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Interpersonal beliefs related to suicide and facial emotion processing in psychotic disorders

Jennifer Villa^a, Amy E. Pinkham^b, Christopher N. Kaufmann^c, Eric Granholm^c, Philip D. Harvey^{d,e}, and Colin A. Depp^{c,f}

^aDepartment of Psychology, San Diego State University, San Diego, CA, United States

^bSchool of Behavioral and Brain Sciences, The University of Texas at Dallas, Richardson, TX, United States

^cDepartment of Psychiatry, UC San Diego, La Jolla, CA, United States

^dResearch Service, Bruce W. Carter Veterans Affairs (VA) Medical Center, Miami, FL, United States

^eDepartment of Psychiatry and Behavioral Sciences, University of Miami Miller School of Medicine, Miami, FL, United States

^fVA San Diego Healthcare System, San Diego, CA, United States

Abstract

Deficits in social cognition are present in psychotic disorders; moreover, maladaptive interpersonal beliefs have been posited to underlie risk of suicidal ideation and behavior. However, the association between social cognition and negative appraisals as potential risk factors for suicidal ideation and behavior in psychotic disorders has not been assessed. In a pilot study, we assessed accuracy and error biases in facial emotion recognition (Penn ER-40), maladaptive interpersonal beliefs as measured by the Interpersonal Needs Questionnaire (INQ), and current suicide ideation and history of past attempts in a sample of 101 outpatients with psychotic disorders (75 schizophrenia/schizoaffective; 26 bipolar disorder). INQ scores were positively associated with history of suicide attempts and current ideation. INQ scores were inversely related with emotion recognition accuracy yet positively correlated with bias toward perceiving anger in neutral expressions. The association between biases pertaining to anger and INQ scores persisted after adjusting for global cognitive ability and were more evident in schizophrenia than in bipolar disorder. The present findings suggest that maladaptive beliefs are associated with a tendency to misperceive neutral stimuli as threatening and are associated with suicidal ideation and behavior. Although better cognitive ability may increase risk for suicide in psychotic disorders, biases in misinterpreting anger in others may be a specific deficit related to formation of maladaptive beliefs about others that are associated with increased risk of suicide.

Keywords

psychotic disorders; suicide; social cognition; facial emotion recognition; negative appraisals

1. Introduction

About 5% of people with psychotic disorders die by suicide (Palmer et al., 2005) and a third attempt suicide in their lifetimes (Pompili et al., 2007), with a standardized mortality rate 3.9 times that in the general population (Olfson et al., 2015). Despite the high risk for lifetime suicidal ideation and behavior in psychotic disorders (schizophrenia, schizoaffective disorder, bipolar disorder), the illness-specific mechanisms underlying risk for suicide are not well understood (Kasckow et al., 2011).

Although several risk factors associated with histories of suicide attempts in people with psychotic disorders parallel that in the general population (e.g., history of prior attempts, depressive symptoms; Pompili et al., 2007), some risk factors differ. In the general population, educational attainment and cognitive ability are negatively associated with histories of suicidal ideation and behavior (Kosidou et al., 2014), whereas several studies indicate greater risk associated with higher cognitive ability in schizophrenia (Kim et al., 2003; Nangle et al., 2006; Villa et al., In Press). A recent meta-analysis found a stronger link between the presence of ideation and suicidal behavior in psychotic disorders than in mood disorders (Chapman et al., 2015), as well as more lethal attempts (Kelleher et al., 2013). The symptom clusters of psychotic disorders appear to be differentially correlated with suicide - positive symptoms (e.g., paranoia and hallucinations) can be associated with increased suicide risk (Castelein et al., 2015), whereas negative symptoms are associated with decreased risk (Hawton et al., 2005). Therefore, due to the elevated risk associated with psychotic disorders and the evidence for somewhat unique determinants of suicide in comparison with other psychiatric disorders, it is important to evaluate potential mechanisms underlying suicidal ideation and behavior in psychotic disorders.

