60**	**.70**	**.80**	**.90**
.25	167	42	20	12	8	6	5	4	3
.50	385	96	42	24	15	10	7	6	4
.60	490	122	53	29	18	12	9	6	5
2/3	570	142	63	34	21	14	10	7	5
.70	616	153	67	37	23	15	10	7	5
.75	692	172	75	41	25	17	11	8	6
.80	783	194	85	46	28	18	12	9	6
.85	895	221	97	52	32	21	14	10	6
.90	1047	259	113	62	37	24	16	11	7
.95	1294	319	139	75	46	30	19	13	8
.99	1828	450	195	105	64	40	27	18	11

two-tailed α = .01 or one-tailed α = .005

	r								
Power	**.10**	**.20**	**.30**	**.40**	**.50**	**.60**	**.70**	**.80**	**.90**
.25	362	91	40	23	15	11	8	6	5
.50	662	164	72	39	24	16	12	8	6
.60	797	198	87	47	29	19	13	9	7
2/3	901	223	97	53	32	21	15	10	7
.70	958	237	103	56	34	23	15	11	7
.75	1052	260	113	62	37	25	17	11	8
.80	1163	287	125	68	41	27	18	12	8
.85	1299	320	139	76	45	30	20	13	9
.90	1481	365	158	86	51	34	22	15	9
.95	1773	436	189	102	62	40	26	17	11
.99	2390	588	254	137	82	52	34	23	13

Table values represent the total number of participants needed to obtain a significant result at the given alpha, for that effect size, and power level.

Example: to detect an r=.5 using with a two-tailed α = .01 at 80% power, I need 41 participants.

Interpolation: What about r=.35, at 80% power for a two-tailed α = .05?

$$\text{sample size} = 46 + \frac{(.40 - .35)}{(.40 - .30)} * (85-46) = 65.5 \text{ ---> } 66$$

Appendix 3. Persecutory and Deservedness Scale (PaDS)

Please read each of the following statements carefully and indicate the extent to which they are true or false by circling a number on the scale.

1. There are times when I worry that others might be plotting against me.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
If you've answered 2 or above to the last question, please answer to the following question:					
1.1 Do you feel like you deserve others to plot against you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
2. I often find it hard to think of anything other than the negative ideas others have about me.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
If you've answered 2 or above to the last question, please answer to the following question:					
2.1 Do you feel like you deserve people to have negative ideas about you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
3. My friends often tell me to relax and stop worrying about being deceived or harmed.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
If you've answered 2 or above to the last question, please answer to the following question:					
3.1 Do you feel like you deserve being deceived or harmed?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
4. Every time I meet someone for the first time, I'm afraid they've	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**

already heard bad things about me.	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
4.1 Do you feel like you deserve to have people hearing bad things about you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
5. I'm often suspicious of other people's intentions towards me.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
5.1 Do you feel like you deserve people having bad intentions towards you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
6. Sometimes, I just know that people are talking critically about me.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
6.1 Do you feel like you deserve people to talk critically about you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
7. There are people who think of me as a bad person.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
7.1 Do you feel like you deserve people to think of you as a bad person?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
8. People will almost certainly lie to me.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**

	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
8.1 Do you feel like you deserve people to lie to you?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
9. I believe that some people want to hurt me deliberately.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
9.1 Do you feel like you deserve people to hurt you deliberately?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4
10. You should only trust yourself.	**Certainly false**	**Possibly false**	**Unsure**	**Possibly true**	**Certainly true**
	0	1	2	3	4
<u>If you've answered 2 or above to the last question, please answer to the following question:</u>					
10.1 Do you feel like you deserve to have no one you can trust?	**Not at all**	**Possibly not**	**Unsure**	**Possibly**	**Very much**
	0	1	2	3	4

Appendix 4. Rosenberg Self-Esteem Scale (RSES)

Rosenberg Self-Esteem Scale (RSE)

Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

	Strongly Agree	Agree	Disagree	Strongly Disagree
1. On the whole, I am satisfied with myself.	☐	☐	☐	☐
2. At times I think I am no good at all.	☐	☐	☐	☐
3. I feel that I have a number of good qualities.	☐	☐	☐	☐
4. I am able to do things as well as most other people.	☐	☐	☐	☐
5. I feel I do not have much to be proud of.	☐	☐	☐	☐
6. I certainly feel useless at times.	☐	☐	☐	☐
7. I feel that I'm a person of worth, at least on an equal plane with others.	☐	☐	☐	☐
8. I wish I could have more respect for myself.	☐	☐	☐	☐
9. All in all, I am inclined to feel that I am a failure.	☐	☐	☐	☐
10. I take a positive attitude toward myself.	☐	☐	☐	☐

Appendix 5. Relationship Questionnaire (RQ)

Scale:
Following are four general relationship styles that people often report. Place a checkmark next to the letter corresponding to the style that best describes you or is closest to the way you are.

____ A. It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

____ B. I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

____ C. I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

____ D. I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Now please rate each of the relationship styles above to indicate how well or poorly each description corresponds to your general relationship style.

