WHEN TRUST IS LOST: THE IMPACT OF INTERPERSONAL TRAUMA ON SOCIAL INTERACTIONS

JUNE 2018

SUBMITTED TO PSYCHOLOGICAL MEDICINE
WORD COUNT: 3497

Dr. Victoria Bell BSc PhD DClinPsy*
Research Clinical Psychologist, Department of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, UK.

Dr. Benjamin Robinson BA BSc MSc PhD MRCPsych
Senior Registrar in Medical Psychotherapy and General Adult Psychiatry, Southwark Integrated Psychological Therapies Team, South London and Maudsley NHS Foundation Trust, London, UK.

Prof. Cornelius Katona MD FRCPsych
Honorary Professor of Psychiatry, University College London, United Kingdom.
Medical Director, Helen Bamber Foundation, London, UK.

Dr. Anne-Kathrin Fett BSc MSc PhD
Department of Psychology, City University of London And Department of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, UK.

Prof. Sukhi Shergill BSc MBBS SFHEA PhD FRCPsych
Professor of Psychiatry & Systems Neuroscience, Department of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, UK.
Consultant Psychiatrist, National Psychosis Service, South London and Maudsley NHS Foundation Trust, London, UK.

Corresponding author: Dr. Victoria Bell, Department of Psychosis Studies, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, SE5 8AF, UK. Email: victoria.1.bell@kcl.ac.uk.

ABSTRACT

Background: Trauma due to deliberate harm by others is known to increase the likelihood of developing Post Traumatic Stress Disorder (PTSD). This is a first study investigating basic and dynamic trust in 'interpersonal' PTSD.

Methods: Thirty-two participants with PTSD and twenty-two healthy controls played the novel multi-round version of a monetary investment protocol, the so-called 'Trust Game', a task from the behavioural economics literature, which is considered to involve trust and reciprocity. We used two 'Trust Games' including cooperative and unfair partners.

Results: Findings showed an effect for lower basic investment in PTSD compared to healthy controls, that trended towards significance (p=0.09). All participants showed behavioural flexibility and modified their reciprocity based on behavioural cues from their cooperative and unfair game partners. However, participants with PTSD participants made significantly lower investments towards the cooperative partner than controls. Investments towards the unfair partner did not differ between groups. Higher trauma scores were associated with lower levels of trust-related investments towards the cooperative but not the unfair game partner.

Conclusion: The association between reduced trust towards cooperative other in individuals who experienced interpersonal trauma could indicate acquired insensitivity to social rewards or inflexible negative beliefs about others as sequel of the traumatic experience, which increase in a dose response relationship with the severity of the trauma. A specific focus on cooperation and trusting behaviour could provide a focus for future cognitive and pharmacological interventions.

INTRODUCTION

Traumatic events can take many forms, such as experiencing or witnessing sexual or physical assault, a terrorist attack, war, or a natural disaster. Most recover, but a proportion will develop Post-traumatic Stress Disorder (PTSD), leading to a lifetime prevalence of about 7% (Kessler et al., 2005). Individuals whose trauma was 'interpersonal' (caused deliberately by other people) are twice as likely to develop PTSD, relative to those who experience accidental trauma with more complex and severe symptoms (Charuvastra & Cloitre, 2008).

Theoretical models of trauma suggest that an individual's interpretation of others' intentions is more important than the actual responses themselves (Ehlers & Clark, 2000). Not surprisingly, interpersonal trauma can alter a sense of trust in a way that is likely to be a significant contributor to relationship difficulties. Cias and colleagues (2000) reported the only distinguishing variable from PTSD and a subsample of individuals with depression was lower reported levels of interpersonal trust. Trust is widely considered fundamental for the recovery of trauma survivors by enabling them to effectively manage conflict in relationships and establish mutually cooperative interactions (e.g., Williams et al., 2014; Chouliara et al., 2017). Trust can be defined as *"a psychological state comprising the intention to accept vulnerability based upon the positive expectations of the intentions or behaviour of another"* (Rousseau et al., 1998, pp. 395). Vulnerability may be defined by the costs and benefits of trusting (i.e., costs are the losses incurred from betrayal vs. profits when the trustee reciprocates). The impairment in trust can take different forms that may depend on the nature of trauma. Those who are exposed to interpersonal trauma are more likely to report a generalising of mistrust to all people, irrespective of whether these individuals had done anything to warrant this suspicion; they are also more likely to distance themselves from others, not giving others a chance to prove trustworthiness. Clinical experience indicates PTSD patients typically wish they could trust others more, and often describe themselves as having been too trusting before their experience of trauma/s, and thus view mistrust as a necessity to their continued sense of safety and control. Mistrust can form quickly, with minor breaches of trust being evidence

