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Mental simulation and experience as determinants of performance expectancies in people with schizophrenia spectrum disorder

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ABSTRACT

People with schizophrenia demonstrate both impairment in mental time travel and reduced expectancies of performance on future tasks. We aimed to reconcile these findings within the Kahneman and Tversky (1982) simulation heuristic framework by testing a key prediction that impaired future simulation would be associated with reduced performance expectancies in people with schizophrenia spectrum disorder (SZSPEC). A total of 54 individuals (30 people with SZSPEC and 24 healthy controls) generated mental simulations of everyday scenarios; after each response they rated performance expectations, distress and the similarity of the scenario to experience. Independent raters coded the coherence of responses. We found that people with SZSPEC had, compared to healthy controls, lower performance expectations and greater anticipated distress when imaging everyday scenarios. Lower performance expectancies were associated with lower experience of similar scenarios, greater negative symptoms and social withdrawal in the SZSPEC group. The current study confirmed previous findings of both impaired mental simulation and abnormal performance expectations in people with SZSPEC, together with the association of the latter with negative symptoms. Experience with social or occupational activities plays a more important role in determining performance expectancies in people with SS than the ability to mentally simulate scenarios.

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1. Introduction

A substantial proportion of people with a diagnosis of schizophrenia display unfavourable outcomes in domains such as community involvement, work and independent living (Menezes et al., 2006). The positive symptoms of schizophrenia – specifically hallucinations and delusions-account for a negligible proportion of the variance in such functional outcomes in clinically stable samples (Ventura et al., 2009). In contrast, there have been consistent reports of moderate associations between greater negative symptoms, characterised by motivational or interpersonal impairments, with poorer functional outcomes (Ventura et al., 2009). However, these associations are small to moderate in magnitude highlighting the need for novel theoretical and empirical perspectives to generate a better understanding of negative symptoms and functioning.

One factor that is potentially pertinent to functional recovery in people living with schizophrenia is the ability to generate and mentally simulate possible future events, which is also termed mental time travel (Suddendorf and Corballis, 2007). Mental simulation has been put forward as an important feature of personal goal planning and development in both healthy populations (D'Argembeau and Mathy, 2011) and people with schizophrenia (D'Argembeau et al., 2008; de Oliveira et al., 2009; Raffard et al., 2013). This ability allows people to 'pre-experience' the details of events before they happen, including both practical and emotional aspects, so consequences of actions can be foreseen (Gilbert and Wilson, 2007). Several studies have shown the ability to generate an imagined future event is impaired in people with schizophrenia compared with healthy control participants (D'Argembeau et al., 2008; de Oliveira et al., 2009; Raffard et al., 2013). In these studies people with schizophrenia generated less specific content with degraded descriptions of sensory detail. These impairments were associated with fewer plans to engage in occupational activities (de Oliveira et al., 2009) and greater apathy (Raffard et al., 2013). Raffard et al. (2013) suggested that impairments in the ability to imagine a future action could inhibit optimism about future performance and, in turn, impede subsequent reproduction of that behaviour. However, this hypothesis was not tested, as expectations about performance were not measured in this study.

A related line on future-orientated thought in people with schizophrenia relevant to expectations has focused on defeatist

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performance beliefs, which are heightened, compared to healthy controls (Grant and Beck, 2009). Beck and Rector (Beck and Rector, 2005; Rector et al., 2005) suggest such beliefs could result in greater avoidance of activities directed towards social or occupational outcomes and leading to functional impairment. In partial support of this, negative expectations about performance (e.g., as "If I try to be more active, it will probably turn out badly") are associated with greater functional impairment and negative symptoms (Couture et al., 2011). Similar research has also established an association between low self-efficacy and poor community functioning (Choi et al., 2010; Cardenas et al., 2013), again highlighting a possible role for performance expectations in functioning ability. Questionnaire measures of performance expectations involve general statements about how classes of events may turn out, rather than expectations of a specific event, such as an imagined journey on public transport or shopping trip. It is unknown whether people with schizophrenia have reduced performance expectations when imagining specific everyday functional activities.