Social cognition has received comparatively little attention in research on suicide risk in psychotic disorders. Nonetheless, many theoretical accounts of the psychological mechanisms underlying suicide in psychosis (Johnson et al., 2008), and in the general population, feature the presence of maladaptive interpersonal beliefs as central to risk (e.g., the Interpersonal-Psychological Theory of Suicidal Behavior; Joiner et al., 2009; Van Orden et al., 2010). These include perceptions of rejection and ostracization from others, social defeat, experiencing oneself as a burden, and low appraisals of belonging and availability of support/rescue from distress (Johnson et al., 2008; Van Orden et al., 2010). The Interpersonal Needs Questionnaire (INQ) was developed to assess two of these constructs (thwarted belongingness, perceptions of being a burden to others), but to our knowledge, this measure has had limited usage in psychotic disorders (Silva et al., 2015; Taylor et al., 2016).

At a more basic level, one aspect of social cognition commonly associated with psychotic disorders is the aberrant processing of emotions in others (Green et al., 2015; Kohler et al., 2010; Lee et al., 2013), in particular biases in identification of threats such as anger (Pinkham et al., 2011; Ruocco et al., 2014). In the few studies that have investigated social

cognitive ability and suicide risk in psychosis, patients displayed deficits on social cognitive tasks relative to comparative groups, with impairment specific to patients with past suicide attempts (Duño et al., 2009; Harenski et al., 2017; Lakimova et al., 2016). In particular, Lakimova et al. (2016) found a negative association between the number of suicide attempts and accurate recognition of anger and disgust in schizophrenia. In a study of facial affect recognition in a sample of persons with schizophrenia, with and without paranoia, Pinkham et al. (2011) found that paranoia was associated with misperception of threat to neutral stimuli. Using ecological momentary assessment, in which a sample of patients with schizophrenia responded to questions about social activities and appraised these activities, we found that patients with recent suicidal ideation were more likely to perceive social interactions as “not worth the effort” (Depp et al., 2016). Participants with recent suicidal ideation were also twice as likely to predict being alone in the near future as compared to patients without recent ideation, despite spending approximately the same amount of time in social interactions and with others, suggesting no real differences in social activity. As such, these preliminary data indicate that aberrant social cognition and appraisals may have bearing on suicidal thoughts and behavior in schizophrenia.

To address these gaps in the literature, we evaluated the associations between maladaptive interpersonal beliefs related to suicidality, as measured by the Interpersonal Needs Questionnaire (INQ), and facial emotion processing, as measured by the Penn Emotion Recognition Test (ER-40). We also evaluated associations between INQ and ER-40 scores with history of past suicide attempts and current suicidal ideation severity. We hypothesized that INQ would be associated with ER-40 scores, and with greater bias in perceiving anger in neutral faces as a measure of social threat, as in a prior study associating this bias with current paranoia (Pinkham et al., 2011) and in the deleterious effects of loneliness (Cacioppo et al., 2015). Additionally, we hypothesized that INQ and ER-40 total scores and bias toward angry facial emotions would be associated with severity of current suicide ideation and a higher rate of past suicidal behavior. We also examined the specificity of these effects after adjustment from other clinical variables, in particular whether these associations persisted after adjusting for general cognitive ability, given that greater cognitive ability is associated with greater risk of suicidal ideation and behavior in schizophrenia (Kim et al., 2003; Nangle et al., 2006; Villa et al., In Press) and with severity of current psychopathologic symptoms.

2. Method

2.1. Participants

Data from this study included baseline data from an ongoing randomized controlled trial evaluating the effectiveness of different mobile-health augmented interventions in serious mental illnesses. Baseline data was recorded prior to randomization. For the current study, we included data from 101 adults aged 18 and older with a diagnosis of schizophrenia or schizoaffective disorder ($N = 75$) and bipolar I disorder ($N = 26$). The total sample recruited was 255 patients, and supplemental funding was received partway through the study to include measures of facial emotion recognition and interpersonal beliefs. Participants were recruited from the users of the San Diego County Adult and Older Adult Mental Health System. The clinical trial was designed to be inclusive of users of the mental health system

and therefore other exclusion criteria were kept minimal. Some of the data on non-social cognition (MCCB scores) and suicidality have been previously reported (Villa et al., In Press), but the data including the INQ and ER-40 have not been previously reported.

