Social affiliation and negative symptoms in schizophrenia: Examining the role of behavioral skills and subjective responding

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ABSTRACT

Schizophrenia is characterized by profound impairment in the motivation for social affiliation. Negative symptoms are associated with such impairment but the contribution of behavioral skill deficits is unclear. In this study we utilized a novel video paradigm to assess performance-based affiliative behavioral skills in individuals with schizophrenia (N = 48) and community controls (N = 29). Individuals with schizophrenia displayed significant impairment in behavioral affiliative skills compared to controls; however, in response to the affiliative interaction the groups did not differ on self-reported affective responding, appraisal of the interaction partner, or desire to interact with the partner in the future. Importantly, within the patient group more severe negative symptoms (particularly those related to motivation and pleasure) were associated with poorer affiliative social skills and this relationship was independent of instrumental (non-social) skills, depression or positive symptoms. More severe negative symptoms were also associated with less positive affect in response to the interaction and less positive appraisals of the interaction partner. Self-reported social anhedonia was related to patients' diminished willingness to interact with the partner in the future. These results demonstrate that negative symptoms in schizophrenia are related to both affiliative skill deficits and less affiliative subjective responses to interaction partners.

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1. Introduction

Negative symptoms, such as anhedonia, amotivation and asociality, are one of the most debilitating aspects of schizophrenia (Herbener and Harrow, 2004; Buchanan, 2007; Rabinowitz et al., 2012). Factor analytic studies have found that negative symptoms can be parsimoniously explained by two factors—diminished expression and diminished motivation and pleasure (Blanchard and Cohen, 2006; Horan et al., 2011; Strauss et al., 2012). Deficits in motivation and pleasure have particular implications for role functioning in the community (e.g., Green et al., 2012; Kring et al., 2013) and may manifest as disruptions in the engagement of positive social interactions with others (i.e., social affiliation) (NIMH, 2012).

The social affiliative deficits reflected in negative symptoms may in part arise from, or contribute to, impairments in social skill. Social skills involve verbal and nonverbal behavior that are essential for the initiation and success of affiliative interactions, and an accumulation of research has shown profound social skill deficits in schizophrenia (e.g., Liberman et al., 1986; Mueser et al., 1990, 2010) leading to interventions to improve these skills (e.g., Granholm et al., 2007; Granholm

et al., 2014; Kurtz et al., 2015). However, when assessing social skill within an interpersonal context, typically through the use of a role play, the association between these behavioral skill ratings and negative symptoms has been inconsistent. While some studies have found that greater negative symptoms are associated with poorer social skill (Mueser et al., 1990; Bellack et al., 1990; Addington and Addington, 1999; Couture et al., 2011a, 2011b; Robertson et al., 2014), other studies have failed to find an association between social skill and negative symptoms (Mueser et al., 1991; Blanchard et al., 1994; Bowie et al., 2010). For example, Bowie et al. (2010) observed that symptoms, including negative symptoms, do not appear to influence the ability to perform social skills but rather the likelihood of performing those skills in the community.

In considering the mixed findings regarding the association between social skill and negative symptoms, it may be informative to consider methodological issues relating to the assessment of both of these domains. Prior studies have utilized measures of negative symptoms that may have limitations in terms of their capacity to assess experiential deficits in interests, motivation, and pleasure that are central to the construct of affiliation (Blanchard et al., 2011). Further, prior studies have often utilized a single summary score of negative symptoms. As noted above, recent research has indicated that negative symptoms are best characterized by two major facets involving deficits in motivation and pleasure and a separate facet of expressive deficits reflecting

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blunted affect and alogia (Blanchard and Cohen, 2006; Horan et al., 2011; Strauss et al., 2012). It may be important to explore the potential differential contribution of experiential and expressive negative symptoms to behavioral skill deficits. For example, Rocca et al. (2014) found that avolition-related symptoms were more strongly associated with functional impairment than expressive deficits. To address these issues, the current study assessed negative symptoms using the Clinical Assessment Interview for Negative Symptoms (CAINS; Horan et al., 2011; Kring et al., 2013). The CAINS is a recently developed semi-structured interview that evaluates the two factors of negative symptoms while providing a more direct assessment of experiential deficits associated with motivation and pleasure (including consummatory and anticipatory pleasure) than is provided by other instruments (Blanchard et al., 2011).

