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## Negative symptoms and the formation of social affiliative bonds in schizophrenia

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### ABSTRACT

Negative symptoms in schizophrenia are characterized by deficits in normative experiences and expression of emotion, and they are associated with poor social functioning. Negative symptoms relating to deficits in motivation and pleasure may hinder the development of affiliative bonds. The current study used a novel procedure to examine the relation between negative symptoms and the development of social affiliation within a laboratory setting. Fifty-five men (35 controls; 20 with a schizophrenia spectrum disorder) completed three Social Affiliation Enhancement Tasks with an experimenter partner. Self-reported affiliation and affect ratings were assessed before and after the affiliative interaction. Across groups, social affiliation and positive affect increased following the interactive tasks. However, the schizophrenia group reported less positive and more negative affect than controls. Within individuals with schizophrenia, negative symptoms reflecting motivation and pleasure deficits and self-reported social anhedonia were associated with less affiliative feelings of interpersonal closeness and less willingness to interact. Additionally, these self-reported reactions to the interaction partner were significantly related to social functioning in the community. These findings indicate that though individuals with schizophrenia can form affiliative bonds, the extent to which this is possible may be limited by negative symptoms relating to motivation and pleasure. Additional research will be necessary to examine just how these negative symptoms interfere with social affiliation.

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### 1. Introduction

Negative symptoms are well documented in schizophrenia and characterized by persistent deficits in emotional experience and expression (Kirkpatrick et al., 2006). Deficits in social affiliation, such as social anhedonia and asociality (Horan et al., 2011), have a substantial impact on functioning (Buchanan et al., 2010), yet available pharmacological treatments have limited impact on such symptoms (Kirkpatrick et al., 2006). To develop improved treatments for social affiliative deficits, it is necessary to understand how social anhedonia and asociality impact the formation of social bonds in schizophrenia. One of the greatest challenges in advancing this work is how to study social affiliation in the laboratory.

Blanchard et al. (2015) has noted that laboratory paradigms assessing emotional responses to evocative stimuli (e.g., photographs or movie clips; see meta-analysis by Cohen and Minor, 2010) may not tap social affiliative processes that are involved in forming and maintaining relationships. Furthermore, studies that do examine social responding via skills assessments in role plays (Bellack et al., 1994; Sayers et al., 1995) may be limited in their ability to contribute to our understanding of affiliation as their evaluative nature can elicit negative affect rather than engender affiliative bonding (Horan and Blanchard, 2003). Finally, experience sampling studies of social interactions lack control of the different social experiences encountered by participants, and information on the nature of such social experiences can be limited (e.g., comparing responses when alone versus with others; Oorschot et al., 2013). Thus, current laboratory methods are not designed to measure social affiliation deficits during positive social encounters.

Understanding how negative symptoms are related to social impairment requires examining how these symptoms are associated with affective responses to social interactions (Blanchard et al., 2015). Using a task in which participants with schizophrenia and controls passively viewed and responded to a video of an affiliative confederate, Blanchard et al. (2015) found that individuals with schizophrenia and

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controls increased positive affect and decreased negative affect after the interaction with no group-level differences in appraisals of the interaction partner. However, within the schizophrenia group, motivation and pleasure deficits (negative symptoms) were related to less positive affect and less positive appraisals of the video affiliative partner (Blanchard et al., 2015). This study suggests there is an association between negative symptoms and affective and affiliative responding to social partners, but these findings are limited by the use of a video stimulus.

Negative symptoms are related to affective responding in a social affiliation paradigm, but available experimental tasks do not measure affiliation using a live social interaction. The current study addresses this limitation with a face-to-face paradigm specifically designed to enhance social bonding and affiliation. We chose three Social Affiliation Enhancement Tasks to create an affiliative bond between participants and their partners. Before and after these tasks, participants completed measures of affiliation and affect. We hypothesized that 1) participants with and without schizophrenia would exhibit increased affiliation and positive affect after completing the social tasks with their partner, 2) in the schizophrenia group, more negative symptoms (motivation and pleasure deficits, including social anhedonia) would be associated with diminished affiliation and positive affect ratings following the tasks, and 3) to examine the external validity of the affiliation task, we explored the hypothesis that diminished self-reported affiliation from the laboratory interaction would be associated with poorer clinical ratings of social functioning in the community.

## 2. Methodology

### 2.1. Participants

Fifty-five participants (20 with schizophrenia spectrum disorders (SSD: 9 schizophrenia, 11 schizoaffective); 35 controls) were recruited from the Baltimore, MD metro area as part of a larger study of the buffering effects of social support on threat reactivity. All data presented below were collected prior to the threat task. Inclusion criteria for the SSD sample were 1) male gender,<sup>2</sup> 2) 18–65 years of age, 3) SSD diagnosis, 4) right-handed, 5) fluent in English,<sup>3</sup> 6) normal hearing, 7) stable medication regimen for at least 2 weeks, and 8) no substance use disorder within the past 6 months. Additional inclusion criteria for controls were: 1) no known psychiatric diagnosis or medication, and 2) no known family history of psychosis in a first/second-degree relative. Of the 59 participants recruited, 4 participants were deemed ineligible after screening, and no participants dropped out of the study.