Style A

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

Style B

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

Style C

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

Style D

1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed			Agree Strongly

Appendix 6. Patient Health Questionnaire (PHQ-9)

Patient Health Questionnaire (PHQ-9)

Patient Name: _____ **Date:** _____

	Not at all	Several days	More than half the days	Nearly every day
1. Over the *last 2 weeks*, how often have you been bothered by any of the following problems?				
a. Little interest or pleasure in doing things	☐	☐	☐	☐
b. Feeling down, depressed, or hopeless	☐	☐	☐	☐
c. Trouble falling/staying asleep, sleeping too much	☐	☐	☐	☐
d. Feeling tired or having little energy	☐	☐	☐	☐
e. Poor appetite or overeating	☐	☐	☐	☐
f. Feeling bad about yourself or that you are a failure or have let yourself or your family down	☐	☐	☐	☐
g. Trouble concentrating on things, such as reading the newspaper or watching television.	☐	☐	☐	☐
h. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around a lot more than usual.	☐	☐	☐	☐
i. Thoughts that you would be better off dead or of hurting yourself in some way.	☐	☐	☐	☐
2. If you checked off any problem on this questionnaire so far, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
	☐	☐	☐	☐

Appendix 7. State Adult Attachment Measure (SAAM)

The following statements concern how you feel **right now**. Please respond to each statement by indicating how much you agree or disagree with it as it reflects your **current** feelings. Please circle the number on the 1-to-7 scale that best indicates how you feel at the moment:

1	2	3	4	5	6	7
Disagree Strongly	***.....***	***.....***	***Neutral/Mixed***	***.....***	***.....***	***Agree Strongly***

Right now…

Anx	I wish someone would tell me they really love me
Avo	I would be uncomfortable having a good friend or a relationship partner close to me
Avo	I feel alone and yet don't feel like getting close to others
Sec	I feel loved
Anx	I wish someone close could see me now
Sec	If something went wrong right now I feel like I could depend on someone
Sec	I feel like others care about me
Anx	I feel a strong need to be unconditionally loved right now
Avo	I'm afraid someone will want to get too close to me
Avo	If someone tried to get close to me, I would try to keep my distance
Sec	I feel relaxed knowing that close others are there for me right now
Anx	I really need to feel loved right now
Sec	I feel like I have someone to rely on
Anx	I want to share my feelings with someone
Avo	I feel like I am loved by others but I really don't care
Avo	The idea of being emotionally close to someone makes me nervous
Anx	I want to talk with someone who cares for me about things that are worrying me
Sec	I feel secure and close to other people
Anx	I really need someone's emotional support
Sec	I feel I can trust the people who are close to me
Avo	I have mixed feelings about being close to other people

Appendix 8. Brief Paranoia Checklist (PCHL)

State adapted Paranoia Checklist, Brief version.

NOTE: Sections printed in purple and green represent alternative phrasing used in different ambulatory assessment studies

Three item version: Items 1, 2, and 3

Validation article: Schlier, B., Moritz, S., & Lincoln, T. M. (2016). Measuring fluctuations in paranoia: Validity and psychometric properties of brief state versions of the Paranoia Checklist. *Psychiatry Research*, *241*, 323-332.

[INSTRUCTIONS]

The following questionnaire deals with thoughts and feelings that one may experience in certain situations.

For each of the feelings and thoughts described below, please indicate how much they [apply/applied] to you [at the moment; for the last xx min/hours /since the last beep].

Feel free to answer based on what first came to your mind. There are no right or wrong answers.

	0 = Not at all										10 = very much
1. I need to be on my guard against others.	0	1	2	3	4	5	6	7	8	9	10
2. People are trying to make me upset.	0	1	2	3	4	5	6	7	8	9	10
3. Strangers and friends look at me critically.	0	1	2	3	4	5	6	7	8	9	10

Appendix 9. State Self-Esteem Scale (SSES)

Table 1
The State Self-Esteem Scale and Factor Loadings

Item	Primary factor	Loading
1. I feel confident about my abilities.	Performance	.65
2. I am worried about whether I am regarded as a success or failure. (R)	Social	.61
3. I feel satisfied with the way my body looks right now.	Appearance	.83
4. I feel frustrated or rattled about my performance (R).	Performance	.47
5. I feel that I am having trouble understanding things that I read. (R)	Performance	.47
6. I feel that others respect and admire me.	Appearance	.34
7. I am dissatisfied with my weight. (R)	Appearance	.69
8. I feel self-conscious. (R)	Social	.54
9. I feel as smart as others.	Performance	.68
10. I feel displeased with myself. (R)	Social	.37
11. I feel good about myself.	Appearance	.52
12. I am pleased with my appearance right now.	Appearance	.72
13. I am worried about what other people think of me. (R)	Social	.75
14. I feel confident that I understand things.	Performance	.62
15. I feel inferior to others at this moment. (R)	Social	.45
16. I feel unattractive. (R)	Appearance	.54
17. I feel concerned about the impression I am making. (R)	Social	.81
18. I feel that I have less scholastic ability right now than others. (R)	Performance	.55
19. I feel like I'm not doing well. (R)	Performance	.51
20. I am worried about looking foolish. (R)	Social	.62

Note. Coefficient alpha for whole scale = .92. *r* refers to corrected item–total correlations. (R) ir reverse scoring.

