Height, social comparison, and paranoia: An immersive virtual reality experimental study

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1. Introduction

Paranoia is unfounded fear that others are trying to cause the person harm. This type of threat anticipation is hypothesised to be an extension of common feelings of vulnerability (Freeman et al., 2002). A paranoia hierarchy is conceptualised (see Fig. 1), with negative socio-evaluative concerns – the self as different and apart and hence vulnerable – underlying the experience (Freeman et al., 2005; Bebbington et al., 2013). There is empirical evidence consistent with this view. Thoughts of vulnerability to rejection in social situations predict the occurrence of paranoia (e.g., Freeman et al., 2008); ideas about the self as a failure or weak predict the persistence of persecutory delusions (e.g., Fowler et al., 2012); and negative inter-personal self concepts have been found to be associated with paranoia (e.g., Lincoln et al., 2010). This self vulnerability perspective may partly explain why levels of paranoia are higher in patients with common emotional disorders (Varghese et al., 2011).

Therefore it can be predicted that paranoia will be more likely to occur in people who view themselves negatively in comparison with other people (i.e., who perceive themselves lower in the social hierarchy). In a cross-sectional study of 1200 people, feeling inferior, less competent, and left out were associated with having paranoid thoughts (Freeman et al., 2005). Similarly, submissive behaviours, lower social rank, and self-criticism have all been associated with paranoid thinking (Allan and Gilbert, 1997; Gilbert et al., 2005; Hutton et al., 2013; Freeman et al., 2005). Social comparison may be an important factor underlying paranoia, but a causal role has not been tested.

An established correlate of social rank is height. For instance, taller people are more likely to have achieved higher educational attainment, hold jobs of higher status, have higher social esteem, earn more, and report higher levels of well-being (Jackson and Ervin, 1992; Judge and Cable, 2004; Magnusson et al., 2006; Carriero and De Paola, 2012). Height is often regarded as conveying authority. An illustration can be seen in seating arrangements: people seeking social dominance put others in lower chairs. Therefore we tested the effect of altering height on paranoia. It was predicted that lowering an individual's height in a social situation, in comparison to his or her normal height, would lead to perceptions of lower social rank and greater levels of paranoia.
It was predicted that increases in paranoia would be fully mediated by changes in social comparison.

We tested these hypotheses using immersive virtual reality (VR). An immersive VR system creates a surrounding three dimensional computer-generated world in which a person can physically move and interact with objects and virtual people. The laboratory room becomes replaced – typically via a tracked head-set worn by the person – by an alternate digitally created and computer generated world. The movements of participants are tracked in real-time so that the images are visually updated as a function of head gaze position and orientation. Testing in VR has ecological validity since it elicits responses in individuals similar to those that would occur in the real situation (Sanchez-Vives and Slater, 2005). For example, individuals who have paranoid thoughts in VR about the computer characters are more likely to report paranoid thoughts in day to day life (Freeman et al., 2008). In VR a person’s height can be lowered in relation to all aspects of the environment. A study of negotiation in immersive VR found that individuals made shorter were less aggressive than individuals made taller, and the effects persisted when the negotiation task was repeated in a real face to face interaction (Yee et al., 2009).

2. Method

2.1. Participants

Sixty adult females (aged 18 or above) with paranoid thinking in the past month, but no history of severe mental illness, were tested. Participants were recruited from the general population using local radio adverts, leafleting of local areas, and posters. Interested participants completed a screening survey, which included a paranoia measure. Since there may be differences by gender in how height is perceived (e.g., Jackson and Ervin, 1992; Buunk et al., 2008; Gawley et al., 2009), we restricted recruitment in this study to one gender (women). Participants had to report persecutory thinking in the past month (a score of 17 or above) as assessed by the Paranoic Thoughts Scale Part B (Green et al., 2008). A history of severe mental illness (e.g., schizophrenia) or substance dependence was an exclusion criterion. A history of being diagnosed or treated for other mental health problems was noted; 15 participants reported a history of mental illness, predominantly depression.

2.2. Assessments

Demographic information was collected from participants and their height measured.

2.2.1. Paranoic thoughts scale part B (GPTS-B) (Green et al., 2008)

The GPTS-Part B measures persecutory ideation, as defined by Freeman and Garety (2000), over the past month. Each of the sixteen items in the scale (e.g., ‘Certain individuals have had it in for me’ ‘People have been hostile towards me on purpose’ ‘I was sure someone wanted to harm me’ ‘I was convinced there was a conspiracy against me’) are rated by the person on a 5-point scale (1–5). Scores can range from 16 to 80, with 16 indicating the absence of persecutory ideation and higher scores indicating greater persecutory ideation.

2.2.2. State social paranoia scale (SSPS) (Freeman et al., 2007)

The SSPS was specifically designed to assess paranoia in VR. It comprises ten persecutory items (e.g., ‘Someone stared at me in order to upset me’; ‘Someone was trying to isolate me’; ‘Someone was trying to make me distressed’), each rated on a 5-point scale. Higher scores on the scale indicate greater levels of persecutory thinking.

2.2.3. Social comparison scale (Allan and Gilbert, 1995)

This measure comprises eleven bipolar scales: inferior–superior, incompetent–competent, unlikeable–likeable, left out–accepted, different–same, untalented–more
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