Another consideration is that prior studies of social skill in schizophrenia typically involve behavioral interactions that may lack positive affective features that are central to affiliation. Role play assessments often include conflict-oriented or problem-solving scenes (Bellack et al., 1994) that are by their nature not affiliative. Further, when existing role-play assessments include affiliative goals (e.g., getting to know a new neighbor), the role plays often place the burden of maintaining the conversation on the participant (Bellack et al., 1994; Sayers et al., 1995; Patterson et al., 2001), discourage confederates from displaying positive affect (Patterson et al., 2001), and typically do not induce positive affect even in healthy participants in a manner that would be expected from an affiliative interaction (Horan and Blanchard, 2003). The use of affiliative skill assessments could be important to examine in schizophrenia. Affiliative deficits are by definition related to positive social interactions that involve different emotional experiences and behavioral displays than those involved in problem solving or conflictual interactions. We have previously noted (Blanchard et al., 1994; Llerena et al., 2012) that individuals high in social anhedonia may have skill deficits that are specific to affiliative interactions.

A final issue in the interpretation of existing findings centers on the subjective response to affiliative interactions in schizophrenia. As suggested by Bowie et al. (2010), negative symptoms may impact the probability of employing social skills in the community rather than the skills themselves. The choice to engage in affiliative behavior may in part be derived from the individual's expectation or experience of pleasure or reward from the social encounter. Laboratory evocative studies would suggest that hedonic responding is intact in schizophrenia (Cohen and Minor, 2010; Kring and Caponigro, 2010; Kring and Elis, 2013). However, caution is appropriate in extrapolating from these laboratory studies to affiliative interactions. When assessing deficits in emotional experience in schizophrenia, mood-induction laboratory studies have generally relied on stimuli that lack a social affiliative component, such as film clips, picture slides, or flavored drinks (Cohen and Minor, 2010). Beyond changes in positive affect, it would be informative to examine how negative symptoms are related to other subjective responses that relate to the likelihood of affiliation including positive appraisals of the interaction partner (e.g., trusting or liking the partner) or willingness to interact with the partner in the future. We are not aware of any studies that have directly examined subjective responses to standardized affiliative skill assessments in schizophrenia to determine if negative symptoms might contribute to deficits in affiliative subjective responding.

In order to better examine affiliative social skills, we recently developed a novel task that involves a highly affiliative interaction partner presented on video (Llerena et al., 2012). Participants are asked to respond to the video as they would in a real social interaction. Initial results indicate that this task is sensitive to individual differences in social anhedonia within a nonclinical sample (Llerena et al., 2012). Specifically, compared to controls, individuals with elevated social anhedonia were less skilled in this affiliative task, reported less change in positive affect, had less positive reactions to the interaction partner, and were

less willing to engage in future hypothetical interactions with the partner (Llerena et al., 2012). These findings indicate that anhedonia may manifest in diminished social affiliative skill as well as in altered subjective affiliative reactions. It remains to be determined if these findings from a nonclinical sample can be replicated in individuals with schizophrenia with elevated negative symptoms.

The aims of the current study are three-fold. First, we sought to examine performance-based social affiliative skill in individuals with schizophrenia using a novel video task (Llerena et al., 2012). We hypothesized that individuals with schizophrenia would demonstrate poorer social affiliative skill as compared to controls. Second, we examined the association between deficits in affiliative skills and clinician-rated negative symptoms and self-reported social anhedonia in schizophrenia. We hypothesized that greater negative symptoms would be associated with poorer affiliative social skills. We also explored whether the two domains of negative symptoms (motivation and pleasure, expression) would be differentially associated with social skill. Relatedly, we expected that this association between negative symptoms and affiliative skill would be independent of functional (non-social) skill impairment and depressive symptoms. Finally, we examined subjective affiliative responding related to the partner in the affiliation video task. We hypothesized that, given their focus on experiential deficits, greater negative symptoms of motivation and pleasure would be associated with less change in positive affect during the role play and less affiliative reactions to the interaction partner.

