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

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## Highlights

- We confirmed previous findings of both impaired mental simulation ability and reduced performance expectancies in people with schizophrenia compared to healthy controls.
- Experience with tasks, rather than the ability to simulate them, was associated with performance expectancies in people with schizophrenia.
- Interventions should target problem solving, goal setting or task initiation rather than beliefs about performance.

**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.

*Keywords:* Psychosis; Functioning; Negative symptoms; Episodic future thought; Mental time travel; Heuristics

## 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 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. Participants were presented with the beginning and end of an imaginary scenario (see supplementary materials for full details of the five scenarios that were presented). They were then asked to give a step-by-step account of what might have happened in between. The aim was to elicit a detailed narrative from the beginning of the scenario to the end. To establish that participants understood the basic task requirement of telling a step-by-step story, they were asked to describe the sequence of steps involved in making a beverage. They next completed a full practice scenario, which included the key features of the simulation task. To ensure that participants did not require clarification of scenario features during their response, a written prompt was presented as the scenarios were introduced. This highlighted, in separate text boxes, the beginning and endpoints of each scenario and was presented for the duration of the participants' response. For example, in one of the scenarios the first box included the details "You are returning a completed official form to the post office that is due by the end of the day. On entering the post office it is very busy and close to closing" and the second stated "At

the end of the situation you have just handed over the form to the postal worker on time". For the experimental scenarios participants' responses were audio taped and transcribed verbatim. The scenarios were developed following separate interviews with nine service users with a diagnosis of schizophrenia. They were asked about everyday scenarios that they had found stressful or taxing so that effort was needed to resolve the scenario. A content analysis identified key themes and the most frequent were chosen for further development. The themes formed source material for the five scenarios. The scenarios were everyday issues such as shopping, travelling on public transport and domestic chores (see supplementary materials). Unlike the Brown et al. (2002) study, the scenarios in the current study were not intended to be completely novel. Imagined events are typically envisaged in the context of familiar surroundings (D'Argembeau and Van der Linden, 2004) so we also asked participants to rate the similarity of scenarios to everyday lives of the participants.

The coherence coding system was taken from the Brown et al. (2002) study. The six coding criteria used were *logical sequence, temporal order, sensitivity to contingency, minimisation of uncertainty, adequate coverage of problem space and flows smoothly*. Each aspect of simulation coherence was rated on a 5-point scale, with each anchored by specific criteria, and higher ratings indicated more evidence of the rated dimension.

Following their response to each scenario, participants gave verbal ratings on a seven point scale (1, not at all to 7, extremely) along four dimensions: (i) probability of the outcome (e.g. how probable do you think it is that you would hand over the form on time?), which provided an indicator of participants' performance expectations (ii) degree of worry about the outcome (e.g. how worried would you be about handing over the form on time?) (iii) distress about being in the situation (e.g. compared to the rest of your day-to-day activities, how distressed would you be if you were in a busy post office needing to hand in an official form?) and (iv) similarity to everyday life (e.g. how similar is this situation to something you have experienced in your day-to-day life?). We created composite measures of the five scenarios for all measures; there was acceptable reliability ($\alpha > 0.7$) for all. For the purposes of the

current study we focused analysis on the distress in the situation, rather than worry about the outcome, because the former variable is more relevant to the existing literature on perceived stress (Allott et al., 2015).

*2.2.2. Hospital Anxiety and Depression Scale (HADS; (Zigmond and Snaith, 1983)*

The HADS is a brief measure of both anxiety and depression that has been shown to have well established reliability and psychometric properties. The anxiety subscale only is reported here.

*2.2.3. Positive and Negative Syndrome Scale (PANSS; (Kay et al., 1987))*

This is a 30-item rating scale completed by trained research staff at the conclusion of a semi-structured interview. It was used with those in the SZSPEC group only.

*2.2.4. Social Behaviour Schedule (SBS;(Wykes and Sturt, 1986))*

The SBS is completed with information from a member of the participant's care team. It comprises a 21-item questionnaire, using a 5-point rating scale to measure social functioning. We used the four-item *Social Withdrawal* factor described by (Cella et al., 2014). This factor includes features such as a lack of initiative or under activity in social functioning. This scale was used with the SZSPEC group only.

*2.3. Procedure*

Measures were administered in the following order: clinical participants initially completed the PANSS, SBS, HADS and then the Simulation Task. The Simulation Task consisted of the warm-up exercise, the practise scenario and the five experimental scenarios, the order of the latter was counter-balanced. Each scenario was followed by the four post-scenario questions. The healthy controls followed the same procedure without the PANSS and SBS.