Appendix 10. Participant Information Sheet

Participant Information Sheet

1. Research Project Title: Can associative evaluative conditioning change implicit trust and implicit self-esteem?

You are being invited to take part in a research project. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Take time to decide whether or not you wish to take part. Thank you for reading this.

2. What is the project's purpose?

There has been evidence to suggest that impaired self-esteem, trust, and attachment relationships may contribute to the severity and course of psychological difficulties (e.g. paranoia and low mood). This research is aiming to test whether or not a brief experimental paradigm could be effective in temporarily changing elements of self-esteem and trust and its impact on self-reported psychological difficulties. If this paradigm is found to be effective, it could be tested in research with clinical populations and, potentially later, used within mental health services alongside other psychological treatments to help aid recovery from psychological difficulties.

You will be asked to read this information sheet carefully and complete an online consent form if you wish to participate. Once you have consented to participate in this study you will be directed to complete some online questionnaires (pre-measures) which should take approximately 10 – 15 minutes to complete. You will then be directed to complete some brief questions about yourself before completing a brief a computer task. Please note the information you provide on the "personal details" section including: name/nickname, surname, and date of birth will not be stored as data for this research. During the computer task you will be presented with some pictures of faces which you will need to rate on how trustworthy you think the face is. You will then be asked to click on a variety of words on the screen as quickly as possible with a picture of a face appearing after each word you click on. Some of the words you see during the computer task will be based on the answers you have given to the questions about yourself immediately prior to the task (e.g. your name). The computer task you are allocated to will either be the new paradigm we are testing or a similar equivalent task as part of the control condition. Which task you complete will be chosen at random. Once you have completed the computer task you will be asked to complete the same online questionnaires (post-measures) you answered during phase one of the study. Participation in this study will take approximately 30 – 45 minutes.

This research is being undertaken as part of completion of the Principal Investigator's Doctorate in Clinical Psychology.

3. Why have I been invited to take part?

You have been invited to participate in this study because you are an adult aged 18 years or

over, who responded to this study advertisement. In total around 200 individuals will be asked to participate in this study.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part in this study. If you do decide to take part, you will be asked to read this information sheet and complete a consent form which will be stored securely. You can request a copy of the information sheet and consent form for your records by emailing Gina Willis (Principal Investigator; gwillis1@sheffield.ac.uk). You can still withdraw from the study in the future without any negative consequences. You do not have to give a reason. If you wish to withdraw from the research, please contact Gina Willis (Principal Investigator; gwillis1@sheffield.ac.uk). The information you have provided will be removed from the study if you choose to withdraw using your anonymised participant ID number to identify it.

5. What are the possible disadvantages and risks of taking part?

The primary disadvantage anticipated for taking part in this study is the time that it may take for you to complete the questionnaires and computer task. In addition, there is a possibility that you may find some topics sensitive and could potentially experience some discomfort in answering them. Should this occur you have the right to discontinue or withdraw from the study if you wish.

6. What are the possible benefits of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will help inform future research and develop possible beneficial novel psychological interventions which help increase self-esteem and trust and reduce psychological difficulties.

7. Will my taking part in this project be kept confidential?

Yes. All of the information that we collect about you during the course of the research will be kept strictly confidential and will only be accessible to members of the research team. You will not be able to be identified in any reports or publications.

8. Will I receive any reimbursement of expenses for taking part in this research?

As this research is being conducted online there will be no reimbursement of expenses for participating. Accordingly, participation in this research is voluntary.

9. What is the legal basis for processing my personal data?

According to data protection legislation (General Data Protection Regulation; applicable in the UK and EU from 25 May 2018), we are required to inform you that the legal basis we are applying in order to process your personal data is that 'processing is necessary for the performance of a task carried out in the public interest' (Article 6(1)(e)). Further information can be found in the University's Privacy Notice https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

As we will be collecting some data that is defined in the legislation as more sensitive, we also need to let you know that we are applying the following condition in law: that the use of your data is 'necessary for scientific or historical research purposes'.

10. What will happen to the data collected, and the results of the research project?

Any data collected from you by you filling the questionnaires or other information to the research team will generally be anonymised. This data will be stored securely and will only be available to members of the research team. All data will be securely destroyed once it is no longer needed for research purposes. **As previously stated the information you provide on the "personal details" section including: name/nickname, surname, and date of birth will not be stored as data for this research** The data controller for this research is the University of Sheffield.

As the study is part of a doctoral course in Clinical Psychology, it will be submitted to the University for marking. It may be that in the future the findings of this study are published in a relevant journal or presented at a conference. A brief report of the findings will be sent to interested participants who request a copy via email to the principle investigator Gina Willis, email: gwillis1@sheffield.ac.uk. Participants will not be identified within any of these publications.

Due to the nature of this research it is very likely that other researchers may find the data collected to be useful in answering future research questions. We would ask for your explicit consent for your data to be shared in this way.

11. Who is organising and funding the research?

The University of Sheffield is organising and funding the research.

12. Who has ethically reviewed the project?

This project has been ethically approved via the University of Sheffield research ethics board department.