2. Methods

2.1. Participants

The sample consisted of 48 individuals with schizophrenia or schizoaffective disorder and 29 nonpsychiatric controls. Participants with schizophrenia were recruited from outpatient mental health clinics affiliated with a division of community psychiatry at a public university (92% of the sample) and a Veterans Administration Medical Center (8%). Participants with schizophrenia were identified by either chart review or referral by a mental health clinician and met the following inclusion criteria: (1) diagnosis of schizophrenia or schizoaffective disorder based on SCID interview; (2) 18–64 years of age; (3) ability to read; and (4) willingness to provide consent. Exclusion criteria for participants with schizophrenia were: (1) DSM-IV diagnosis of any Axis I psychiatric disorder other than schizophrenia or schizoaffective disorder; (2) DSM-IV diagnosis of alcohol or drug dependence in the last 6 months or DSM-IV diagnosis of alcohol or drug abuse in the last month; (3) history of significant head injury, defined as a head injury followed by loss of consciousness for more than 1 h, recurring seizures, clear cognitive sequelae, and/or need for cognitive rehabilitation; (4) history of neurological disease such as Parkinson's, multiple sclerosis, seizure disorder, stroke; (5) intellectual disability as indicated by clinical chart review; (6) inability to provide informed consent; or (7) inability to participate due to intoxication or escalation of psychiatric symptoms at the time of assessment resulting in disruptive or aggressive behavior. Other than diagnosis, all inclusion and exclusion criteria were evaluated via a review of the individual's clinical record.

Control participants were recruited via flyers advertised in several buildings around the investigators' research offices and via word of mouth from control participants once their participation was completed. Inclusion criteria for control participants were age 18–64 years and willingness to participate. Control participants were screened with the SCID and excluded if they met criteria for any DSM-IV Axis I psychiatric disorder, a DSM-IV diagnosis of alcohol or drug dependence in the last 6 months, or a DSM-IV diagnosis of alcohol or drug abuse in the last month. Additional exclusion criteria for control participants included history of significant head injury, neurological disease, and mental retardation as outlined above and determined via self-report. Personality disorders were not assessed.

2.2. Procedures

All study procedures were approved by the University of Maryland Institutional Review Board. All participants completed a standardized informed consent process with trained recruiters. Following consent, participants completed assessments during one four-hour appointment or two two-hour appointments with ample opportunity for breaks. Assessments were conducted by interviewers who completed extensive training for all measures (e.g., attended training workshops, rated training videos of clinical interviews to achieve a required reliability standard with gold standard ratings, and were observed administering interviews prior to performing study assessments) and received regular supervision to review videotaped assessments to discuss administration and scoring. Assessors were not blind to condition (schizophrenia versus control).

All participants received study measures in the same order. Final eligibility was determined following administration of the SCID. Videotaped social affiliation tasks (see below for a complete description) were rated for indicators of social skills. These skill ratings were made by two raters who did not administer assessments to participants. This ensured that raters did not have any contact with the participants before rating their videotaped interactions and so were blind to participants' diagnostic status and responses on the symptom, functioning, and emotional responding measures.

2.3. Measures

2.3.1. Diagnostic and symptom measures

The Structured Clinical Interview for DSM-IV (SCID-I; First et al., 2001) was used to establish diagnoses. Interviews were completed by master's level assessors who were extensively trained, had achieved reliable ratings, and completed bi-monthly supervision of study interview videotapes to prevent rater drift. The Clinical Assessment Interview for Negative Symptoms (CAINS; Horan et al., 2011; Kring et al., 2013) is a 13-item semi-structured interview that evaluates two factors of negative symptoms in schizophrenia, Expression (EXP; 4 items) and Motivation and Pleasure (MAP; 9 items). The two scales have good internal consistency, test–retest reliability, inter-rater reliability, convergent validity, and discriminant validity (Kring et al., 2013). Rater agreement was not directly assessed in the current study; however, the two clinical raters were trained and regularly supervised by one of the developers of the CAINS (JJB). To complement interview-assessed symptoms of motivation and pleasure, an abbreviated 17-item version of the Social Anhedonia Scale was used to obtain self-reported levels of social anhedonia (Reiss et al., 2011). The Brief Psychiatric Rating Scale (BPRS; Overall and Gorham, 1962; Ventura et al., 1993) is a 24-item clinician-rated measure that assesses clinical psychiatric symptomatology experienced over the past week. Following the factor structure supported by Kopelowicz et al. (2008), four subscale scores (positive symptoms, agitation/mania, negative symptoms, depression/anxiety) were computed. The Calgary Depression Scale for Schizophrenia (CDSS; Addington et al., 1990) is a 9-item semi-structured interview designed to assess depressive symptoms in individuals with schizophrenia distinct from positive, negative, and extrapyramidal symptoms. The CDSS total score was used in all analyses.

2.3.2. Adaptive instrumental skills

The UCSD Performance-based Skills Assessment-Brief Version (UPSA-B; Mausbach et al., 2007) is a brief assessment of functional capacity related to basic life skills in individuals with serious mental illness. In the UPSA-B, participants are instructed to role play tasks related to every day functioning, specifically in the domains of finances and communication. A total score for the UPSA-B (combining scores on communication and finances) was used in analyses.