*2.4. Analyses*

All variables were normally distributed, with the exception of the Social Withdrawal and PANSS negative symptom scores, so these were square-root-transformed for inclusion in parametric analyses. We initially aimed to confirm if people with SZSPEC were impaired on cognitive performance and mental simulation ability compared to healthy controls using t-

tests. We then carried out two sets of analyses to test the predictions of the simulation and availability heuristics. We used t-tests to determine if people with SZSPEC provided lower ratings of simulation outcome probability and higher distress compared to healthy controls. We then carried out Pearson correlation coefficients to determine whether, within the SZSPEC group, lower simulation coherence or similarity to experience, was associated with lower outcome probability and distress. The latter analyses were repeated after controlling for anxiety as this could confound the distress variable on the simulation task.

The next set of analyses concerned the potential impact of impaired mental simulation on negative symptoms and social withdrawal that follow from the operation of the simulation heuristic framework. We firstly determined if higher simulation coherence was associated with lower negative symptoms and lower functioning using Pearson correlations. We then determined if higher performance expectations were correlated with lower negative symptoms and social withdrawal. These analyses of negative symptoms and functioning were repeated using scenario similarity in place of mental simulation coherence to test the predictions of the availability heuristic framework. Finally, variables that were significantly correlated with negative symptoms or functioning were included as independent variables in regression analyses.

## 3. Results

### *3.1 Simulation task reliability*

Two independent raters assigned scores for each of the dimensions blind to the participant group. The intraclass correlation coefficients (ICC) for the simulation coherence components across the five scenarios were clearly acceptable, ranging from (ICC = 0.73 (temporal links) to ICC = 0.97 (coverage of problem space)). As with Brown et al. (2002) each rating was then discussed and adjustments made so that no rating differed by > 1 point. For these agreed ratings the internal consistency for each of the simulation coherence dimensions across the five scenarios ranged from $\alpha = 0.67$ (contingency) to $\alpha = 0.89$ (problem space). The internal consistency of the simulation coherence composite was $\alpha = 0.88$ with all

item-total correlations large ($r$ > 0.68) with the exception of the sensitivity to contingency dimension, which demonstrated a moderate correlation ($r$ = 0.46). It was therefore removed from the simulation coherence composite. The five dimension simulation coherence then had excellent internal consistency $\alpha$ = 0.91.

*3.2 Differences between the SZSPEC and control groups*

An effort was made to match these participants to the SZSPEC group on age, gender, ethnicity and educational attainment and there were no significant differences on these variables (see Table 1). Participants in the healthy control group were, however, much more likely to be working or in full time education. Those in the SZSPEC group displayed significantly higher anxiety and depression. A minority (< 13%) of the healthy control samples displayed "mild" depression and anxiety with the remaining displaying negligible anxiety and depression according to established cut off scores (Bjelland et al., 2002).

3.3 *Test of the underlying simulation and availability heuristic theory: performance expectancies and distress*

*Group differences on simulation task variables: (see Table 1)* People with SZSPEC judged the scenario outcomes as significantly less likely and anticipated greater distress than those in the healthy control group. There was a trend towards people with SZSPEC rating scenarios as less similar to experience than healthy control participants. This finding had not been expected and may be reflective of reduced engagement in recreational or vocational activities in the SZSPEC group.

*Simulation coherence and similarity (see Table 2)*: There was no significant association between simulation coherence and performance expectancies. However, there was a significant positive association between performance expectancies and similarity of scenarios to experience. These data are consistent with the notion that the availability of a similar scenario in memory influences performance expectancies in people with SZSPEC, rather than the ability to construct a coherent simulation.

*Simulation distress (see Table 2):* There were no significant correlations of post-scenario distress with either performance expectancies or simulation coherence. Greater distress was, however, associated with significantly higher similarity of scenarios to experience. This was in the opposite direction to expectations. We had predicted that people for whom the scenarios were more available in memory would imagine *less* distress in the scenarios, not more, as we found. The effect was reduced to a trend when HADS Anxiety was controlled in a partial correlation ($r$ (27) =0.32, $p$ =0.09).