13. What if something goes wrong and I wish to complain about the research?

If you have a concern about any aspect of this study, please do not hesitate to contact either myself or my project supervisor (please see below):

Principal Investigator:	**Project Supervisor:**
Gina Willis, Trainee Clinical Psychologist gwillis1@sheffield.ac.uk Clinical Psychology Unit, Department of Psychology, University of Sheffield, Floor F, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT	Professor Richard Bentall r.bentall@sheffield .ac.uk Department of Psychology, University of Sheffield, Floor D, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT Tel: 01142226525

Should you feel that your complaint has not been handled to your satisfaction, or if you wish to contact a person external to the project, please do not hesitate to contact our Head of Department: **Professor Liz Milne, Department of Psychology, University of Sheffield Floor D, Cathedral Court, 1 Vicar Lane, Sheffield, S1 2LT**. The Head of Department will then be able to escalate the complaint through the appropriate channels.

If your complaint relates to how your personal data has been handled, then further information about raising this type of complaint may be found in the University's Privacy Notice: https://www.sheffield.ac.uk/govern/data-protection/privacy/general.

14. Contact for further information

For further information please do not hesitate to contact a member of the project team

(please see above).

You will be given a copy of the information sheet and of your consent form, to keep.

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

Appendix 11. Participant Electronic Consent form

Consent Form

Please check the appropriate boxes

Taking part in the project

I have read and understood the project information sheet. (If you answer No to this question please do not proceed with this consent form until you are fully aware of what your participation in the project will mean.)

☐ Yes

☐ No

I understand that my taking part is voluntary and that I can withdraw from the study at any time I do not have to give any reasons for why I no longer want to take part and there will be no adverse consequences if I choose to withdraw.

☐ Yes

☐ No

How my information will be used during and after the project

I understand my personal details such as name/nickname, surname, and date of birth will not be stored as data in this research.

☐ Yes

☐ No

I understand and agree that other authorised researchers may use my data in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

☐ Yes

☐ No

I give permission for the response data that I provide to be deposited in the Open Science Framework repository (https://osf.io) so it can be used for future research and learning.

☐ Yes

☐ No

Appendix 12. Participant Debrief

Debrief sheet

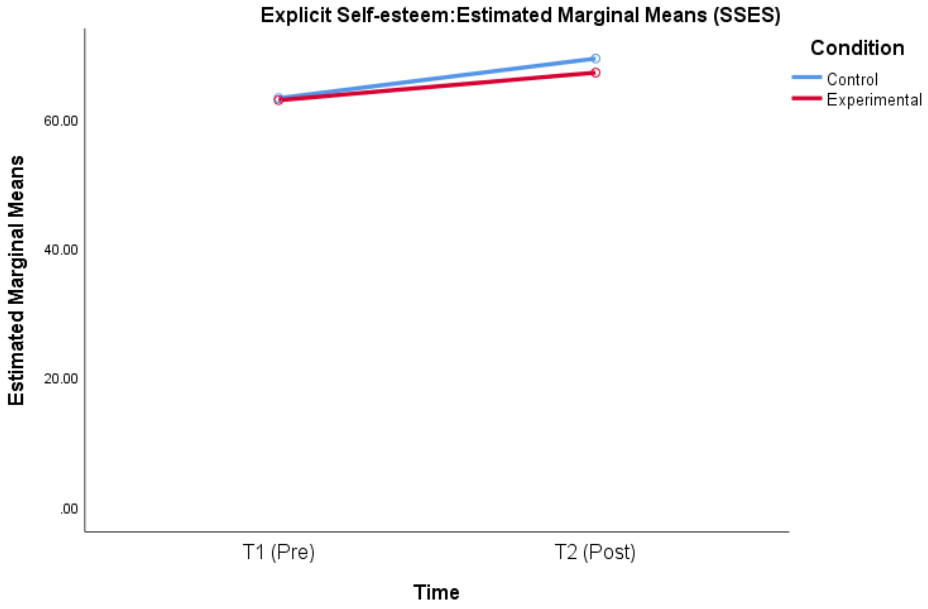
This research aimed to explore whether evaluative conditioning could improve implicit self-esteem and implicit trust in individuals who may have experiences of psychological difficulties. To test this we asked you to fill in a series of questionnaires both before and after completing a computer task. It is important to note the information you provided in **"personal details"** including name/nickname, surname, and date of birth **has not been stored** as data for this research as this was only used to personalise the computer task to you. You were randomised into one of two groups:

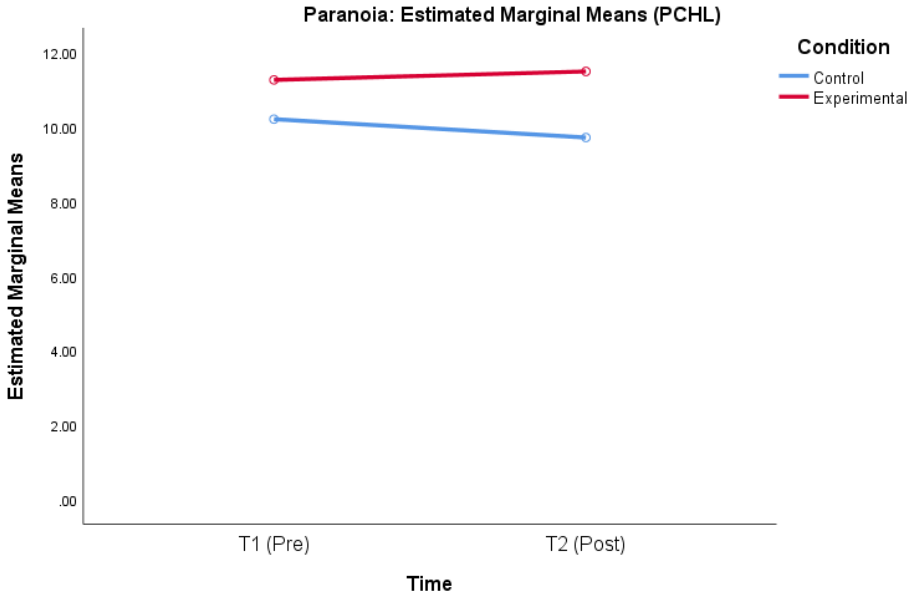
1) Experimental condition – you received the evaluative conditioning computer task.

