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Anticipation and experience of emotions in patients with schizophrenia and negative symptoms. An experimental study in a social context

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ABSTRACT

Negative symptoms play a central role in the impairment of social functioning in schizophrenia. Healthy individuals use anticipated emotions to guide their decisions to seek out social interactions. It is unknown whether social withdrawal in negative symptoms is related to a biased anticipation of emotions that will arise in social situations. This study thus examined differences between patients with negative symptoms of schizophrenia and healthy controls in the anticipation and experience of positive and negative emotions related to a social interaction.

In a between-subject factorial design, participants were instructed to either predict or to experience emotions related to a simulated social inclusion and exclusion interaction.

Overall, patients anticipated more intense negative emotions than controls. Divided by the type of social situation, however, patients reported less intense positive emotions than controls with regard to social inclusion, but not with regard to social exclusion.

The lack of an overall deficit in anticipation of positive emotions speaks against the assumption that anticipation abnormalities in negative symptoms are due to a neurocognitive deficit. Rather, the findings seem to reflect negative beliefs about potentially rewarding social situations in people with negative symptoms.

1. Introduction

Belongingness is a fundamental human need (Baumeister and Leary, 1995). Even when people believe that others are dangerous or critical they desire social interactions (Silvia and Kwapil, 2011). In people diagnosed with schizophrenia the need to belong is threatened: they have fewer social contacts than their healthy peers (Hamilton et al., 1989; Harley et al., 2012) and their social network decreases even further during the course of the disorder (Goldberg et al., 2003; Salokangas, 1997). Negative symptoms such as asociality and avolition play a central role in the impairment of social functioning in schizophrenia (Bellack et al., 1990; Blanchard et al., 2011b). Studies exploring the nature of impaired social functioning have recently highlighted that the way in which individuals with schizophrenia process and regulate their emotions has a substantial influence on their social functioning (e.g., Aghveli et al., 2003; Hooker and Park, 2002; Kimhy et al., 2012).

There is consistent evidence that patients with schizophrenia and negative symptoms report to experience emotions in comparable intensity and valence compared to controls (Cohen et al., 2010; Gard and Kring, 2009; Oorschot et al., 2013). Although patients with schizophrenia report less pleasant events than controls, they seem to experience equal positive affect when processing positive events in-the-moment suggesting that they are not characterized by hedonic deficits (Oorschot et al., 2013). Nevertheless, several studies have indicated that patients with negative symptoms are less likely to anticipate positive emotions (e.g., Chan et al., 2010; Gard et al., 2007; Juckel et al., 2006; Wynn et al., 2010). Even healthy individuals who are prone to negative symptoms report a diminished ability to anticipate pleasure (Engel et al., 2013).

Studies exploring the nature of anticipatory pleasure deficits in schizophrenia have so far focused on neurocognitive deficits (e.g., Lui et al., 2015; Strauss and Gold, 2012), because the ability to anticipate whether something in the future will be pleasurable requires cognitive skills, such as imagination, maintaining an image, or remembering the past (Kring and Elis, 2013). A possible alternative explanation for these findings on anticipation is provided by the cognitive model of negative symptoms (Beck et al., 2009; Rector et al., 2005) that emphasizes the role of dysfunctional beliefs (e.g., expecting low pleasure or acceptance when meeting new persons) and their association with negative symptoms which are likely to result in social withdrawal or diminished engagement (Beck et al., 2012; Couture et al., 2011). However, the question whether a neurocognitive deficit or dysfunctional beliefs account for the difficulties in anticipation cannot be convincingly answered so far because previous studies focused on positive emotions only and did not control for abnormalities in anticipating negative emotions. A fundamental neurocognitive deficit in anticipation would be

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expected to be independent of the type of emotion, whereas dysfunctional beliefs would rather lead to differential results. To shed further light on this question, studies investigating anticipatory emotion should include the anticipation of both positive and negative affect.

Moreover, it has remained unclear from previous research whether the difficulties to anticipate positive emotions in patients with negative symptoms also apply to the anticipation of social interactions. This is a relevant question, because in healthy people the anticipation of emotional experiences or the so-called affective forecasts (e.g., Gilbert and Wilson, 2009) have been found to be associated with the motivation to seek out a social interaction (Mallett et al., 2008; Wilson and Gilbert, 2003). Several findings even suggest that people tend to overestimate the impact of future events on their positive emotional reactions across a variety of social situations, which has been described as a "forecasting bias" (e.g., Gilbert et al., 2002) and further underlines how relevant emotion anticipation is in regard to social behavior. Emerging research has found psychopathology, and particularly depressive symptoms, to be associated with both stronger negative and weaker positive mood prediction biases (e.g., Hoerger and Quirk, 2010; Wenze et al., 2012). Together with the findings from previous studies on the difficulties in anticipating positive emotions in schizophrenia as well as assuming that anticipation of emotions is primarily belief driven, it is intuitive to expect that a decreased likelihood to anticipate positive emotions related to social interactions, combined with an increased likelihood to anticipate negative emotions is likely to reduce a patients' motivation to seek out social interactions and thereby contribute to the social withdrawal and reduced activity (Horan et al., 2006).

