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## Interpersonal sensitivity in those at clinical high risk for psychosis mediates the association between childhood bullying victimisation and paranoid ideation: A virtual reality study

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### ABSTRACT

**Background:** Experience of bullying victimisation in childhood and heightened interpersonal sensitivity have been independently linked to the clinical high risk for psychosis.

**Aim:** To examine the potential mediating effect of interpersonal sensitivity in explaining the link between childhood bullying victimisation and real-time paranoid ideation in adult participants at clinical high risk for psychosis.

**Method:** In a cross-sectional study data were collected for 64 individuals at clinical high risk for psychosis. Measures included history of bullying victimisation, interpersonal sensitivity and state paranoid ideation following exposure to a social virtual reality environment. The virtual reality scenario was a London Underground journey. **Results:** Path analysis indicated that interpersonal sensitivity fully explained the significant association between severe bullying victimisation in childhood and paranoid ideation in the clinical-high risk group. Based on AIC criteria the best model selected was the full mediation model: severe bullying → interpersonal sensitivity → state paranoid ideation. The results suggest that severity of bullying is more important than frequency of bullying in explaining state paranoid ideation.

**Conclusions:** The significant role played by interpersonal sensitivity in the association between being bullied in childhood and paranoid ideation in the clinical high risk group suggests that this could become a target for intervention.

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### 1. Introduction

Borne of research suggesting that there may be a specificity in the relationship between early adverse events and later development of psychotic symptoms (Bentall et al., 2012; Campbell and Morrison, 2007; Lopes, 2013), interest in a specific link between bullying victimisation and paranoid ideation has emerged (Valmaggia et al., 2015). Bullying victimisation has been linked with increased risk of psychotic experiences in clinical and non-clinical populations (van Dam et al., 2012) and high rates of bullying victimisation have been reported in people at Clinical High Risk (CHR) for psychosis (Addington et al., 2013;

Stowkowy et al., 2016; Valmaggia et al., 2015) and in people with established psychosis (Trotta et al., 2013). The negative effects of bullying victimisation on mental health have been reported to exist independent of the occurrence of other adverse experiences in childhood such as sexual, physical and emotional abuse (Fisher et al., 2012; Lereya et al., 2015; Sansen et al., 2014). Childhood bullying victimisation has been linked to lower self-esteem and heightened interpersonal sensitivity in adult life (Butler et al., 2007). Interpersonal sensitivity describes a personality trait characterised by “an undue and excessive awareness of, and sensitivity to, the behaviour and feelings of others... particularly to perceived or actual situations of criticism or rejection...” (p. 342 (Boyce and Parker, 1989). Interpersonal sensitivity has been implicated in the formation of paranoid ideation (Bell and Freeman, 2014; Freeman et al., 2005); and it was found to be heightened in those at CHR for psychosis (Masillo et al., 2012; Masillo et al., 2016). The core characteristics of paranoid ideation are its interpersonal nature and unfoundedness (Freeman and Garety, 2004). Adequate measurement should thus

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ensure that paranoid ideation is not an appropriate response to a genuinely hostile environment, or absent of an interpersonal context. This has been termed the 'paranoia problem' (Freeman, 2008) and cannot always be circumvented by traditional testing paradigms or by measuring trait or baseline paranoia. In recent years, a number of studies have emerged implementing Virtual Reality (VR) technology which allows for the study of paranoid ideation, elicited in laboratory settings, in real-time, using computer programmed characters (avatars) and life like social environments (Valmaggia et al., 2016). The aim of the current study was to explore the potential mediating role played by interpersonal sensitivity in the association between self-reported experiences of childhood bullying victimisation and the occurrence of state paranoid ideation in a VR social environment.

## 2. Methods

### 2.1. Design

This study employed a cross-sectional design.

### 2.2. Sample

Participants (N = 65) were recruited the Outreach and Support in South London service (OASIS) which offers assessment and treatment to people at CHR for developing psychosis (Fusar-Poli et al., 2013). CHR individuals meet at least one of three criteria; (i) psychotic experiences of sub-threshold severity, (ii) psychotic experiences of psychotic intensity and frequency, which last less than one week and resolve without treatment or (iii) Functional impairment in the context of genetic risk or schizotypal personality disorder (Yung et al., 2005). The majority (80%) of those classified to be at CHR meet criterim (i) (Fusar-Poli et al., 2016).

One participant was excluded as a result of equipment malfunction leaving a total of 64 CHR participants.

### 2.3. Procedure

#### 2.3.1. Virtual reality environment

The VR scenario was a London Underground tube train ride (developed by the Department of Computer Science at University College London), used in previous studies (Valmaggia et al., 2016).

The London Underground virtual environment was displayed using an immersive VR head mounted display with build-in headphones (VR 1280, Virtual Research Systems, Aptos, California). Participants boarded the Underground carriage and were asked to remain on board for two stops (approximately 4 min). While on board,

participants could walk and move around the carriage, which was populated with avatars representing passengers of different ages, gender and ethnicity. The noise of the moving carriage, as well as background chatting and laughter could be heard through the headphones. Avatars did not speak to the participant, but if a participant looked at an avatar, they would look at the participant for a few seconds (Fig. 1).

Prior to beginning the VR session, verbal instructions were provided by the researcher. Participants were asked to "Try and form an impression of what the people in the tube think about you and what you think about them". Participants were asked to complete the State Social Paranoia Scale after they left the virtual reality environment.

### 2.4. Measures

#### 2.4.1. Socio-demographic information

Socio-demographic information was collected using a study-specific self-report questionnaire. This included gender, age, ethnicity, level of education, years in education, country of birth, migrant status and social class.

#### 2.4.2. Bullying victimisation

Experiences of bullying victimisation in childhood and adolescence were recorded using the Retrospective Bullying Questionnaire (RBQ) (Schafer et al., 2004). Experiences during primary school and secondary school are assessed separately. The questions ask about verbal, physical, and indirect forms of bullying; and focus on the severity and frequency of the bullying experience. Frequency is assessed by asking the participant how often the bullying experienced occurred (on a five point scale never to constantly); severity is assessed by asking the participant how serious they experienced the bullying attacks to be (not at all to extremely serious).

Following recommendations (Volk et al., 2014) we differentiated between severity and frequency. The highest frequency and highest severity scores were isolated and used for each participant irrespective of bullying type. Frequency and severity were thus each treated as separate predictor variables.

The RBQ has been shown to demonstrate a good degree of 2-week test-retest reliability (primary school scale  $r = 0.88$ , secondary school scale  $r = 0.87$ , trauma  $r = 0.77$ ) (Schafer et al., 2004).

#### 2.4.3. Interpersonal sensitivity

Levels of interpersonal sensitivity were recorded for each participant using the Interpersonal Sensitivity Scale (IPSM) (Boyce and Parker, 1989). This 36-item self-report scale comprises five sub-scales: 'Interpersonal awareness' (e.g. of an item in this scale "I worry about the effect I have on other people"); 'Need for approval' (e.g. of an item in



Fig. 1. Virtual Reality London Underground train carriage.

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