*3.4 Test of the underlying simulation and availability heuristic theory: performance expectancies, negative symptoms and functioning*

*Negative symptoms: (see Table 2)* Simulation coherence was not significantly associated with negative symptoms so no further analyses were conducted on simulation coherence. More severe negative symptoms were significantly associated with lower performance expectancies in the SZSPEC group and tended to be associated with lower similarity of scenarios to remembered experiences. To determine if performance expectancies and similarity judgements had an independent relationship with negative symptoms we carried out a regression analysis with negative symptoms as the dependent variable, with similarity and performance expectancies as the predictor variables. The model explained 21% of the variance ($F$(2, 29) = 3.4, $p$ =0.049) with performance expectancies tending towards predicting independent variance ($p$ =0.08), while similarity ($p$ =0.60) was not a significant predictor.

*Social Withdrawal: (see Table 2)* simulation coherence was not significantly associated with social withdrawal, so no further analyses were conducted on simulation coherence. Greater social withdrawal was associated with lower performance expectancies. As above, we examined correlations between social withdrawal and similarity ratings, and found poorer functioning was associated with less apparent similarity of scenarios to everyday life. We repeated the regression analysis approach above and found this model

explained 39% of the variance ($F(2, 28) = 3.4$, $p = 0.005$). Similarity was an independent predictor in the model ($p = 0.03$) but performance expectancy judgements ($p = 0.54$) were not.

## 4. Discussion

Consistent with our hypotheses we found that people with SZSPEC produced less coherent mental simulations than those in the healthy control group, which is in keeping with several findings of impaired 'mental time travel' in people with SZSPEC (D'Argembeau et al., 2008; de Oliveira et al., 2009; Raffard et al., 2013). People with SZSPEC reported lower performance expectancies than the demographically matched healthy control group, which is comparable with previous findings on defeatist performance beliefs (Grant and Beck, 2009). Reduced performance expectancies were significantly associated with both more severe negative symptoms and greater social withdrawal. This is again consistent with previous questionnaire studies that found defeatist performance beliefs (Grant and Beck, 2009; Green et al., 2012), negative expectancy appraisals (Couture et al., 2011) and self-efficacy (Choi et al., 2010; Cardenas et al., 2013) were related to negative symptoms and functioning.

We did not find the hypothesised associations between mental simulation coherence with severity of negative symptoms and/or functional impairment. This finding departs from the previous report of an association between difficulties envisaging future pleasant events and apathy in people with schizophrenia (Raffard et al. 2013). In the latter study participants were asked to imagine an event but were not required to construct an event with a step-by-step sequential structure, as was the case in the current study. The extra requirement of constructing a sequential narrative may have been more demanding and diminished the association of mental simulation with social withdrawal or negative symptoms.

We also did not find the association between mental simulation coherence and performance expectancies predicted by the operation of the simulation heuristic (Kahneman and Tversky, 1982; Brown et al., 2002). Instead we found that higher similarity of scenarios to previous experience alone was strongly associated with higher performance expectancies. The finding that the availability of similar scenarios alone influenced performance expectations in people

with SZSPEC has a potentially important consequence for belief models of negative symptoms and functional impairment such as Rector and colleagues (2005). If memory of similar experiences influences performance expectancies then those people with SZSPEC with greater functional impairment, and less experience, should both rate scenarios as less similar to their daily lives and have lower performance expectations, which is exactly what we found. We also found that when both similarity and expectancies were included in a regression model only the former explained independent variance in social withdrawal. This further supports the importance of limited availability of similar experiences in determining lower performance expectancies in people with SZSPEC.

The association between the similarity of scenarios to experience and functional impairment is consistent with previous findings reported by (Holshausen et al., 2014). This study used questionnaire measures to show that inexperience with functionally skilled acts, such as using public transportation or handling money, was associated with poorer current real world functioning. The study extends this finding by demonstrating that inexperience with activities could lead to limited availability of memories of successful outcomes and, via the availability heuristic, lower expectations of success. The causal relationship between expectations and functioning could, therefore, run in the opposite direction to that assumed, but not proven, by the literature on negative performance beliefs and self-efficacy (Rector et al., 2005; Cardenas et al., 2013). That is, the assumption that low confidence in task performance impedes motivation and action. This highlights the clear need for longitudinal research to establish if changes in performance expectations precede functional change or vice versa.

