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Structure and correlates of self-reported empathy in schizophrenia

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ABSTRACT

Research on empathy in schizophrenia has relied on dated self-report scales that do not conform to contemporary social neuroscience models of empathy. The current study evaluated the structure and correlates of the recently-developed Questionnaire of Cognitive and Affective Empathy (QCAE) in schizophrenia. This measure, whose structure and validity was established in healthy individuals, includes separate scales to assess the two main components of empathy: Cognitive Empathy (assessed by two subscales) and Affective Empathy (assessed by three subscales). Stable outpatients with schizophrenia (n = 145) and healthy individuals (n = 45) completed the QCAE, alternative measures of empathy, and assessments of clinical symptoms, neurocognition, and functional outcome. Exploratory and confirmatory factor analyses provided consistent support for a two-factor solution in the schizophrenia group, justifying the use of separate cognitive and affective empathy scales in this population. However, one of the three Affective Empathy subscales was not psychometrically sound and was excluded from further analyses. Patients reported significantly lower Cognitive Empathy but higher Affective Empathy than controls. Among patients, the QCAE scales showed significant correlations with an alternative self-report empathy scale, but not with performance on an empathic accuracy task. The QCAE Cognitive Empathy subscales also showed significant, though modest, correlations with negative symptoms and functional outcome. These findings indicate that structure of self-reported empathy is similar in people with schizophrenia and healthy subjects, and can be meaningfully compared between groups. They also contribute to emerging evidence that some aspects of empathy may be intact or hyperresponsive in schizophrenia.

1. Introduction

A growing body of research on social cognition in schizophrenia has focused on empathy. Although defined in many ways (Batson, 2009), contemporary social neuroscience models define empathy as the ability to understand and share the thoughts and feelings of others. There is general agreement that empathy is a multidimensional construct, which includes distinct cognitive and affective processes (Decety and Jackson, 2006; Shamay-Tsoory, 2011). Cognitive empathy refers to reflective processes that include taking the perspective of others and understanding the mental state of others, whereas affective empathy refers to relatively automatic processes through which perceived actions and social cues trigger a shared emotional response. These subprocesses involve separate neural systems, and the capacity to effectively empathize is believed to involve coordinated interaction between them (Zaki and Ochsner, 2011). This social neuroscience framework provides a foundation for translational research into empathy in schizophrenia.

The vast majority of research on empathy in schizophrenia has used a self-report measures of trait empathy called the Interpersonal Reactivity Index (IRI) (Davis, 1983), which includes two subscales considered to be indicators of cognitive empathy (Perspective-Taking, Fantasy) and two considered to be indicators

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of affective empathy (Empathic Concern, Personal Distress). A recent meta-analysis (Achim et al., 2011) and subsequently published studies of the IRI consistently indicate that schizophrenia subjects report diminished cognitive empathy on the Perspective-Taking subscale, while findings for the Fantasy subscale are inconsistent. Furthermore, lower Perspective Taking accounts for unique variance in functional outcome, above and beyond symptoms and neurocognitive impairments (Smith et al., 2012). In contrast, individuals with schizophrenia report similar scores to healthy subjects on the affective empathy subscales in most studies, though some have reported diminished Empathic Concern and/or elevated Personal Distress (Corbera et al., 2013; Lee et al., 2011; Shamay-Tsoory et al., 2007; Sparks et al., 2010). Thus, it appears individuals with schizophrenia report functionally relevant disturbances in at least some aspects of trait empathy.

It is worth noting that the IRI is over 30 years old and was not developed to distinguish between cognitive and affective empathy (Davis, 1983). In addition, concerns have been raised about its psychometric properties and the compatibility of its subscales with newer models of empathy (see Michaels et al., 2014 for a review). For example, the IRI conflates empathy and sympathy, and it assesses emotional reactions to others' negative experiences rather than true sharing of affective states (for Empathic Concern). Less is known about how individuals with schizophrenia respond on measures designed to assess the core cognitive and affective subcomponents of empathy described in contemporary models.

To address limitations of existing self-report measures, Reniers et al. (2011) recently developed the Questionnaire of Cognitive and Affective Empathy (QCAE). The QCAE was developed from a pool of items with the strongest face validity from several existing self-report measures (including the IRI) and refined through extensive psychometric analyses in a large healthy sample. Based on exploratory and confirmatory factor analyses, the QCAE includes a Cognitive Empathy scale, comprised of subscales labeled Perspective Taking and On-line Simulation, and an Affective Empathy scale, comprised of subscales labeled Emotion Contagion, Proximal Responsivity, and Peripheral Responsivity. The five subscales demonstrated good reliability, as well as strong convergent and divergent validity with respect to relevant interpersonal and personality variables. The Cognitive and Emotional Empathy scales correlate in expected directions with prosocial behavior, psychopathy, and neural activity during moral judgments (Lockwood et al., 2014; Reniers et al., 2012; Yoder and Decety, 2014).