To enroll in the clinical trial, participants must have met DSM-IV criteria for schizophrenia or schizoaffective disorder or bipolar disorder with psychosis. Participants must have had at least a minimum level of impairment on at least one of the target outcomes, defined as a moderate score (≥ 3) on at least one of the BPRS depression, mania, hallucinations, or emotional withdrawal items. Diagnoses were formed based on a combination of the Mini-International Neuropsychiatric Inventory (MINI; Lecrubier et al., 1997) and medical records obtained with participant consent. Participants needed to be able to read and speak English, willing to sign a release of information for their provider, and provide informed consent, as well as pass the University of California, San Diego Brief Assessment of Capacity to Consent (UBACC) test (Jeste et al., 2007). Participants were excluded if they were currently enrolled in psychotherapy or had received cognitive behavioral therapy within the past 5 years, had been diagnosed with dementia, had experienced head trauma with loss of consciousness for more than 20 minutes, or current participation in a psychosocial/pharmacological clinical trial. This trial was approved by the University of California, San Diego's Human Research Protections Program, and all patients signed an informed consent form.

2.2. Procedures

During the baseline visit, participants completed cognitive testing, symptom assessments, facial emotion recognition as well as interpersonal beliefs assessments, and suicide attempt history and current ideation assessments in a research facility or in the community, depending upon their preference. Raters were trained in administering interview-based measures and needed to achieve a 0.90 inter-rater reliability kappa with gold-standard raters in order to administer tests.

2.3. Measures

2.3.1. Interpersonal needs questionnaire-15—The Interpersonal Needs Questionnaire (INQ)-15 is a 15-item self-report measure assessing interpersonal beliefs underlying the desire for suicide (Van Orden et al., 2012), which is based upon key constructs from the Interpersonal-Psychological Theory of Suicidal Behavior comprising 2 subscales (Van Orden et al., 2010). The “perceived burdensomeness” subscale consists of 6 items measuring patients’ unmet need for social connectedness (e.g., “These days, I think my death would be a relief to the people in my life”), and the “thwarted belongingness” subscale consists of 9 items measuring patients’ unmet need to belong (e.g., “These days, I rarely interact with people who care about me”). In a normative population of adults, average scores on the subscales were: perceived burdensomeness ($M=7.9$, $SD=4.1$) and thwarted belongingness ($M=18.7$, $SD=10.4$) (Anestis et al., 2015); in a general clinic sample of help-seeking psychiatric outpatients scores were: perceived burdensomeness ($M=12.3$, $SD=8.0$) and thwarted belongingness ($M=31.7$, $SD=12.9$) (Hawkins et al., 2014); in an inpatient sample with mood disorders scores were: perceived burdensomeness ($M=22.5$, $SD=11.9$) and thwarted belongingness ($M=37.6$, $SD=13.0$) (Taylor et al., 2016). Participants

are asked to rate the degree to which they agree with each statement on a 7-point Likert scale.

2.3.2. Penn emotion recognition task-40—The Penn Emotion Recognition Task (ER-40) was used to assess facial emotion recognition via computerized assessment (Kohler et al., 2003). The ER-40 consists of 40 color photographs of faces expressing the basic emotions of fear, anger, happiness, and sadness, as well as neutral expressions. There are 4 female faces and 4 male faces for each emotion. Participants are shown each of the faces at random and asked to identify the emotion expressed. For the present study, we assessed accuracy as well as the rate of incorrect responses to neutral faces as an indicator of response bias, as in Pinkham et al. (2011).