confirming an implicit suspicion of others. Such thoughts may vary across a continuum, from low levels of mistrust and suspiciousness to distressing unfounded paranoid ideas (Freeman et al., 2010). A less trusting attitude towards others may be initially self-protective, yet longer-term the reduced ability to establish trust can be a barrier to engagement with mental health services.

Quantifying relational trust in an objective way is not an easy task since reasons to trust or not will vary between individuals. One objective approach to quantify trust can be repurposed from economic game theoretical approaches (Camerer, 2003), without bias created by the inherent contextual factors in questionnaire based studies. The interactive 'Trust Game' (King-Casas et al., 2005; Berg et al. 1995) attempts to assess dynamic changes in the development of trust-related behaviour during the investment and reciprocation of money between an investor and partner; the cross-diagnostic value of this paradigm in the investigation of social behaviour and its associated neural mechanisms was recently reviewed by Fett et al. (2015). The participant has to decide how much of an endowment s/he wants to invest, and this transferred amount is multiplied and the partner decides how much of the total amount to return. There are two game partners: cooperative and unfair, which allows exploration of whether the participant can reciprocate investment behaviour, a possible index of trust, following repeated friendly signals by the partner, or whether there is a general insensitivity to social feedback. The 'Trust Game' has previously been used in other clinical (Fett et al., 2014; Fett et al., 2012; Zhang et al., 2012; King-Casas et al., 2008) and non-clinical populations (Houser et al., 2010). To date, there is surprisingly little research on the link between trust and PTSD and only a few studies have adopted the 'Trust Game' with PTSD samples. For example, Cisler and colleagues (2015) found women with PTSD who had been assaulted responded to an unfair playing style with decreases in trust, and showed significantly lower learning rates suggesting less flexibility in updating social expectations and less use of social experiences in guiding social decision-making. Within a therapeutic context, Williams and colleagues (2014) showed changes in interpersonal trust with twenty-one veterans using the 'Trust Game' following long-

term group psychotherapy. Interest in these relational aspects of PTSD is growing with the planned introduction of the diagnosis of Complex PTSD (CPTSD) in new International Classification of Diseases 11 (ICD11) in 2018; affective and relational functioning are key new components of this new diagnostic category.

The aim of the study is to investigate if and how interpersonal PTSD influences investment behaviour, and therefore possibly trust, compared to individuals without PTSD. We hypothesised that, relative to the healthy controls, the PTSD group would: a) have lower levels of initial investment (suggestive of trust towards unknown others); b) behave in a self-protective manner and not increase investments during iterative cooperative interactions; c) be more sensitive to unfair treatment by others and thus invest lower amounts; and d) within the PTSD group, the degree of impairment in trust-related investment behaviour will be influenced by the severity of overall trauma symptoms.