2.3.3. Community functioning

The Role Functioning Scale (RFS; Goodman et al., 1993) assesses functioning in the real world in the domains of working productivity, independent living/self-care, family network relationships, and immediate social network relationships. Each domain is rated from 1 (a very minimal level of role functioning) to 7 (an optimal level of role functioning).

2.3.4. Affiliative social skills

We utilized a video social affiliation interaction task to assess performance-based affiliative social skills (Llerena et al., 2012). In this simulated social affiliative interaction, participants viewed a video of a socially affiliative individual and were instructed to respond at the end of the video as they would if they were meeting the individual in person. In order to maximize the detection of individual differences in the desire to affiliate, there was no time limit imposed on the participant's response and the task was completed when the participant indicated that they were done responding ($M = 97.69$ s; SD = 88.78). This task has been shown to be sensitive to individual differences in affiliation such that compared to controls, individuals with elevated social anhedonia are rated as less skilled, report less change in positive affect, have less positive reactions to the interaction partner, and are less willing to engage in future hypothetical interactions with the partner (Llerena et al., 2012). The use of the affiliative video in the current study differed from Llerena et al. (2012) in that participants in the current study understood that this was a role play in response to a video (the Llerena et al. study utilized deception to lead individuals to believe that they were interacting with another person via video link when in actuality this was a videotape). The clip, which lasted 2 min 43 s, featured a friendly, attractive, and outgoing female who discussed her social relationships and activities she enjoyed with others. In order to enhance the relatability of the interaction across diverse samples, the script used in the video was designed to avoid gender or age specific topics and instead referred to broad social activities and reactions (visiting and talking with friends and family, meeting new people, and enjoyment and support derived from these relationships and interactions). As the video clip ended, the video confederate asked participants what they like to do with friends and family, at which point the video concluded and the participants were instructed to respond. Participants' entire responses to the video were videotaped for later behavioral rating. Raters used the social skills manual developed by Llerena et al. (2012), which is similar to behavioral rating procedures used in previous social interaction studies (e.g., Penn et al., 1994). Please see Llerena et al. (2012) for more information on the specific skill domains assessed. Social skill was rated based on four components (verbal, nonverbal, affiliation, and overall social skill) in response to the social affiliation interaction task. Items were rated on a 5-point scale from 1 ("very poor") to 5 ("very good"), with higher scores indicating greater skill. Ratings were made by graduate level raters who were blind to group status and participants' scores on symptom, functioning, and self-report measures. Trained raters were used who previously (Llerena et al., 2012) demonstrated high rater agreement across the skill components assessed (range of intra-class correlations .87 to .93).

2.3.5. Subjective responding

Before and after completing the social affiliation video task, participants self-reported on mood using 14 adjectives to assess positive affect (happy, delighted, glad, cheerful, pleased, warmhearted, friendly) and negative affect (lonely, miserable, sad, grouchy, gloomy, blue, unhappy). The Willingness to Interact Scale (WILL; Coyne, 1976) is a 6-item assessment of willingness to engage in interactions with a specified target individual. In this study, participants were asked about their desire to have future contacts with the individual from the social affiliation video task (e.g., "*How willing would you be to invite your partner to a social event?*"). Items are rated on a 5-point scale from 1 ("definitely willing") to 5 ("definitely unwilling") and reverse-scored, with higher scores indicating more willingness to engage in future interactions

with the target individual. Internal consistency, Cronbach's alpha, in the current study was high ($\alpha = .91$)

The Positive Reactions to Partner (PRP) scale is an 8-item measure that assesses participants' subjective responses to a specified target individual. The PRP was developed by Llerena et al. (2012) to assess affiliative reactions of participants in response to the video affiliation task. Items are rated on a 5-point scale from 1 ("completely agree") to 5 ("completely disagree") and include, "*I liked talking to my partner*" and "*My partner seemed like a warm, caring person.*" Items are reverse-coded, with higher scores reflecting more positive responses toward the target individual. Internal consistency in the current study was adequate ($\alpha = .70$).

2.3.6. Cognitive functioning

The Brief Cognitive Assessment Tool (BCAT; Mansbach et al., 2012) measures global cognitive function with the trail making test B, category fluency test, and digit symbol test.