2.3.3. Modified scale for suicidal ideation—The Modified Scale for Suicidal Ideation (MSSI) is a measure of current suicidality (e.g., presence of ideation in the previous 48 hours) and degree of severity (Miller et al., 1986) derived from the Scale for Suicidal Ideation (Beck et al., 1979). The MSSI consists of 18-items, including domains measuring intensity of attitudes, competence to attempt, and talking or writing about death. Overall scores may range from 0 to 54, with higher scores representing greater severity of suicidal ideation. For the present study, we used continuous MSSI scores and dichotomized MSSI scores as 0 and 1 for the analyses given that the data were positively skewed.

2.3.4. Columbia suicide severity rating scale (lifetime)—The Columbia Suicide Severity Rating Scale (C-SSRS) was used to assess lifetime histories of suicidal ideation and behavior (Posner et al., 2011). The C-SSRS ideation and behavior sub-scales showed strong convergent validity with established ideation and behavior scales (Posner et al., 2011). The scale distinguishes suicidal ideation (passive or active with plan and intent) and suicidal behavior domains (suicide attempt, preparatory, aborted). For the purposes of this study, we reduced the number of variables of interest to history of suicide attempt. The question in the C-SSRS that asks about history of suicide attempt begins with the following prompts, which is then converted to a binary yes or no response: “Did you do anything to try to kill yourself or make yourself not alive anymore?”. The scale was administered in interview format by trained raters, and ratings were reviewed by C.A.D. when discrepancies were identified.

2.3.5. MATRICS consensus cognitive battery—The MATRICS (Measurement and Treatment Research to Improve Cognition in Schizophrenia) Consensus Cognitive Battery (MCCB) was used to assess global cognitive performance (Nuechterlein et al., 2008). The battery consists of 10 tests measuring 7 cognitive and social cognitive domains, but for the present study, only the measures that generated Verbal Learning (Hopkins Verbal Learning Test), Speed of Processing (Trail Making: Test A; Brief Assessment of Cognition in Schizophrenia: Symbol Coding; Category Fluency: Animal Naming), Working Memory (Wechsler Memory Scale Spatial Span; Letter Number Span), and Reasoning and Problem-Solving (Neuropsychological Assessment Battery: Mazes) were administered. The domain scores and composite score were normed for age and education using the MCCN scoring program, yielding 4 T-scores and one summary score, which was created by averaging the other 4 scores.

2.3.6. Brief psychiatric rating scale-24—The Brief Psychiatric Rating Scale-24 item expanded version 4.0 (BPRS-24) was used to measure psychopathology symptoms (Ventura et al., 2000). The BPRS-24 assesses 24 psychiatric symptoms including anxiety, depression, mania, delusions/hallucinations, unusual behavior, and suicidality. Scores range from 24 to 168, with higher scores indicating greater severity of psychotic symptoms.

2.4. Statistical analyses

Normality assumptions were first checked with Kurtosis or Skewness values ± 3 as a cut-point for normal distribution. All of the scales were normally distributed except for the MSSSI, which was positively skewed. We computed Pearson correlations to assess ER-40 accuracy and response biases with the INQ. Spearman correlations were used for the analyses with the MSSSI. We assessed for potential demographic and clinical covariates for ER-40 and INQ measures, as well as for current suicidal ideation and attempt history. We then used t-tests to evaluate the relationship of past history of attempts and current suicide ideation with INQ scores and ER-40 response biases. A hierarchical linear regression was used to examine INQ scores with ER-40, first as univariate analyses and then as adjusted by relevant clinical variables. A logistic regression was used to examine INQ scores with MSSSI dichotomized scores (MSSSI scores were dichotomized as 0 and 1 for the analyses). For response biases, we adjusted for global cognitive ability, and MSSSI dichotomized current ideation scores we adjusted for psychopathology symptoms, since these two variables were associated with suicidal behavior history and current suicidal ideation respectively. Lastly, we compared relationships with diagnostic groups in exploratory analyses. The alpha-level was set to 0.05 for hypotheses testing the association between INQ Total and suicide attempt history and current ideation. We used a Bonferroni correction for the exploratory analyses examining 2 INQ subscales ($\alpha = 0.025$) and 5 ER-40 subscales ($\alpha = .01$).