METHOD

Participants

The sample comprised 54 participants. Participants with PTSD (n=22) were recruited from adult mental health services in South London and Maudsley NHS Foundation Trust and the Helen Bamber Foundation charity; a human rights charity working with survivors of torture and extreme human cruelty. Participants included refugees and asylum seekers who are survivors of state-sponsored torture, human trafficking, slavery, war, and domestic, gender, or sexuality-based violence. Healthy controls (n=32) were recruited via King's College volunteer database and adverts in the local area. Inclusion criteria for the PTSD group included a primary diagnosis of PTSD given by their treating team as defined by DSM-5 (APA, 2013) with no change in psychotropic medication in the last month. The control group had no current psychiatric diagnosis or history of PTSD. All participants were 18 years+ and required to have a sufficient command of the English language to take part in the study. Criteria for exclusion were: a primary diagnosis of alcohol or substance dependency; organic syndrome or learning

disability; or a current risk of suicide/risk to others judged by the clinical team to be sufficient to warrant exclusion.

Outcomes

Post-traumatic Diagnostic Scale (PDS). PTSD symptoms were confirmed with the PDS (Foa, et al., 1997), which was also used to exclude PTSD symptoms in controls. The questionnaire consists of four parts: parts 1 and 2 cover exposure to a range of traumas in accordance with DSM criteria, part 3 covers the severity of symptoms, and part 4 assesses the impact of the trauma on social functioning. It yields a total score (ranging from 0 to 51), with severity ratings: 0 none, 1–10 mild, 11–20 moderate, 21–35 moderate to severe and 36+ severe. The PDS is shown to have a good concordance with full clinical interviews (SCID) to diagnose PTSD.

National Adult Reading Test (NART). The NART was used as an indicator of general cognitive ability (Crawford et al., 2001) and is widely used in research and is shown to be a good estimate of the intelligence quotient. It was administered to screen for potential differences in IQ between individuals with and without PTSD, to ensure the impairment in trust was not confounded by intelligence.

'Trust Game'. We used a modified version (see Gromann et al., 2013; King-Casas, 2005), where participants were told that they would play with two different human partners. Participants were given £10 at the beginning of each trial and could invest any amount between £0-10. The pre-programmed partner returned an amount depending on a computer algorithm; the cooperative partner strongly reinforced cooperation, as the chance of a higher repayment increased with every increase in investor trust; and the unfair partner in turn reduced repayment with increases in investor trust. In total, all participants played 20 game trials and 20 null trials. Null rounds were designed to ensure participants attended to the game; in these rounds, a red triangle appeared beneath boxes representing different monetary values and the participant was required to move the arrow key to that box. These control

rounds were later excluded from the data analysis, after ensuring that participants had correctly understood the task.

Procedure

Participants read the study information sheets and provided written informed consent during an initial session that also included a brief interview about demographic information. Participants were assessed individually; they completed the questionnaires, and then the order in which the 'Trust Games' were administered was counterbalanced. Participants were led to believe they were playing against two anonymous persons, in a different room through a computer interface. They were all compensated £25 for their time. The specific focus was upon trust and PTSD was not explained until the end of the study in order not to bias the sample during assessment. The study was approved by the Outer West London Research Ethics Committee 10/H0709/8.

Statistical analysis

Analyses were performed in STATA version 14.1 (StataCorp, 2015). Demographics were analysed with $\chi 2$ tests or t-tests as appropriate. We analysed the 'Trust Game' data using mixed effects random regression (XTMIXED) to account for repeated measures within person. The models included the effect of group (PTSD vs. Control), condition (cooperative vs. unfair), trial number and all two and three-way interaction terms. A dose-response relationship between trauma (PDS scores) and trust in patients was explored using mixed effect random regression.

RESULTS

Sample characteristics

Participants (n=54) were aged 20-63 years (Mean=34.30, SD=11.47) and ethnicities were white (n= 25), black British (n=4), black African (n=11), and other (n=14). They had a National Adult Reading Test (NART; Crawford et al., 2001) estimated IQ within the normal (84-123)

range. There were no significant differences between the groups in age, ethnicity or premorbid IQ. The PTSD group's mean trauma score (PDS total) was within the 'severe' range [Mean=39.9, SD=7.8; Range 22-50] and for the controls was 'low' [Mean=1.9, SD=2.9; Range 0-7].