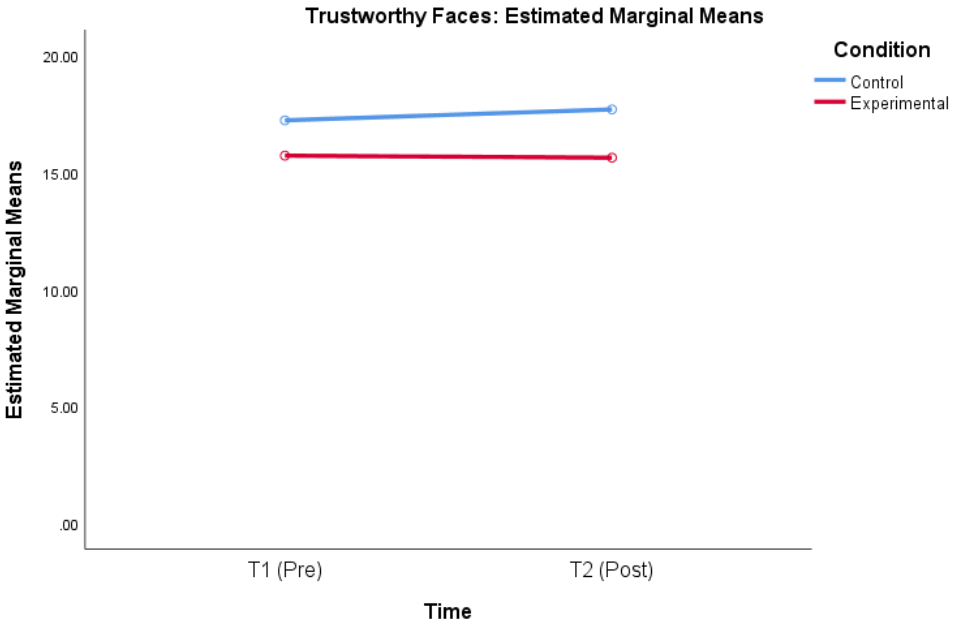
2) Control condition – you received a neutral computer task

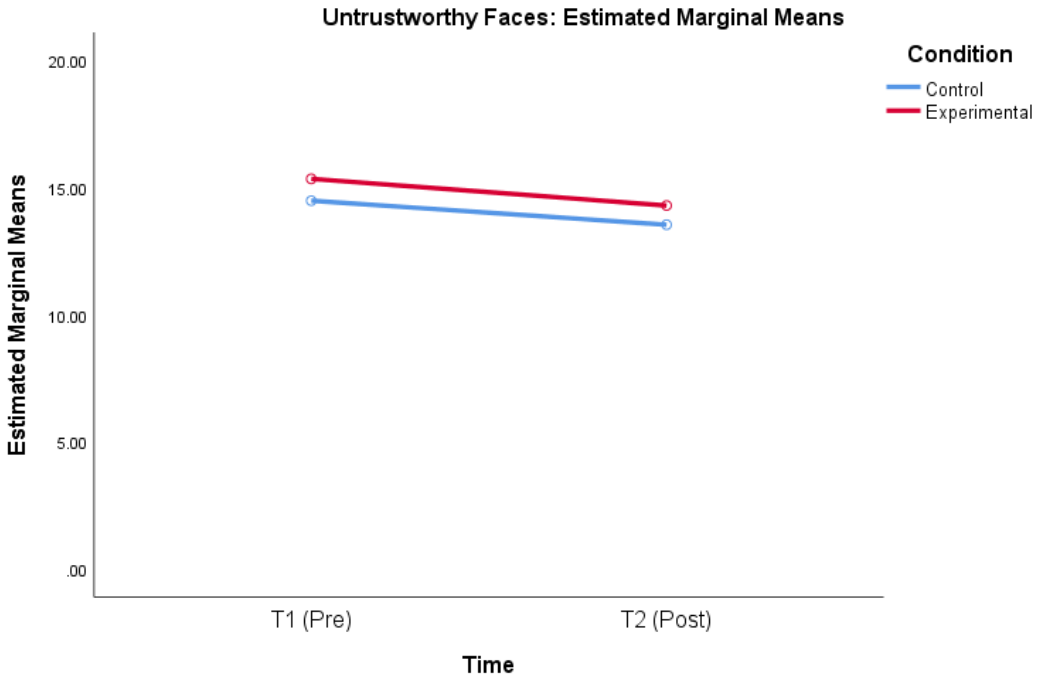
The reason you were randomised was to eliminate bias and to ensure that every individual who agreed to take part in this study was given an equal chance of being chosen to do the experimental condition. In addition by randomising which group you were allocated to we are able to increase the chances that our sample and the study findings are representative of the wider general population which is important to confirm whether the intervention will be useful for everyone. If the experimental condition is shown to be effective and you were initially allocated to the control condition you will have the opportunity to engage in the experimental task if you wish.