3. Results

3.1. Sample characteristics (Table 1)

The sample was, on average, slightly more likely to be female (54.5%), middle-aged ($M = 49.9$ years, $SD = 11.3$), and ethnically diverse, with an average level of education completed at a high school level. A majority of patients had experienced passive suicidal ideation (67.3%); histories of active ideation (30.7%) or suicide attempts (39.6%). The average number of lifetime attempts among persons with attempt history was 2 ($SD = 6.4$). In comparing diagnoses, and as expected, a diagnosis of bipolar disorder was associated with higher MCCB scores [$F(1,95) = 7.9$, $p = 0.006$, $M = 41.1$ ($SD = 10.3$) vs schizophrenia $M = 35.2$ ($SD = 8.8$)]. There were no significant differences in rates of current ideation, suicide attempt history, or BPRS scores across diagnosis.

3.2. INQ and ER-40 descriptive information

INQ demonstrated high internal consistency ($\alpha = 0.86$). INQ Total ($M = 41.0$, $SD = 16.9$) was positively associated with BPRS Total ($r = 0.329$, $p = 0.001$). There was a negative association between INQ Total and MCCB composite scores ($r = -0.266$, $p = 0.009$). There were no associations of INQ Total or INQ subscales, or ER-40 Total or biases, with age, gender, education, race, or diagnosis. There was a negative association between ER-40 Total

and BPRS Total ($r = -0.216$, $p = 0.030$) and a positive association with MCCB Total Score ($r = 0.425$, $p < .01$). Overall, patients displayed highest accuracy in emotion recognition identifying ER-40 Happy faces ($M = 7.6$, $SD = 0.9$) with the lowest accuracy identifying ER-40 Angry faces ($M = 4.3$, $SD = 1.6$). Patients with a bipolar diagnosis displayed higher accuracy identifying ER-40 Happy faces [$F_{(1,99)} = 4.2$, $p = 0.043$, $M = 7.9$ ($SD = 0.3$) vs schizophrenia $M = 7.5$ ($SD = 1.0$)].

3.3. INQ and ER-40 relationships (Table 2 and Table 3)

We examined associations between the INQ and ER-40 in the entire group first. INQ Total was negatively associated with ER-40 Total ($r = -0.266$, $p = 0.007$). INQ scores were negatively associated with accuracy for Angry faces ($r = -0.237$, $p = 0.018$), but not with other ER-40 face scales. When examining bias errors in No Emotion faces, errors of misperceiving Angry Faces were associated with higher INQ scores ($r = 0.197$, $p = 0.049$) but no other emotion. These associations persisted in a multivariate model adjusting for MCCB Total Score (in which MCCB Total Score was associated negatively with INQ) (Table 3). Among INQ subscales, there were negative associations between ER-40 Total and INQ Thwarted Belongingness ($r = -0.199$, $p = 0.047$) and Perceived Burdensomeness ($r = -0.272$, $p = 0.006$). In addition, we found negative associations between accuracy for Angry faces and INQ Thwarted Belongingness ($r = -0.217$, $p = 0.030$) and Perceived Burdensomeness ($r = -0.197$, $p = 0.048$), but no other scales.

We explored within diagnostic groups, and in schizophrenia, higher scores on the INQ Total were associated with less accuracy on ER-40 Total ($r = -0.264$, $p = 0.022$), as well as greater errors in attribution of anger to neutral expressions ($r = 0.252$, $p = 0.029$). In addition, MCCB Total was negatively associated with INQ in this group ($r = -0.323$, $p = 0.006$). Among INQ subscales, Perceived Burdensomeness was negatively associated with ER-40 Total ($r = -0.329$, $p = 0.004$), ER-40 No Emotion ($r = -0.235$, $p = 0.043$), ER-40 Happy ($r = -0.309$, $p = 0.007$), and positively associated with misperception of neutral faces as angry ($r = 0.233$, $p = 0.044$). There were no significant associations between INQ and ER-40 Total scores or subscales in bipolar disorder (Pearson r 's ranging from -0.394 to 0.304 , all $p > 0.051$), albeit with a considerably smaller overall sample.