2.4. Data analysis

Characteristics of the sample and group differences in demographic characteristics were examined using chi-squared analyses and *t*-tests. Group comparisons in measures of community functioning, instrumental skills, and social affiliative skill were conducted with one-way analysis of variance (ANOVA), *t*-tests, and repeated measures ANOVA. Self-report differences in affective responding and reactions to the affiliative partner were then explored in between-group analyses. Finally, associations among negative symptoms, instrumental and social skill, and subjective responding to the video affiliative interaction were examined with correlations within the schizophrenia group.

3. Results

3.1. Characteristics of the sample

Demographic and clinical characteristics of the sample are displayed in Table 1. Individuals with schizophrenia ($n = 48$) and controls ($n = 29$) did not differ in gender ($X^2 = 2.54$, $p = .11$), race ($X^2 = 6.06$, $p = .10$), or age, $t(75) = 1.55$, $p = .13$. However, compared to controls, patients did have fewer years of education, $t(74) = 5.69$, $p < .05$. The groups differed in cognitive ability with patients displaying poorer

performance on category fluency, $t(74) = -3.40$, $p < .01$, digit symbol coding, $t(72) = -2.60$, $p < 0.05$, and trail making test B, $t(70) = 6.78$, $p < 0.001$ (note that *n*s for the schizophrenia group ranged from 43 to 47 as not all participants completed each cognitive task).

3.2. Community functioning and skill assessments

Community functioning, instrumental skills, and affiliative skill measures are shown in Table 2. Compared to controls, individuals with schizophrenia demonstrated overall poorer community functioning as measured by the RFS subscores, $F(4,72) = 25.04$, $p < .001$, with significant group differences in each of the four domains (all ps < .01). Patients were rated as having lower instrumental skills on the UPSA, $t(75) = -4.76$, $p < .001$.

In terms of behavioral affiliative social skills, compared to controls, individuals with schizophrenia were rated as having poorer verbal and nonverbal skills, ts$(75) = -4.57$, -4.03, ps < .001, respectively; poorer affiliative skill, $t(75) = -5.93$, $p < .001$; and lower overall social skill, $t(75) = -5.61$, $p < .001$. With regard to subjective self-reported reactions to the affiliative video, there were no group differences in either willingness to interact, $t(75) = 1.20$, $p > .05$ or positive appraisals of the interaction partner, $t(73) = 1.66$, $p > .05$.

Self-reported mood associated with the affiliative role play was examined with group × time (pre- and post-role play) repeated measure ANOVAs. For positive affect, there was a significant main effect of time, $F(1,74) = 4.17$, $p = .045$ with marginal means showing that participants reported higher positive affect after the social interaction ($M = 26.33$, $SE = 0.81$) compared to baseline ($M = 25.474$, $SE = 0.73$). There was no main effect of group, $F(1,77) = 0.14$, $p = 0.71$ and the group × time interaction was not significant, $F(1,77) = 0.84$, $p = .36$. Similarly, a two-way repeated measure ANOVA examining change in self-reported negative affect indicated that there was a significant main effect of time, $F(1,75) = 4.78$, $p = 0.03$, with marginal means showing that participants reported less negative affect after the social interaction ($M = 8.85$, $SE = 0.43$) compared to baseline ($M = 9.56$, $SE = 0.50$). There was no main effect of group, $F(1,75) = 2.64$, $p = 0.11$ and the group × time interaction was not significant, $F(1,75) = 1.04$, $p = 0.31$.

Table 1
Demographic and clinical characteristics.

	Schizophrenia ($n = 48$)	Control ($n = 29$)
Percentage male	67%	48.3%
Age	47.98 (7.85)	44.31 (12.99)
Education	11.04 (2.25)	13.86 (3.00)
Race, *n* (%)		
White	4 (8.3%)	7 (24.1%)
African American	43 (89.6%)	21 (72.4%)
American Indian or Alaskan native	1 (2.1%)	0 (0%)
Multiple racial backgrounds	0 (0%)	1 (3.4%)
BCAT		
Digit symbol coding	5.61 (6.00)	8.82 (3.27)
Category fluency	39.13 (8.66)	46.59 (10.25)
Trails B	161.70 (61.56)	76.55 (33.81)
Social Anhedonia Scale	6.10 (3.95)	2.38 (2.13)
Symptoms		
CAINS MAP	11.19 (6.21)	
CAINS EXP	6.29 (4.03)	
CDSS	2.90 (3.27)	
BPRS, positive symptoms	11.73 (5.98)	

BCAT = Brief Cognitive Assessment Tool; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = motivation and pleasure score; EXP = expression score; CDSS = Calgary Depression Scale for Schizophrenia total score; BPRS = Brief Psychiatric Rating Scale.