'Trust Game' performance

The analysis showed a non-significant trend effect for baseline trust (*b*=.96, *p* =.09; see Figure 1). Controls made slightly higher investments than individuals with PTSD (6.75, SD=2.41 vs. 5.78, SD=2.63). The mixed effects random regression analysis showed no significant three-way interaction between group, condition and trial number and no interaction between group and trial number. Interactions between trial number and condition (*b*=-.21, *p*<.001) and group and condition (*b*=-.76, *p*<.001) were significant. Post-hoc analyses by condition showed significantly higher investments during cooperation in controls compared to individuals with PTSD (*b*=1.13, *p*<0.01; see Figure 2). All participants increased their investments over trials (b=.08, *p*<0.001). The interaction between group and trial number was non-significant (*p*=.81). The investments did not differ significantly between groups in the unfair condition. A significant effect of trial number showed that all participants decreased investments over trials (b=-.13, *p*<0.001). The interaction between group and trial number was non-significant (*p*=.71, see Table 1 for mean investments by condition and group). Within patients higher PDS scores were associated with lower trust towards the cooperative (b = -.03, *p < 0.001)* but not towards the unfair other (*p* = .3).

[Table 1]

[Figure 1]

[Figure 2]

DISCUSSION

We examined trust-related behaviour and the ability to develop such trust behaviour in PTSD following interpersonal trauma, using real-time social interactions. The results revealed lower basic trust in those with PTSD compared with controls, but this was not statistically significant. Trial-by-trial interactions showed that both groups were able to anticipate and act upon the behaviour of their partner by adapting their responses accordingly. The PTSD group had a lower propensity to reciprocate their partners' trustworthy behaviour, even in the face of ostensible cooperative behaviour. We considered it probable that interpersonal trauma would skew judgements about others to the negative and this is what was found; higher trauma scores were correlated with lower levels of overall trust-related behaviour. An ability to recognise when to employ trusting behaviour (or not) is positive, but caution developing trust and cooperation may not only influence social relationships but also therapeutic alliances in mental health services.

The smaller initial investments made by the PTSD group may suggest an impaired ability to initiate mutually trusting relationships which fits with the general existing literature that interpersonal trauma/s are particularly damaging to social relationships (Chouliara et al., 2017). Definitions of trust emphasise that it is an ability (and confidence in the ability) to predict others' behaviour, and it is plausible that this confidence may have been shattered following traumatic event/s. The modification of responses according to their partners playing style shows an ability to accurately interpret social cues, anticipate future behaviour, and a general behavioural flexibility, which has been associated with activation in Theory of Mind related brain areas using the 'Trust Game' paradigm (King-Casas et al., 2008; van den Bos et al., 2011).

Although those with PTSD were able to use feedback to change behaviour, they displayed a lower propensity to trust cooperative others compared to controls. There are several possible explanations. First, although the PTSD group might have a desire to cooperate, they may

have been unwilling to reciprocate trust unless they believed that others would not take advantage of their own cooperation; perhaps indicating reduced perspective-taking or adopting a 'better safe than sorry' approach toward others. This fits with the literature that continues to implicate an individual's beliefs as central to the development and maintenance of PTSD (Beck et al., 2014). This is also supported by the dose response relationship between PDS scores and trust during cooperation. Second a lower propensity to reciprocate their partners' cooperative behaviour could also be explained by a lack of trust in oneself (rather than the partner). Research indicates that some survivors of interpersonal violence blame themselves for the trauma happening (Deprince et al., 2011), which may place doubt in their mind about their ability in deciding who to trust. Furthermore they may believe they are not worth achieving the profit and therefore have less interest in cooperating with a partner. One study investigated PTSD symptoms at one and four month's post-trauma and reported that the relationships between early re-experiencing and emotional numbing symptoms and later PTSD symptoms were mediated by negative cognitions about the self (Carper et al., 2015). Third, neuroimaging studies with healthy populations have showed activation in brain areas related to reward learning when adapting behaviour during the 'Trust Game' circumstances (King-Casas et al., 2005, 2008; Sanfey, 2007; Phan et al., 2010). Therefore, it is possible that the observed finding is due to a reduced experience of social reward following positive social contact, which may limit the reciprocal interactions of PTSD patients with others; future studies could conduct the 'Trust Game' in the MRI scanner, as has been done with those with psychosis, to identify underlying neural processes (Gromann et al., 2013).