The well-established Cyberball paradigm (Williams et al., 2000) provides a way to examine emotional processes under standardized social conditions. It is appropriate to induce positive and negative emotions that may arise in social situations (Williams and Zadro, 2005). Furthermore, it can be assumed to be suitable to assess anticipated emotions, because in- and exclusion during a ball game is a familiar situation that is easy to picture.

We hypothesized that patients with a diagnosis of schizophrenia or schizoaffective disorder will show pronounced differences to healthy controls in anticipating emotions that will arise in a situation of social inclusion and exclusion, but will not differ from healthy controls in their actual emotional experience of a situation of social inclusion and exclusion. Specifically, we hypothesized that participants with schizophrenia or schizoaffective disorder would anticipate less intense positive and more intense negative emotions than controls, but experience positive and negative emotions in comparable intensity to controls.

2. Method

2.1. Participants

The total sample included 40 participants with acute or remitted schizophrenia or schizoaffective disorder (patient group) and 40 healthy controls (control group). In the patient group, diagnoses were confirmed by one of the researchers (M.E.) using the psychosis modules B and C of the Structured Clinical Interview for DSM-IV (SCID; First et al., 2002). Exclusion criteria in the patient sample were: 1) neurological disorder or head injury with loss of consciousness, 2) diagnosis of substance abuse or substance dependence (made by the treating psychiatrist), 3) inability to provide informed consent. The inclusion criterion was at least two mild or one moderate negative symptom as operationalized by the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987). Participants with schizophrenia ($n = 33$) or schizoaffective disorder ($n = 7$) were recruited from inpatient mental health clinics ($n = 15$) and outpatient treatment settings ($n = 25$) in and around Hamburg/Germany. The recruitment of the control group occurred via leaflets in and around the University of Hamburg. Exclusion criteria for the healthy control group were a present or past mental disorder as assessed with two questions (i.e. "Have you had or do you have a mental health problem?", "If yes, what kind of mental health problem?") and a family history of schizophrenia or schizoaffective disorder as assessed with two questions (i.e. "Is there anybody in your family who has had or has a mental health problem?", "If yes, what kind of mental health problem?") before the assessment started. All participants were 18 years or older. Study procedures were approved by the local ethical committee.

2.2. Design

In this study we used a $2 \times 2 \times 2$ mixed design with two between-subject factors (group: patients vs. controls, and condition: anticipation vs. experience) and one within-subject factor (situation: social inclusion vs. social exclusion). We chose a design in which the participants either predicted or experienced emotions, because the act of making affective forecasts has been found to alter participants' reports of later emotional experience (Dolan and Metcalfe, 2010). For example, Dolan and Metcalfe (2010) found a group of fans who had been asked to predict how they would feel if their team lost the match to rate their happiness a whole point lower than the fans who had not been asked to make any affective forecasts prior to the game. To prevent anticipating from influencing the subsequent experience we followed the methodology adopted by Wilson and Gilbert (e.g., Gilbert et al., 1998; Wilson and Gilbert, 2003) and randomly assigned participants to be either forecasters (*anticipation condition*) or experiencers (*experience condition*). All participants rated their emotional experience twice, once with regard to a situation of social inclusion and once with regard to a situation of social exclusion in a randomized order.

2.3. Procedure

The experimental procedure is depicted in Fig. 1. Prior to the experiment, all participants provided informed consent. After a baseline assessment of mood, demographic characteristics, diagnosis and symptoms, participants were told that they will be playing an online game called Cyberball (Williams et al., 2000) with two other players who are online at the same time. The welcome page of Cyberball (accessed via Internet explorer) was presented. Participants randomized to the *anticipation condition* (20 patients, 20 controls) were asked to complete a pre-Cyberball questionnaire that assessed the anticipated emotions related to being socially included and socially excluded during the game in randomized order. They were then informed via the computer display that they will not be able to play the game due to a technical defect and were asked to complete a questionnaire instead (TEPS; Gard et al., 2006) which was part of another study. Participants randomized to the *experience condition* (20 patients, 20 controls) started Cyberball immediately after seeing the welcome page. The participants had to throw a ball to or catch a ball from two other animated players. In the *inclusion version* of the game, participants received the ball for approximately one-third of the total throws, whereas in the *exclusion version* the ball was not thrown to them. Each version of the game lasted approximately 2:30 min. After each version, participants were immediately asked to complete a post-Cyberball questionnaire that assessed the emotions experienced during the game. Participants in the experience condition also completed manipulation checks assessing the subjective perception of inclusion and exclusion. Finally, all participants in the anticipation and experience condition were extensively debriefed about the aim of the study.

2.4. Measures

2.4.1. Baseline mood.

To control for baseline group differences in mood, we used the pleasure dimension of the Self-Assessment Manikin (SAM; Bradley and Lang, 1994). Participants were asked to report how happy they

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