### 2.2. Diagnostic and symptom measures

Diagnostic status was assessed with the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Patient Edition (SCID-I/P; First et al., 2002). The Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1962; Ventura et al., 1993) assessed psychiatric symptoms during the previous week. Using the Kopelowicz et al. (2008) factor structure, that has demonstrated consistency across a range of SSD participants, the Positive Symptoms subscale served as a measure of psychotic/positive symptom severity with adequate internal consistency in the current sample (SSD Cronbach's  $\alpha = 0.79$ ). Negative symptoms were assessed with the Clinical Assessment Interview for Negative Symptoms (CAINS; Blanchard et al., 2011; Horan et al., 2011; Kring et al., 2013), a 13-item measure with two subscales: Motivation and

Pleasure (MAP) and Expression (EXP) that have good validity and, in the present sample, excellent internal consistency (SSD Cronbach's  $\alpha = 0.90$  and  $\alpha = 0.92$ , respectively). The primary measure of negative symptoms was the CAINS MAP subscale. The Social Anhedonia Scale – Brief (SAS-B; Reise et al., 2011), a 17-item true/false questionnaire, assessed trait levels of diminished pleasure from social interactions with good internal consistency in our sample (SSD Cronbach's  $\alpha = 0.85$ ). The 4-item Role Functioning Scale (RFS; Goodman et al., 1993) assessed functioning in four areas and has good validity and reliability. The Family Network Relationships and the Extended Social Network Relationships scales were included as the two variables of social functioning. A continuous measure of heterosexuality from the Sell Assessment of Sexual Orientation (SASO; Sell, 1996) was used to control for differences in participant heterosexuality that could potentially impact affiliation ratings of opposite gender research partners.

### 2.3. Social affiliation self-report measures

The Inclusion of the Other in the Self Scale (IOS; Aron et al., 1992) assessed relationship closeness between participants and partners on a 7-point Likert scale. Aron et al. (1992) reported that the IOS has good test-retest reliability and convergent validity with other social connectedness measures. The 8-item Positive Reactions to Partner Questionnaire (PRP; Llerena et al., 2012) measured current social affiliation with the partner on a 5-point Likert scale. The PRP has good convergent validity with other social affiliation assessments and adequate internal consistency (Blanchard et al., 2015); internal consistency in the current sample was  $\alpha = 0.64$  (pre) and 0.68 (post). The 6-item Willingness to Interact Questionnaire (WIQ; Coyne, 1976) assessed willingness for future social interactions on a 5-point Likert scale. The WIQ has support for construct validity (Coyne, 1976; Burchill and Stiles, 1988) and good internal consistency in the present sample (pre and post  $\alpha = 0.87$  and 0.93). The latter two measures were reverse scored with higher scores representing more positive reactions and willingness to interact. The 20-item Positive and Negative Affect Scale (PANAS; Watson et al., 1988) assessed current affect using a 5-point Likert scale, and emotional experience ratings summed to form Positive and Negative Affect Scores. The PANAS has good convergent and divergent validity (Watson et al., 1988), as well as adequate to excellent internal consistency in our sample (Positive pre and post  $\alpha = 0.92$  and 0.92; Negative pre and post  $\alpha = 0.69$  and 0.76).

### 2.4. Social Affiliation Enhancement Tasks

Three interpersonal tasks were utilized to promote affiliative social interaction, positive affect, and social bonding: 1) the participant and partner completed a 3.5-minute *Conversation Task* developed for the current study to get to know the other person. To begin, the partner delivers a scripted introduction, then the participant is asked to speak about himself. The partner interacts with positive affect, positive body language, and self-disclosure to promote social affiliation, incorporating principles that contribute to the development of trust and cooperation (Declerck et al., 2013). 2) The *Implicit Fingertip Synchrony Task* (Yun et al., 2012) is an 8-minute task consisting of coordinated movements wherein the dyad mirrors each other's hand movements. The task aims to increase implicit interpersonal synchrony and is associated with decreasing social anxiety (Yun et al., 2012). 3) The *Team Building Task* was adapted from a competitive task to increase the level of acquaintance between individuals (South et al., 2005), drawing on principles of competition increasing in-group identification and cooperation (Brewer, 1979; Buttelmann and Böhm, 2014). Each participant and partner comprised a team; they were instructed to choose a team name and build a block structure in 10 min. They were told that they were competing against another team and that their structures would be judged. After completing the block construction, digital photographs were taken of the structure, and performance feedback was provided.

<sup>2</sup> Of note, we included a single gender in the current study to reduce within-group variability by establishing consistency with the gender of the research confederate who acted as the affiliative partner. In considering which sex to recruit for this study we ultimately considered the logistics of recruitment and the representation of gender within known outpatient samples of schizophrenia and in our available clinical samples.

<sup>3</sup> Confirmed by post-informed consent evaluation to check for understanding of study procedures.

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