During the unfair games all participants invested less than during cooperative rounds and this is consistent with previous studies (Fett et al., 2012; King-Casas et al., 2005) that show individuals are sensitive to the violation of the expected reciprocity. Most conceptualisations of trust emphasise that it involves beliefs about other's benevolent motives during social interactions that involve a conflict of interests. Balliet and Van Lange (2012) found that the degree of conflict in the dilemma moderated the relationship between trust and cooperation;

situations of high conflict make it especially likely that people will condition their cooperation based on beliefs about other's intentions (Holmes, 2004; Simpson, 2007). We anticipated that individuals with PTSD would have reacted more strongly to the unfair partner, but perhaps this condition contained a low conflict of interest and therefore behaviour may have been more influenced by other more self-serving motives, such as impression management. Furthermore, Parks and Hulbert (1995) assessed trust with the public goods game and resource dilemma game, and found that when fear was present (i.e., greater costs associated with a partner taking advantage of one's own cooperation), those with initial high trust cooperated more frequently than those with initial low trust; however when fear was absent (i.e., when a partner's non-cooperative behaviour caused less harm to one's own outcomes), both groups performed the same. Given the importance placed on a sense of current threat in cognitive theoretical models of PTSD, these results imply that findings may be influenced by whether the particular social dilemma contains an element of fear and this could be explored in future work.

We also found that those experiencing the most severe trauma symptoms made the lowest investments indicating a greater impairment in trust, as measured by the average investments during the cooperative trials. Having more severe symptoms could indicate a more recent exposure to trauma or prolonged exposure over a longer period of time; perhaps these individuals are more likely to re-experience the trauma/s more frequently than those with milder symptoms and thus the inability to develop trust is maintained. It will be important in future work to clarify the role of trust and reciprocity in the onset, maintenance and complexity of PTSD.

A key strength of the study is that it illustrates the potential methodological advancement in the use of a behavioural economic paradigm to study relational trust in PTSD. Nevertheless, the study has some limitations worth noting in order to enhance the impact of future research. First it is not possible to determine cause and effect due to the cross-sectional design; the

inclusion of a comparison accidental trauma sample and a larger sample size would be needed to replicate these findings more robustly. Second one advantage of probabilistic tasks, like the 'Trust Game', is that analysis of learning in terms of prediction errors is possible, this would involve elaborating a model of: a) the prior, b) the prediction error mechanism, and c) how action selection (investment amounts) is dependent on the prediction error mechanism. This aspect of the data has not been explored in this study, primarily because there are too few data points to successfully fit his type of model. However, a future study with larger number of trials could usefully examine these interesting parameters. Third it could be argued that the findings related to a lower propensity to reciprocate partners' trustworthy behaviour is a result of high levels of anxiety or depression; therefore assessment of comorbid disorders will be important. It may also be beneficial to corroborate the 'Trust Game' data with other behavioural measures of trust alongside a self-report questionnaire of relational trust. Fourth it is possible that the 'Trust Game' might depart too much from the type of trust decisions that survivors of interpersonal trauma make about others and which often include vulnerability or the threat of harm from others. Implementing a dynamic manipulation of reciprocity from the partner could provide a context within which to examine how the participants respond to unexpected changes in social behaviour. Participants were primed with the idea that they were playing with another person, and this concept is widely recognised in psychology to influence people's decision-making even if it happens sub-consciously (Baragh, 2006). However it is possible that participants did not believe they were playing against a human partner, and future investigations should provide an appropriate level of details about the partner's identity. For example, trustworthiness is dependent on a person's appearance, ethnic origin and the situation in which trust is exerted. This raises the broader question of the extent to which the 'Trust Game' reflects actual experiences of trust in day to day life, and future studies need to address how behaviour in the Trust Game is associated with social behaviour in real life, for example with experience sampling measures. Finally we are curious about the association between severity of trauma symptoms, perceived extent of betrayal that occurred during the trauma (Martin et al., 2013) and the experience of social defeat that may increase the risk of