Table 2
Functioning in the community, functional capacity, affiliative role play performance.

	Schizophrenia	Control
Community functioning (RFS)		
Working productivity	2.85 (2.10)	6.72 (1.13)
Independent living/self-care	5.73 (1.50)	7.00 (0.00)
Family network relationships	5.71 (1.86)	6.69 (0.97)
Immediate social network	4.94 (2.28)	6.72 (0.84)
Functional capacity		
UPSA-B	65.63 (17.40)	83.79 (14.03)
Affiliative role play behavioral ratings		
Nonverbal skill	2.88 (1.23)	4.10 (0.98)
Verbal skill	3.02 (1.11)	4.03 (0.98)
Affiliation	2.38 (1.18)	3.93 (0.99)
Overall social skill	2.73 (1.09)	4.07 (0.88)
Affiliative role play self-report		
Willingness to interact	24.23 (6.61)	21.67 (6.07)
Positive reactions to partner	32.89 (6.30)	31.21 (5.47)
Positive affect (pre-role play)	24.94 (6.48)	26.07 (5.52)
Positive affect (post-role play)	26.62 (7.30)	26.64 (6.00)
Negative affect (pre-role play)	10.44 (4.15)	8.69 (4.35)
Negative affect (post-role play)	9.40 (3.81)	8.31 (3.42)

RFS = the Role Functioning Scale; UPSA-B = UCSD Performance-based Skill Assessment—Brief.

3.3. Symptom correlates of social skill and subjective responding in schizophrenia

Table 3 presents correlations between negative symptoms, self-reported social anhedonia, social skill, and subjective responding in individuals with schizophrenia. In order to minimize the number of correlations we focused on the overall rating of social skill as this behavioral rating was highly correlated with the other social skill ratings (range of rs in the full sample $= .84$ to $.91$, $ps < .001$). CAINS MAP symptoms were significantly correlated with instrumental skills on the UPSA-B ($r = -.28$, $p < .05$) but CAINS EXP symptoms were not ($r = -.12$). With regard to overall social skill both MAP ($r = -.38$, $p < .01$) and EXP ($r = -.30$, $p < .01$) negative symptoms were correlated with skill such that greater negative symptoms were related to poorer social skill ratings. Controlling for EXP, MAP negative symptoms remained significantly associated with social skills ($pr = -.32$, $p = .03$); however, when controlling for MAP symptoms, EXP was no longer associated with social skills ($pr = -.19$, $p = .18$). Given that CDSS depression was associated with poorer social skills ($r = -.31$, $p = .033$), we controlled for depression and found no impact on the association between social skill and MAP ($pr = -.33$, $p = .024$) or EXP ($pr = -.34$, $p = .021$). Positive symptom severity was not related to social skill ($r = -.01$).

In order to determine if social affiliative deficits were uniquely associated with MAP negative symptoms, independent of other (instrumental) skill deficits, we computed partial correlations controlling for UPSA-B performance and found that social skills remained significantly associated with MAP symptoms and the magnitude of the association was unaltered ($pr = -.39$, $p = .007$). To examine the combined contribution of instrumental and social skills to experiential negative symptoms a regression analysis was conducted with these two skill measures predicting severity of MAP symptoms. The regression was significant, $F(2,47) = 6.30$, $p = .004$, with both instrumental ($\beta = -.27$, $p = .048$) and social skills ($\beta = -.38$, $p = .007$) contributing to the model that accounted for 22% of the variance in MAP severity.

In examining correlates of self-reported subjective responding to the affiliative role play, more severe MAP negative symptoms, but not EXP negative symptoms, were related to less positive appraisals of the interaction partner ($r = -.42$, $p < .01$). Neither negative symptom scale was correlated with self-reported willingness to interact with the partner. However, greater self-reported anhedonia on the Social Anhedonia Scale was significantly related to less positive appraisals of the partner ($r = -.40$, $p < .01$) and less willingness to interact with the partner ($r = -.33$, $p < .05$).

Looking at affective responding, more severe MAP negative symptoms were significantly associated with less positive affect both before ($r = -0.42$, $p < .01$) and after ($r = -0.40$, $p < .01$) the affiliative interaction. More severe EXP negative symptoms were related to lower positive affect before the role play ($r = -.33$, $p < .05$) but this association was weaker and nonsignificant for post-interaction positive affect ($r = -.25$). Neither MAP nor EXP negative symptoms were significantly correlated with reports of negative affect before or after the affiliative interaction.