3.4. Relationships between INQ and ER-40 with current and past suicidality (Table 4)

As can be seen in Table 4, patients with a History of Attempt and MSSSI Current Ideation had higher INQ Total scores than those without any past history of attempts or current ideation (MSSSI Total Score was also correlated with INQ Total ($\rho = 0.309$, $p = 0.002$); INQ Thwarted Belongingness ($\rho = 0.320$, $p = 0.001$); INQ Perceived Burdensomeness ($\rho = 0.222$, $p = 0.027$)). ER-40 Total scores or accuracy for specific emotions were unrelated. Of note, bias for greater errors in misattributing No Emotion as Angry faces were in the direction of more errors in those with past suicide attempts or suicidal ideation but were non-significant.

In comparing diagnoses, bipolar patients with MSSSI Current Ideation had higher INQ Total scores than patients without current ideation [$F_{(1,23)} = 8.0$, $p = 0.010$, $M = 58.0$ ($SD = 16.8$) vs No MSSSI Current Ideation $M = 33.1$ ($SD = 16.1$)]. Among subscales, patients with MSSSI

Current Ideation had higher INQ Thwarted Belongingness scores [$F_{(1,23)} = 9.0, p = 0.006, M = 41.8 (SD = 11.2)$ vs No MSSI Current Ideation $M = 23.0 (SD = 11.5)$], and those with a History of Actual Attempt had greater INQ Perceived Burdensomeness scores [$F_{(1,24)} = 4.6, p = 0.043, M = 13.7 (SD = 7.3)$ vs No History of Actual Attempt $M = 8.7 (SD = 4.0)$]. In the subsample with diagnoses of schizophrenia, patients with MSSI Current Ideation had higher INQ Thwarted Belongingness scores than those without [$F_{(1,73)} = 4.9, p = 0.031, M = 37.9 (SD = 8.1)$ vs No MSSI Current Ideation $M = 28.8 (SD = 11.3)$].

4. Discussion

In this pilot study, we examined the relationship among maladaptive interpersonal beliefs and facial emotion processing with suicidality in psychosis. Adding support to the Interpersonal-Psychology Theory of Suicidal Behavior positing burdensomeness and thwarted belongingness as constructs underlying risk for suicidality (e.g., Van Orden et al., 2010), we found that INQ scores were associated with history of suicide attempts and current ideation. Novel in this study was the examination of INQ ratings and facial emotion recognition. INQ scores were inversely related with ER-40 accuracy, yet were positively correlated with bias in perceiving anger in neutral expressions. This latter finding persisted after adjusting for global cognitive ability, and so is in contrast to the positive association between suicidality and better general cognition (which was correlated with increased risk for past suicidality as in previous reports; Kim et al., 2003; Nangle et al., 2006; Villa et al., In Press). While greater errors in misattributing neutral expressions as angry were not associated with suicidality, there was a trend toward significance in the direction of more errors in those with past suicide attempts and current ideation. Although sample sizes limited power to perform a direct comparison, the link between biases pertaining to anger and INQ scores appeared to be evident in schizophrenia than in bipolar disorder. This pilot study provides initial support for broadening investigation of maladaptive social appraisals, fundamental aspects of social cognition as contributors to suicidal thoughts and behavior in psychotic disorders.