Similar to findings on retrospectively measured stress (Allott et al., 2015), we found people with SZSPEC also imagined greater distress than the healthy controls on this prospective thinking task. However, we also did not find any association between imagined distress and either performance expectancies or simulation coherence. One explanation for this is that imagining a scenario involves remembering past experiences (Schacter et al., 2012) and for people SZSPEC these experiences are likely to be associated with distress

(Allott et al., 2015), regardless of their outcome, eliminating any relationship between performance and distress.

The findings are restricted by the sample of people with SZSPEC employed in the current study, which was representative of those living in the community, but was mostly made up of middle-aged men. This limits generalisation of the findings to younger people and women. As with other recent studies on negative performance beliefs (Grant and Beck, 2009; Couture et al., 2011; Green et al., 2012) the current study is also limited by its cross sectional design, so we are not able to determine which factors were primary in driving causal relationships.

In summary, while we found, compatible with previous reports (D'Argembeau et al., 2008; de Oliveira et al., 2009; Raffard et al., 2013), impaired mental simulation in people with SZSPEC, we did not confirm our prediction that the severity of these impairments would be associated with performance expectancies or imagined distress. Instead, it was the similarity of the scenarios to experience that was associated with performance expectancies. It may be that impairments in the ability to construct a novel mental simulation in people with SZSPEC is compensated by an over-reliance on memory for similar experiences. A clearer implication of these findings is that if low performance expectations are a consequence of inexperience with community activities they are, in effect, an epiphenomenon of poor functioning, so targeting performance beliefs alone in interventions is unlikely to be effective. Instead, other techniques applied in cognitive behavioural therapy are likely to be more useful. In particular, behavioural activation (Jacobson et al., 2001) helps people to reengage with valued activities through focused activation strategies. These strategies are intended to reduce avoidance and inactivity that might contribute to the pattern of motivational impairments that are so problematic in impeding functional recovery in people with schizophrenia. Another possibility is that targeting cognitive skills using cognitive remediation (Wykes et al., 2011) could bolster the resources needed to break a cycle of inexperience that produce pessimistic expectancies about functional performance. This class of interventions uses techniques such as errorless learning that promote experiences of

success in a controlled therapeutic setting that can be later generalise to activities relevant to recovery goals.

**Table 1**. Demographic, symptoms (Hospital Anxiety and Depression Scale (HADS); Positive and Negative Symptom Scale (PANSS)) and simulation task variables for the two groups

| | Healthy controls $n = 24$ | People with SZSPEC $n = 30$ | Statistic |
|---|---|---|---|
| Age | 36.5 (8.1) | 39.4 (9.1) | $t(52) = 1.1$ |
| Sex (m / f) | 17/7 | 24/6 | $\chi^2(1) = 0.6$ |
| Ethnicity (% white British) | 37.5 % | 10% | $\chi^2(1) = 1.2$ |
| Years of education | 13.9 (2.6) | 12.8 (2.6) | $t(52) = 1.4$ |
| Occupation (% Employed/education) | 70 % | 10 % | $\chi^2(1) = 22.3$** |
| HADS: Anxiety | 4.7 (2.5) | 5.33 (3.2) | $t(52) = 2.3$* |
| HADS: Depression | 3.5 (2.9) | 7.3 (4.3) | $t(52) = 2.6$* |
| PANSS (Negative) | - | 12.1 (4.5) | - |
| PANSS (Positive) | - | 11.5 (4.0) | - |
| PANSS (Total) | - | 48.3 (12.7) | |
| Simulation coherence | 20.1 (2.1) | 16.2(2.4) | $t(52) = 6.4$** |
| Performance expectancy | 5.6 (0.8) | 4.9 (1.3) | $t(52) = 2.3$* |
| Similarity | 5.1 (1.0) | 4.5 (1.5) | $t(52) = 1.7$^ |
| Distress in scenario | 3.3 (1.3) | 4.4 (1.3) | $t(52) = 3.2$** |

^ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$

**Table 2.** Pearson correlations between judgements of similarity, performance expectancy, distress, PANSS negative symptoms (Negative Symptoms) and Social Withdrawal factor of the Social Behaviour Scale (Withdrawal) for those in the SZSPEC group

| | Performance expectancy | Simulation coherence | Scenario similarity |
|---|---|---|---|
| Performance expectancy | - | -0.11 | 0.62** |
| Simulation distress | 0.07 | 0.07 | 0.42* |
| Negative symptoms | -0.45* | 0.05 | -0.34^ |
| Withdrawal | -0.46* | 0.10 | -0.56** |

^ $p$ <0.1, * $p$<0.05, ** $p$ < 0.01.

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