4. Discussion

The present study sought to understand the nature of affiliative deficits in both behavior and subjective responding, and their association with negative symptoms in individuals with schizophrenia. We utilized a novel social affiliation video task (Llerena et al., 2012) and assessed the two major domains characterizing negative symptoms, namely motivation and pleasure (MAP) symptoms and expressive (EXP) negative symptoms (Kring et al., 2013). Compared to controls, individuals with schizophrenia were rated as having poorer verbal and nonverbal skills, poorer affiliative skill, and lower overall social skill. This supports our first hypothesis that individuals with schizophrenia would demonstrate impairments in behaviors necessary to successfully engage in affiliative social interactions with others and replicates prior findings (e.g., Liberman et al., 1986; Mueser et al., 1990, 2010) of social skill impairments in schizophrenia.

Interestingly, while individuals with schizophrenia were rated as having poorer affiliative social skill compared to controls, they reported similar positive appraisals of their interaction partner and there were no group differences in the self-reported willingness to engage in future interactions. Further, in examining self-reported positive and negative affect, while there was a main effect of time (increased positive and decreased negative affect after the interaction), there was no main effect of group and no interaction. Individuals with schizophrenia were similar to controls in terms of their self-reported affective response to an affiliative interaction. These results extend prior findings showing that, at the group-level, affective responding to evocative stimuli in schizophrenia is largely intact (Cohen and Minor, 2010; Kring and Caponigro, 2010; Kring and Elis, 2013). Further, our results show that while individuals with schizophrenia may perform more poorly than controls, their positive appraisals of an interaction partner and their desire to interact are comparable to controls.

We hypothesized that individual differences in behavior and subjective responding within the schizophrenia group would be associated with the severity of clinician-rated negative symptoms and self-reported social anhedonia. Use of the CAINS (Horan et al., 2011; Kring et al., 2013) allowed us to examine the differential contribution of MAP and EXP negative symptoms to affiliative skill and instrumental skill deficits. Performance-based affiliative skill was most strongly associated with experiential negative symptoms. Instrumental skill (assessed with

Table 3
Negative symptoms, self-reported social anhedonia, and affiliative skill measures in schizophrenia (N = 48).

Measure	1	2	3	4	5	6	7	8	9	10
1. CAINS MAP	–									
2. CAINS EXP	.32*	–								
3. SocAnh Scale	.43**	−.07	–							
4. UPSA-B	−.28*	−.12	−.27†	–						
5. Social skill	−.38**	−.30*	−.06	.03	–					
6. Reactions to partner	−.42**	.06	−.40**	.01	.32*	–				
7. Willing to interact	−.24	.13	−.33*	.13	.08	.69**	–			
8. PA pre-role play	−.42**	−.33*	−.26	.26	.41**	.36*	.23	–		
9. PA post-role play	−.40**	−.25	−.22	.18	.40**	.49**	.41**	.69**	–	
10. NA pre-role play	.13	−.16	−.01	−.05	−.15	−.19	−.07	−.11	−.07	–
11. NA post-role play	.22	−.03	.16	−.01	−.13	−.17	−.01	−.19	.67**	

CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = motivation and pleasure score; EXP = expression score; SocAnh = social anhedonia; UPSA-B = UCSD Performance-based Skill Assessment—Brief; PA = positive affect; NA = negative affect.

† $p < .06$.
* $p < .05$.
** $p < .01$.

the UPSA) was also related to motivation and pleasure symptoms. This latter correlation is not consistent with Kring et al., 2013 finding of no relation between the UPSA and CAINS-rated negative symptoms but the current result does converge with prior reports showing that UPSA performance is related to more severe negative symptoms (e.g., Cardenas et al., 2013; but see Green et al., 2012). The association between motivation and pleasure negative symptoms and impairment in affiliative social skill, was largely independent of instrumental (UPSA-rated) skills and depressive or positive symptoms. Together, affiliative social skill and instrumental skill accounted for a combined 22% of the variance in MAP severity. Overall our findings extend prior results (Mueser et al., 1990; Bellack et al., 1990; Addington and Addington, 1999; Couture et al., 2011a, 2011b; Robertson et al., 2014) and indicate that negative symptoms can influence the ability to perform affiliative social skills (and not just the probability of using these skills in the community). This is inconsistent with other studies (Mueser et al., 1991; Blanchard et al., 1994; Bowie et al., 2010) that have failed to show such a link between negative symptoms and social skill in schizophrenia. The reasons for such variable findings are unclear and may relate to sample differences or characteristics of the skill assessments such as the current study's focus on an affiliative social interaction.