The findings of this pilot study should be interpreted in light of limitations. This was a relatively small outpatient sample and was a retrospective, cross-sectional study. Therefore, we cannot infer any causal relationships among maladaptive beliefs, emotion recognition, and risk of suicidal ideation or behavior nor generalize our findings to inpatients or untreated outpatients. Additionally, our sample consisted of middle aged adults on average. Therefore, our findings do not encompass the first years of illness, which are likely to be that of highest risk for suicide in schizophrenia (Ventriglio et al., 2016), and we were unable to cross-validate history of attempts with other sources of data (e.g. medical records). Although the C-SSRS and INQ are validated screening measures for suicidality in the general population, it is not fully clear whether these instruments have different properties in samples with psychotic disorders. The imbalance in size of the schizophrenia and bipolar sub-samples did not allow for formal cross-diagnostic comparison of effects.

Nonetheless, the current results are of clinical interest in demonstrating the growing importance of social cognition to the cumulative evaluation of suicide risk in psychosis and identification of potential targets for suicide prevention. Few prior studies have reported

results from the INQ measure in psychotic samples. Scores on the INQ, and INQ subscales, were comparable to that in a general clinic sample of help-seeking psychiatric outpatients (Hawkins et al., 2014), higher than that in a normative population of adults (Anestis et al., 2015), and lower than that in an inpatient sample with mood disorders (Taylor et al., 2016). The INQ was internally consistent and associated with both current ideation and past attempts. Thus, the INQ may be a useful complement to research on the determinants of suicidality in psychotic disorders.

Facial emotion processing is an aspect of social cognition. Similar to a prior study indicating that biases toward rating neutral faces as angry was associated with paranoia in schizophrenia (Pinkham et al., 2011), we found that these same biases were associated with the constructs measured by the INQ. It would be important for such research to investigate to what extent these biases are specific to only some psychotic disorders, as our pilot results suggested that these effects may be more pronounced in schizophrenia than in bipolar disorder. A speculative hypothesis, which would need to be tested in a longitudinal study, would be that misperceptions of anger in others may lead to more maladaptive appraisals of relationships. These beliefs may lead to subsequent experiences of alienation, which may then lead to suicidal thinking and behavior. To date, findings indicating a positive association between non-social cognition and suicidality have produced unclear implications for rehabilitation, since many efforts at functional rehabilitation center on cognitive remediation. In contrast, a deficit pertaining to misperception of angry faces could be addressed through existing interventions specifically targeting social cognitive abilities (e.g., SCIT: Social Cognition and Interaction Training; Roberts et al., 2014). It would also be important to understand if other social cognitive tasks validated in psychotic disorders (e.g., trustworthiness; Pinkham et al., 2015) may contribute additional variation in beliefs related to suicidality and to suicidality itself. Understanding how these mechanisms develop over the life course may yield novel suicide prevention strategies in this high-risk population.

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Table 1

Sample Characteristics

Variable	Mean (SD) or %	Range
Age	49.9 (11.3)	24 - 77
Gender (% Female)	54.5%	
Diagnosis (%Schizophrenia/Schizoaffective)	74.3%	
Ethnicity		
Caucasian	46.9%	
African American	18.4%	
Hispanic	24.5%	
Asian	8.2%	
Native American	1.0%	
Bi/Multiracial	1.0%	
Education	12.4 (2.3)	6 - 18
BPRS Total	43.8 (10.8)	25 - 74
MCCB Total	36.8 (9.6)	18 - 62
INQ Total	41.0 (16.9)	15 - 84
INQ Subscales		
Perceived Burdensomeness	12.3 (7.5)	6 - 36
Thwarted Belongingness	29.0 (11.8)	9 - 58
ER-40 Total	29.0 (5.1)	12 - 37
ER-40 Face Accuracy		
No Emotion	5.7 (2.3)	0 - 8
Fear	5.5 (1.9)	0 - 8
Anger	4.3 (1.6)	0 - 8
Sad	5.9 (1.9)	0 - 8
Happy	7.6 (0.9)	2 - 8
MSSI Current Ideation, %	11.9%	
and Average	0.4	
C-SSRS (Lifetime)		
History of Wish to be dead	67.3%	
History of Active SI w/Specific	30.7%	
Plan and Intent		
History of Actual Attempt	39.6%	