developing paranoid appraisals (Valmaggia et al., 2013). Investigating paranoia in response to interpersonal trauma is a novel focus for research, looking at the extent to which fears are generalized and exaggerated beyond the trauma event/s. The hypothesis here would be that clinical paranoia may emerge in those with PTSD as a result of a loss of trust in others, so that loss of trust may contribute both to the PTSD and the paranoia. One plausible way forward is to assess the degree to which these same psychological processes may occur in PTSD, psychosis and non-clinical samples, as consistent with assumptions of a continuum (Bebbington et al., 2013).

In conclusion, these findings provide preliminary support to our main hypothesis that diminished trust may be an important process in relational difficulties following interpersonal PTSD. We found trust in PTSD was only significantly lower when playing cooperative others, and that higher PDS scores were associated with lower trust but again only during cooperative tasks. Therefore, the factors that contribute to the development and maintenance of reciprocating cooperative behaviour could provide a focus for future cognitive and pharmacological interventions.

ACKNOWLEDGEMENTS

We would like to thank all the participants who contributed to this study. The authors thank: Natalia Baranova, Samantha Hongsubchat, Abu-Bakr Mudawi, Sumeet Sanghera, and Aditi Trehan for assisting with data collection.

FINANCIAL SUPPORT

SS was funded by a European Research Council Grant [grant number 311686], and by the National Institute for Health Research (NIHR) Mental Health Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and King's College London and a joint infrastructure grant from Guy's and St Thomas' Charity and the Maudsley Charity. AF received

support from the Netherland Organization for Scientific Research (NWO) VENI Grant [451-13-035] and a [2015] NARSAD Young Investigator Award from the Brain and Behaviour Foundation.

CONFLICT OF INTEREST

None

ETHICAL STANDARDS

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guides on the care and use of laboratory animals.

REFERENCES

American Psychiatric Association (APA) (2013). *Diagnostic and statistical manual of mental disorders* (5th Ed.). Washington.

Balliet D, Van Lange PA. (2013). Trust, conflict, and cooperation: A meta-analysis. *Psychological Bulletin* **139**, 1090.

Bargh JA. (2006). What have we been priming all these years? On the development, mechanisms, and ecology of nonconscious social behaviour. *European Journal of Social Psychology* **36**, 147 -168.

Bebbington PE, McBride O, Steel C, Kuipers E, Radovanovič M, Brugha T, Jenkins R, Meltzer HI, Freeman D (2013). The structure of paranoia in the general population. *The British Journal of Psychiatry* **202**, 419-27.

Beck JG, Jacobs-Lentz J, Jones JM, Olsen SA, Clapp JD (2014). Understanding post-trauma cognitions and beliefs. In Facilitating Resilience and Recovery Following

Trauma. Edited by Zoellner LA, Feeny NC, Zoellner LA, Feeny NC. Guilford Press: 167-190.

Becchetti L, Conzo P, Romeo A. (2014). Violence, trust, and trustworthiness: Evidence from a Nairobi slum. *Oxford Economic Paper* **66,** 283-385.

Berg J, Dickhaut J, McCabe K. (1995). Trust, reciprocity and social history. *Games and Economic Behaviour* **10**, 122–42.

Camerer CF (2003). Psychology and economics. Strategizing in the brain. *Science,* 300, 1673–5.

Carper TL, Mills MA, Steenkamp MM, Nickerson A, Salters-Pedneault K, Litz BT (2015). Early PTSD symptom sub-clusters predicting chronic posttraumatic stress following sexual assault. *Psychology of Trauma Theory Research and Practice Policy* **7**, 442-447.

Charuvastra A, Cloitre M (2008). Social bonds and posttraumatic stress disorder. *Annual Review of Psychology* **59**, 301-28.