With regard to negative symptoms and positive affective responding to the affiliative interaction, our hypothesis was only partially confirmed. While more severe negative symptoms were associated with less positive affect this was evident across both baseline and following the affiliative interaction. Thus, MAP symptoms were related to a broad general diminution of positive affect and not just altered reactivity to the social encounter. This would appear consistent with prior findings that negative symptoms are associated with trait measures of positive affect (Horan and Blanchard, 2003; Blanchard et al., 1998). These results were specific to positive affect, as neither MAP nor EXP negative symptoms were related to self-reported negative affect within the affiliative role play.

Beyond affective responding, negative symptoms and self-reported anhedonia were associated with how individuals with schizophrenia appraised their interaction partner and their willingness to interact with the partner in the future. More severe MAP negative symptoms (but not EXP) and self-reported social anhedonia were associated with less positive appraisals of the interaction partner. Although clinician rated negative symptoms were not related to willingness to interact with the partner in the future, greater self-reported social anhedonia was associated with less willingness to interact. These results indicate that MAP negative symptoms are related to less positive appraisals of social partners and social anhedonia is related to less willingness to interact with potential social partners—both of which could presumably contribute to the diminished likelihood of actually engaging in social affiliative interactions. It would be informative to explore the factors that contribute to the relationship between negative symptoms and these social appraisals and willingness to interact. For example, behavioral skill impairments and lower positive affect in the interaction appear to, in part, contribute to the diminished positive appraisals as evident in our correlational findings. It may also be that other factors could play a role such as internalized-stigma (Corrigan et al., 2005; Park et al., 2013), dysfunctional attitudes (Couture et al., 2011a, 2011b; Grant and Beck, 2009; Rector et al., 2005), or the diminished anticipation of future pleasure (Gard et al., 2007) that could play a role in how affiliative social partners and the potential for interaction are viewed.

This study had several limitations. The sample was comprised of mostly male African-Americans, and caution should be used in generalizing these results to women and individuals from other racial or ethnic groups. Relatedly, the affiliative interaction video featured a young adult, Caucasian female and it is unclear how age, gender or race of the interaction partner may contribute to the responding of participants (e.g., Shelton, 2003). Future studies may consider how behavioral skills and subjective responding differ in response to demographic characteristics of the affiliative partner. The current study did not include a social

skill assessment using non-affiliative (e.g., problem-solving, conflict-oriented) social interactions. Thus we are not able to conclude that our current results show that affiliative assessments provide unique relations that might not be found in these other interactions. However, the current results using an affiliative skill assessment differ from recent studies that have failed to find an association between negative symptoms and other social skill assessments (Mueser et al., 1991; Blanchard et al., 1994; Bowie et al., 2010). Another limitation is that we utilized a video-based interaction to assess skill which does not require turn-taking and responding to ongoing and shifting reactions from an interaction partner. The advantage of the current approach is that it provides for a standardized social stimulus that is held constant across participants; however, this limits a full assessment of skill deficits that may be evident in live dyadic interactions. The current study is correlational and it is not possible to determine the direction of causal relations. For example, skill deficits may give rise to social avolition and anhedonia secondary to failed social interactions or the lack of pleasure and motivation for social interactions may lead to less skillful social affiliative behavior. Finally, this study conducted a number of correlational analyses to examine the proposed hypotheses—caution is warranted in the interpretation of the findings based on the number of correlations computed.

Despite these limitations, these results have several implications. These findings illustrate that individuals with schizophrenia and who have low negative symptoms may have a desire to interact and affiliate with others but many will lack the skills to do so successfully. Importantly, more severe negative symptoms are associated with both poorer affiliative skills and altered subjective responding to affiliative interactions that may discourage the initiation of affiliative social interactions. Such findings suggest that clinical interventions focused on improving social affiliative behavioral skills in this population may be indicated and that, for those with motivation and pleasure-related negative symptoms, additional intervention may be needed to target cognitive appraisals of social interaction partners. The fact that the impact of negative symptoms on affiliative social skill was found independent of functional skills or symptoms of depression suggests that skill training focusing on instrumental behavior or interventions that improve non-negative symptoms will not likely yield improvements in affiliative skill.

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