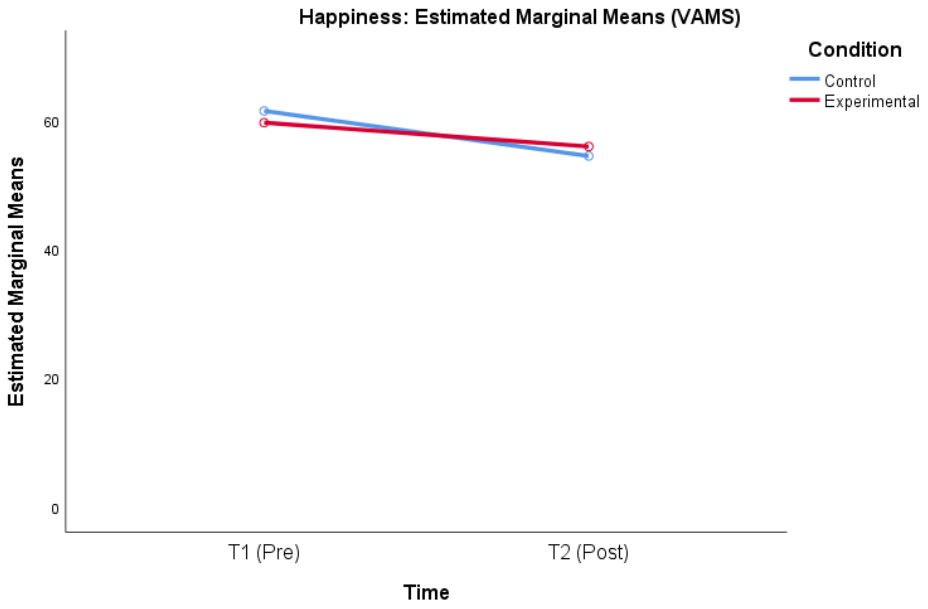
Appendix 13. Repeated Measures ANOVAs Graphs for pre- and post variables