Chouliara, Z., Karatzias, T., Gullone, A., Ferguson, S., Cosgrove, K., & Burke Draucker, C. (2017). Therapeutic change in group therapy for interpersonal trauma: a relational framework for research and clinical practice. *Journal of interpersonal violence*, 0886260517696860.

Cias CM, Young R, Barreira P. (2000). Loss of trust: correlates of the comorbidity of PTSD and severe mental illness. *Journal of personal and interpersonal loss* **5**, 103-123.

Cisler JM, Bush K, Steele JS, Lenow JK, Smitherman S, Kilts CD. (2015). Brain and behavioural evidence for altered social learning mechanisms among women with assault-related posttraumatic stress disorder. *Journal of Psychiatric Research* **30**, 75-83.

Crawford JR, Deary IJ, Starr J, Whalley LJ (2001). The NART as an index of prior intellectual functioning: a retrospective validity study covering a 66-year interval. *Psychological Medicine* **31**, 451-8.

Davis, RC, Brickman, E, Baker, T (1991), Supportive and unsupportive responses of others to rape victims: Effects on concurrent victim adjustment. *American Journal of Community Psychology* **19,** 443–451.

Dunmore EC, Clark DM, Ehlers A. (1997). Cognitive factors in persistent versus recovered post-traumatic stress disorder after physical or sexual assault: a pilot study. *Behavioural and Cognitive Psychotherapy* **25**,147-159.

Deprince AP, Chu AT, Pineda AS. (2011). Links between specific post-trauma appraisals and three forms of trauma-related distress. *Psychological Trauma: Theory, Research, Practice and Policy* **3**, 430-441.

Ehlers A, Clark DM (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy* **38**, 319-45.

Fett AK, Shergill SS, Krabbendam L. (2015). Social neuroscience in psychiatry: unravelling the neural mechanisms of social dysfunction. *Psychological Medicine,* **45**, 1145-65.

Fett AK, Gromann PM, Giampietro V, Shergill SS, Krabbendam L. (2012). Default distrust? An fMRI investigation of the neural development of trust and cooperation. *Social cognitive and Affective Neuroscience* **9**, 395-402.

Fett AK, Shergill SS, Joyce DW, Riedl A, Strobel M, Gromann PM, Krabbendam L (2012). To trust or not to trust: the dynamics of social interaction in psychosis *Brain* **135**, 976-84.

Foa EB, Cashman L, Jaycox L, Perry K (1997). The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment* **9**, 445.

Forbes D, Fletcher S, Parslow R, Phelps A, O'Donnell M, Bryant RA, McFarlane A, Silove D, Creamer M (2012). Trauma at the hands of another: longitudinal study of differences in the posttraumatic stress disorder symptom profile following interpersonal compared with non-interpersonal trauma. *The Journal of Clinical Psychiatry* **73**, 372-6.

Freeman D, Pugh K, Vorontsova N, Antley A, Slater M (2010). Testing the continuum of delusional beliefs: An experimental study using virtual reality. *Journal of Abnormal Psychology* **119**, 83.

Freyd JJ. (1996). *Betrayal trauma: the logic behind forgetting childhood trauma.* Cambridge, MA: Harvard university press.

Gromann PM, Heslenfeld DJ, Fett A-KJ, Joyce DW, Shergill SS, Krabbendam L (2013). Trust versus paranoia: abnormal response to social reward in psychotic illness. *Brain* **136**, 1968–1975.

Hanley KE, Leifker FR, Blandon AY, Marshall AD. (2013). Gender differences in the impact of posttraumatic stress disorder symptoms on community couples intimacy behaviours. *Journal of Family Psychology* **27**, 525-530.

Holmes JG. (2004). The benefits of abstract functional analysis in theory construction: The case of interdependence theory. *Personality and Social Psychology Review* **8***,* 146–155,

Houser D, Schunk D, Winter J (2010). Distinguishing trust from risk: An anatomy of the investment game *Journal of Economic Behaviour & Organization* **74**, 72-81.