Research on mental time travel in schizophrenia has so far lacked a conceptual framework for making predictions about the impact of impairments in mental time travel or simulation. Heuristic theory (Tversky and Kahneman, 1973; Kahneman and Tversky, 1982) can inform an understanding of how impairments in mental simulation ability lead to abnormal performance expectancies or reduced coping in people with schizophrenia. This account suggests that performance expectancies are determined by heuristic processes based on the accessibility of paths to expected outcomes. A path is accessible if an experience of using that path is available in memory (the availability heuristic) or, if no similar memory exists, how smoothly a given path runs in the imagination (the simulation heuristic). Brown et al. (2002) provide results to support the simulation heuristic explanation by demonstrating that higher outcome probability is associated with better quality of the path to the outcome. In their task, a sample of pregnant women imagined going into labour and then travelling to hospital, while concurrently providing a verbal protocol of their mental simulation. Afterwards they rated the probability of arriving at the hospital on time. More coherent simulations were associated with higher outcome probability judgements and lower worry about the outcome, supporting the simulation heuristic theory (Kahneman and Tversky, 1982).

An impairment of future event simulation in people with schizophrenia could potentially have a detrimental effect on managing stress or regulating emotion. Compared with healthy participants those with schizophrenia report higher perceived stress (Allott et al., 2015) and higher negative affect in response to disturbances or hassles of daily life (Myin-Germeys et al., 2001). These studies focused on current or past experience of stress in everyday life, leaving open the possibility that the mental simulation of future stressors is also accompanied by increased anticipated distress. Research in healthy populations has demonstrated that mental simulation increases coping and emotion regulation (Rivkin and Taylor, 1999), so it is also possible that impairments in mental simulation have a detrimental impact on how future stressors are conceived.

In the current study we used a similar approach to Brown et al. (2002). In doing so it was possible to examine the impact of impaired mental simulation ability in people with schizophrenia spectrum disorder (SZSPEC) on performance expectancies, prospective stress and functioning. In the mental simulation task used here, instead of a pregnancy scenario, performance expectancies were measured via participants' ratings of the probability or likelihood of the outcome of various everyday tasks, such as shopping or travelling on public transport. Thus, we investigated performance expectancies when specific scenarios are imagined, which extends the existing literature that has employed general questionnaire measures (Couture et al., 2011). It also explicitly tests the prediction made by Raffard et al. (2013) that difficulties simulating future events should not only relate to negative symptoms but also expectancies about future performance.

1.1. Aims

1. To determine the effect of impaired mental simulation in people with SZSPEC on performance expectancies and prospective stress. on the basis of the Kahneman and Tversky (1982) framework we expected that lower mental simulation coherence in people with SZSPEC would be accompanied by lower performance expectations compared to healthy controls. We also expected, within the SZSPEC group, that less coherent simulations would be associated with lower performance expectations.
2. To investigate the potential role of impaired mental simulation in the severity of negative symptoms and functioning. In keeping with the hypothesised primacy of the simulation heuristic, we predicted a negative association between performance expectancies and both negative symptoms and functioning, with any associations being eliminated when mental simulation coherence is controlled for.
3. We expected that people with SZSPEC would demonstrate higher distress compared to those in the healthy control group. Also, within the SZSPEC group, we expected lower performance expectancies to be associated with greater anticipated distress.

2. Methods

2.1. Participants

2.1.1. Clinical participants

Clinical participants were recruited from a large inner London National Health Service (NHS) mental health trust and were all receiving care at the time of participation. Participants in the SZSPEC group were recruited if they met Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition) (DSM IV) (American Psychiatric Association, 2000) criteria for either schizophrenia ($n=24$) or schizoaffective disorder ($n=6$), were of working age (range: 18–65) and were fluent in English. Participants were excluded if there was evidence of an organic cause of illness or if they had current severe drug or alcohol problems that met DSM-IV criteria. Five participants (17%) were receiving inpatient care and 25 (83%) were residing in the local community. All participants were clinically stable; the severity of psychotic symptoms is given in Table 1: the total PANSS score for those in the SZSPEC group fell into the "mildly ill" category of the Clinical Global Impression scale (Leucht et al. 2005).

2.1.2. Healthy controls

Twenty-four healthy participants were recruited by various means including advertisements placed in local job centres, libraries and other locations. These participants were screened for absence of a psychiatric diagnosis via a semi-structured interview using the Mini International Neuropsychiatric Interview (Sheehan et al., 1998). All individuals were compensated at an hourly rate for their time and travel expenses.

2.2. Measures

2.2.1. Mental simulation task (Brown et al., 2002)

The protocol was taken from the Brown et al. (2002) study.

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