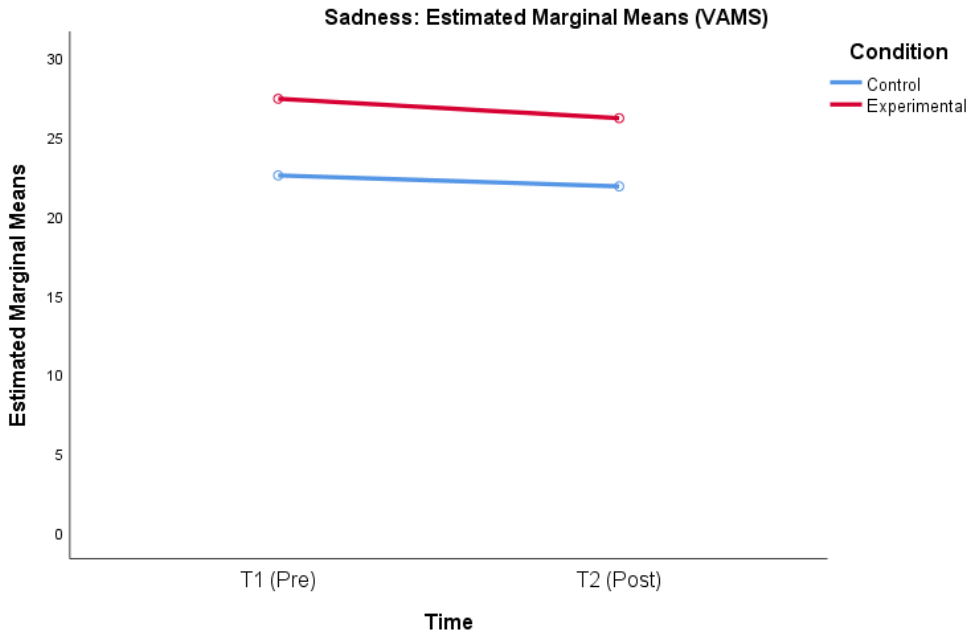


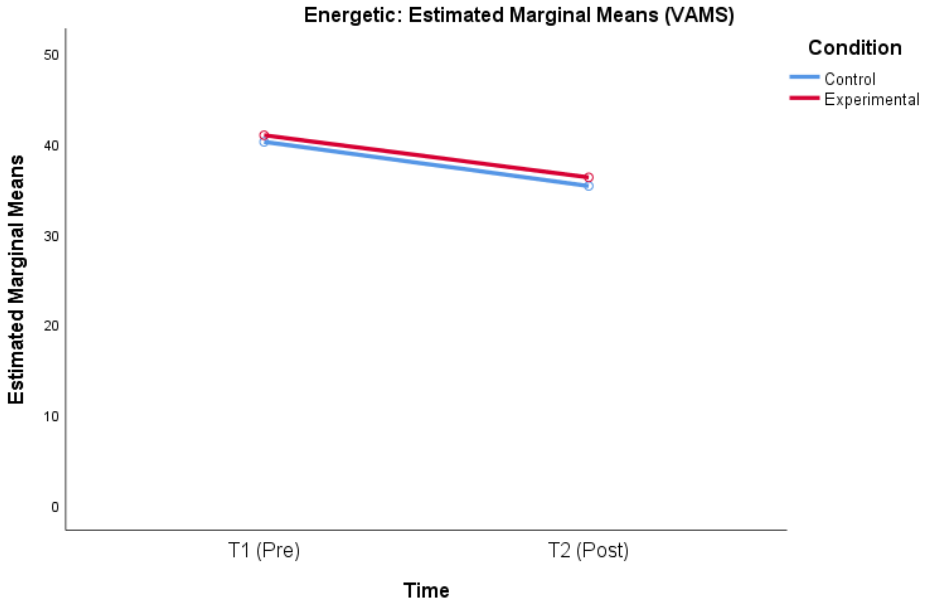


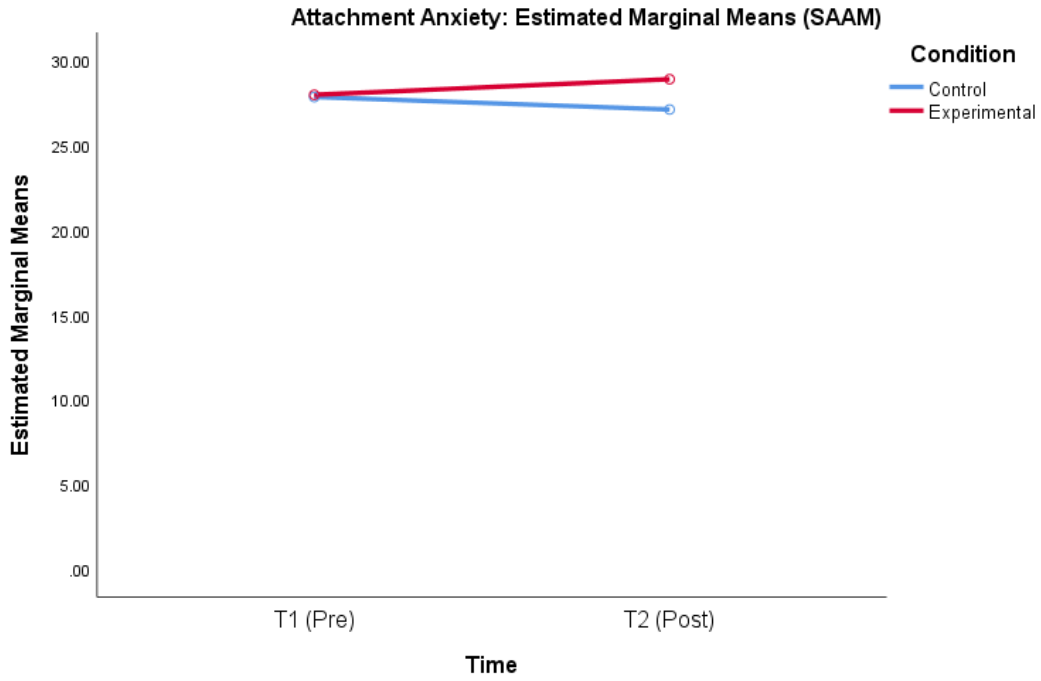

Trustworthy Faces: Estimated Marginal Means
Condition
Control
Experimental
Estimated Marginal Means
20.00
15.00
10.00
5.00
.00
T1 (Pre)
T2 (Post)
Time