IBM Corp (2013). *IBM SPSS Statistics for Windows*, Version 220 NY: IBM Corp.

ISTSS (2017). http://www.istss.org/ISTSS_Main/media/Documents/ISTSS-Expert-Concesnsus-Guidelines-for-Complex-PTSD-Updated-060315.pdf. Accessed on 17 Sept 2017.

Joseph S, Andrews B, Williams R, Yule W (1992). Crisis support and psychiatric symptomatology in adult survivors of the Jupiter cruise ship disaster. *British Journal of Clinical Psychology* **31**, 63-73.

Kessler RC, Chiu WT, Demler O, Walters EE (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. Archives of General Psychiatry **62**, 617**-**627.

Kessler RC (2000). Post-traumatic stress disorder: the burden to the individual and to society. *Journal of Clinical Psychiatry* **61**, 12-14.

King-Casas B, Sharp C, Lomax-Bream L, Lohrenz T, Fonagy P, Montague PR. (2008). The rupture and repair of cooperation in borderline personality disorder. *Science* **321**, 806–10.

King-Casas B, Tomlin D, Anen C, Camerer CF, Quartz SR, Montague PR (2005). Getting to know you: reputation and trust in a two-person economic exchange. *Science* **308**, 78-83.

Martin CG, Cromer LD, DePrince AP, Freyd JJ (2013). The role of cumulative trauma, betrayal, and appraisals in understanding trauma symptomatology. *Psychological Trauma: Theory, Research, Practice, and Policy* **5**, 110.

Messman-Moore TL, Ward RM, Zerubavel N. (2013). The role of substance use and emotion dysregulation in predicting risk for incapacitated sexual revictimization in women: results of a prospective investigation. *Psychology of Addictive Behaviour* **27**, 125-32.

Parks CD, Hulbert LG. (1995). High and low trusters' responses to fear in a payoff matrix. *Journal of Conflict Resolution* **39**, 718–730.

Phan KL, Sripada CS, Angstadt M, McCabe K. (2010). Reputation for reciprocity engages the brain reward centre. Proceedings of the National Academy of Sciences **107**,13099–104.

Rousseau DM, Sitkin SB, Burt RS, Camerer C (1998). Not so different after all: A cross-discipline view of trust. *Academy of management review*, **23**, 393-40.

Sanfey A. (2007). Social decision-making: insights from game theory and neuroscience. *Science* **318**, 598–601.

StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Simpson JA. (2007). Psychological foundations of trust. *Current Directions in Psychological Science* **16**, 264–268.

Ullman SE. (1996). Correlates and consequences of adult sexual disclosure. *Journal of Interpersonal Violence* **11**, 554-557

Valmaggia LR, Day F, Garety P, Freeman D, Antley A, Slater M, Swapp D, Myin-Germeys I, McGuire P (2015). Social defeat predicts paranoid appraisals in people at high risk for psychosis. *Schizophrenia Research* **168**, 16-22.

Van den Bos W, Van Dijk E, Westenberg H, Rombout SARB, Crone EA. (2011). Changing brains, changing perspectives: the neurocognitive development of reciprocity. *Psychological Scienc*e **22**, 60–70.

Walsh K, DiLillo D, Messman-Moore TL. (2012). Lifetime sexual victimization and poor risk perception: does emotion dysregulation account for the links? *Journal of Interpersonal Violence* **27**, 3054-71.

Williams W, Graham DP, McCurry K, Sanders A, Eiseman J, Chiu PH, King-Casas B. (2014). Group psychotherapy's impact on trust in veterans with PTSD: a pilot study. *Bulletin of the Menninger Clinic* **78**, 335-48.

Yeater EA, McFall RM, Viken RJ. (2011). The relationship between women's response effectiveness and a history of sexual victimization. *Journal of Interpersonal Violence* **26**, 462-78.

Zhang HJ, Sun D, Lee T (2012). Impaired social decision-making in patients with major depressive disorder. *Brain and Behaviour* **2**, 415-23.