Note: BPRS: Brief Psychiatric Rating Scale; MCCB: MATRICS Consensus Cognitive Battery; INQ: Interpersonal Needs Questionnaire; ER-40: Penn Emotion Recognition Task; MSSI: Modified Scale for Suicidal Ideation; C-SSRS: Columbia Suicide Severity Rating Scale

Table 2

INQ and ER-40 Response Bias Correlations

INQ Total	
ER-40 Total	$r = -0.266, p = \mathbf{0.007}$
ER-40 No Emotion-Angry	$r = 0.197, p = \mathbf{0.049}$
ER-40 No Emotion-Fear	$r = 0.050, p = 0.618$
ER-40 No Emotion-Sad	$r = 0.063, p = 0.536$
ER-40 No Emotion-Happy	$r = 0.108, p = 0.287$

Note: Pearson correlations between interpersonal beliefs (INQ) and total accuracy and response bias (ER-40)

Table 3

Regressions Predicting INQ Total and MSSSI Scores Adjusted for Covariates

	INQ Total B (S.E.)	<i>p</i> -value
MCCB Total	-0.157 (0.187)	0.007
ER-40 No Emotion-Angry	5.259 (2.271)	0.023
ER-40 No Emotion-Fear	-2.281 (2.318)	0.328
ER-40 No Emotion-Sad	0.227 (1.115)	0.839
ER-40 No Emotion-Happy	2.733 (2.053)	0.186
MSSI Current Ideation Score Dichotomized		
BPRS Total	0.008 (0.030)	0.789
INQ Total	0.053 (0.021)	0.010

Note: Response biases adjusted for global cognitive ability (MCCB); MSSSI dichotomized score (as 0 and 1) adjusted for psychopathology symptoms (BPRS)

Table 4

Associations of INQ and ER-40 with Attempt History and MSSI Scores

	No History of Attempt (N = 61)		History of Attempt (N = 40)		t-value	df	p-value	Cohen's d
	M (SD)		M (SD)					
INQ Total								
INQ Thwarted Belongingness	38.3 (15.0)		45.4 (18.9)		-2.1	98	0.038	0.416
INQ Perceived Burdensomeness	27.0 (10.4)		31.8 (13.3)		-2.1	98	0.043	0.402
ER-40 Total								
ER-40 No Emotion-Angry	11.3 (6.9)		13.8 (8.2)		-1.6	99	0.110	0.329
ER-40 No Emotion-Fear	28.4 (5.7)		30.0 (3.8)		-1.8	99	0.081	0.330
ER-40 No Emotion-Sad	0.3 (0.7)		0.4 (1.0)		-0.6	99	0.530	0.115
ER-40 No Emotion-Happy	0.4 (1.0)		<0.01 (0.2)		2.4	99	0.019	0.555
	1.4 (1.5)		1.4 (1.6)		-0.1	99	0.941	0.000
	0.4 (0.9)		0.3 (0.6)		0.6	99	0.541	0.131
No MSSI Current Ideation (N = 89)								
INQ Total								
INQ Thwarted Belongingness	39.2 (16.4)		54.6 (14.1)		-3.1	98	0.003	1.006
INQ Perceived Burdensomeness	27.4 (11.5)		39.2 (8.9)		-3.4	98	0.001	1.147
ER-40 Total								
ER-40 No Emotion-Angry	11.9 (7.6)		15.4 (6.5)		-1.5	99	0.126	0.494
ER-40 No Emotion-Fear	29.0 (4.8)		28.8 (6.9)		0.1	99	0.893	0.033
ER-40 No Emotion-Sad	0.3 (0.8)		0.4 (0.9)		-0.4	99	0.719	0.117
ER-40 No Emotion-Happy	0.2 (0.8)		0.3 (0.6)		<0.01	99	0.991	0.141
	1.4 (1.5)		1.0 (1.5)		0.9	99	0.350	0.266
	0.3 (0.8)		0.4 (1.2)		-0.4	99	0.719	0.098