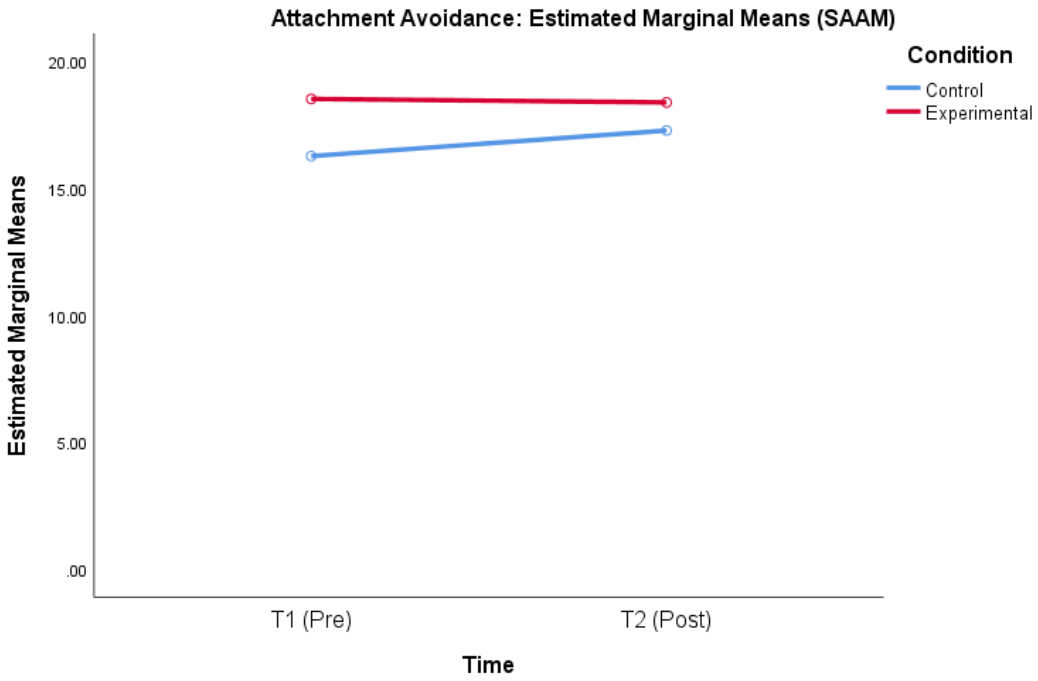

Untrustworthy Faces: Estimated Marginal Means
Condition
Control
Experimental
Estimated Marginal Means
20.00
15.00
10.00
5.00
.00
T1 (Pre)
T2 (Post)
Time

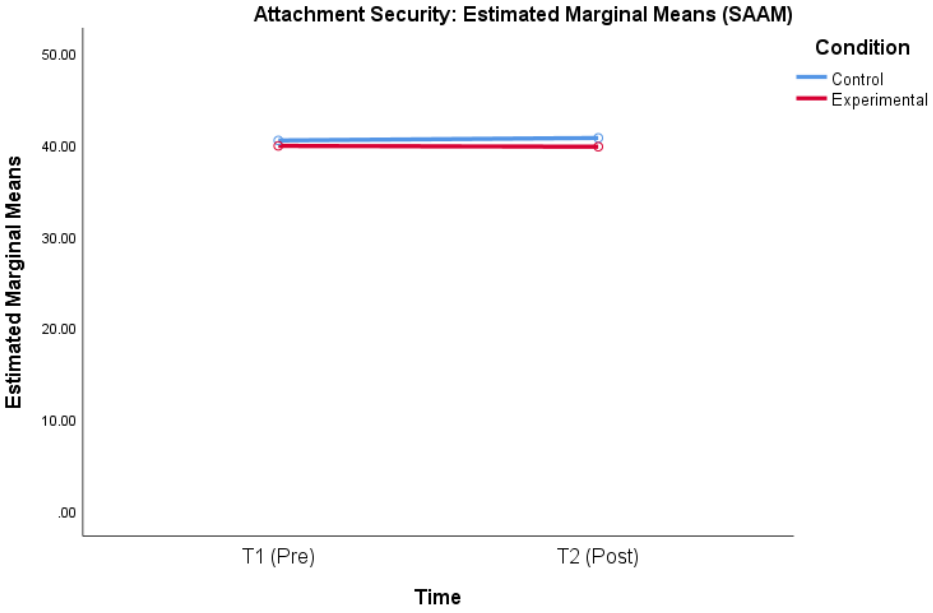

Happiness: Estimated Marginal Means (VAMS)
Condition
Control
Experimental
Estimated Marginal Means
60
40
20
0
T1 (Pre)
T2 (Post)
Time


Sadness: Estimated Marginal Means (VAMS)
Condition
Control
Experimental
Estimated Marginal Means
30
25
20
15
10
5
0
T1 (Pre)
T2 (Post)
Time


Energetic: Estimated Marginal Means (VAMS)
Condition
Control
Experimental
Estimated Marginal Means
50
40
30
20
10
0
T1 (Pre)
T2 (Post)
Time


Attachment Anxiety: Estimated Marginal Means (SAAM)
Condition
Control
Experimental
Estimated Marginal Means
30.00
25.00
20.00
15.00
10.00
5.00
.00
T1 (Pre)
T2 (Post)
Time


Attachment Avoidance: Estimated Marginal Means (SAAM)
Condition
Control
Experimental
Estimated Marginal Means
20.00
15.00
10.00
5.00
.00
T1 (Pre)
T2 (Post)
Time


Attachment Security: Estimated Marginal Means (SAAM)
Condition
Control
Experimental
Estimated Marginal Means
50.00
40.00
30.00
20.00
10.00
.00
T1 (Pre)
T2 (Post)
Time

Appendix 14. Social Media Study Advert

ONLINE EXPERIMENT PARTICIPANTS NEEDED

The University Of Sheffield.

Would you like to take part in a study exploring whether it is possible to change implicit (unconscious) trust and self-esteem?

WHAT IS IT ABOUT?

This study is looking for adults, aged 18 years and over, to complete a set of questionnaires online before and after completing a brief computer task.

You can complete this research online in one session from home on your computer or laptop. Participation should take approximately 30 - 40 minutes.

This work has been approved by: The University of Sheffield, Department of Psychology Ethics Committee. All information recorded will remain anonymous throughout.

HOW TO TAKE PART

If you are interested in taking part, please follow the link provided.

https://sheffieldpsychology.eu.qualtrics.com/jfe/form/SV_41l2DvKfHtK2zVY