We are aware of only one study that evaluated the QCAE in schizophrenia. Michaels et al. (2014) found that patients ($n = 52$) reported significantly lower Cognitive Empathy than healthy controls ($n = 37$), and that lower scores were associated with worse social functioning, even after accounting for neurocognition and symptoms. No group differences were found for overall Affective Empathy, though patients actually reported higher scores on the Emotional Contagion subscale, and the Peripheral Responsivity subscale had poor internal consistency and low correlations with the other subscales in the patient sample.

We evaluated the QCAE in a substantially larger sample of patients ($n = 145$) to address three primary goals. First, we conducted a comprehensive structural analysis of the QCAE to determine whether patients' self-reported empathy demonstrates a two-factor structure similar to healthy subjects. Second, we evaluated patient vs. control group differences on the QCAE. Third, we examined the correlates of QCAE scores, including relations to alternative measures of empathy, as well as symptoms, neurocognition, and functional outcome.

2. Methods

2.1. Participants

Participants included 145 outpatients with schizophrenia and 45 healthy comparison subjects recruited from two sites (University of California, Los Angeles [UCLA]; University of North Carolina [UNC] at Chapel Hill) as part of the larger project "Social Cognition and Functioning in Schizophrenia" (Green et al., 2013). Selection criteria for both groups included: (a) age 18–60 years, (b) able to understand spoken English sufficiently to comprehend testing procedures, (c) no clinically significant neurological disease as determined by medical history (e.g., epilepsy), (d) no history of serious head injury (i.e., loss of consciousness longer than 1 h, no neuropsychological sequelae, no cognitive rehabilitation treatment post head injury), (e) no sedatives or benzodiazepines within 12 h of testing.

All patients were administered the Structured Clinical Interview for DSM-IV (SCID) (First et al., 1997) by trained diagnosticians (Kern et al., 2013). Additional selection criteria: (a) no evidence of substance or alcohol dependence in the past six months; no evidence of substance or alcohol abuse in past month, (b) no history of mental retardation or developmental disability based on chart review, and (c) clinically stable (i.e., no inpatient hospitalizations for three months prior to enrollment, no changes in antipsychotic medication type in the four weeks prior to enrollment). 76.9% were taking a second-generation antipsychotic, 10.4% a first-generation antipsychotic, 6.4% were taking both, and 1.7% were taking other psychoactive medications only; current medication type was unknown for 4.6%. The patients had a mean duration of illness of 20.0 years (SD = 12.5 years).

General psychiatric symptoms were assessed by trained interviewers using the expanded Brief Psychiatric Rating Scale (BPRS); scores for the Positive, Depressive, and Total subscales are reported (Kopelowicz et al., 2008). Negative symptoms were assessed using the Scale for the Assessment of Negative Symptoms (SANS) (Andreasen, 1984); scores for experiential symptoms (mean of avolition-apathy, anhedonia-asociality) and expression symptoms (mean of affective flattening, alogia) were computed.

Healthy controls were recruited through ads placed on the Internet. Additional selection criteria: (a) no psychiatric history involving schizophrenia spectrum disorder (including avoidant, paranoid, schizotypal, or schizoid personality disorders) according to the SCID II and no psychotic or recurrent major mood Axis I disorder according to the SCID I, (b) no family history of a psychotic disorder among first degree relatives, and (c) no history of substance or alcohol dependence; no current substance abuse. After providing a complete description of the study to prospective study participants, written informed consent was obtained from participants at UCLA and UNC.

2.2. Measures

2.2.1. Self-reported empathy

The QCAE consists of 31 items comprising five subscales intended to assess cognitive and affective components of empathy (see Supplemental Table 1 for QCAE items). The Cognitive Empathy scale consists of two subscales: (1) Perspective Taking (10 items) assesses the extent to which respondents can take another's perspective or see things from another's point-of-view; (2) Online Simulation (9 items) assesses the extent to which respondents make an effort to understand and mentally represent another's emotional state. The other subscales assess Affective Empathy: (3) Emotion Contagion (4 items) reflects the extent to which a respondent engages in self-oriented emotional state matching from observing the affective states of others; (4) Proximal Responsivity (4 items) assesses one's

emotional responsiveness to the moods of others with whom they are emotionally or physically close (e.g. friends); (5) Peripheral Responsivity (4 items) assesses one's emotional responsiveness to the moods of others in a detached social context (e.g. characters in movies). Respondents used a 4-point Likert scale to indicate how much they agreed with each item's statement.

Participants also completed the IRI, a 28-item self-report measure of empathy (Davis, 1983) comprised of four subscales: (1) Perspective Taking assesses taking the cognitive point-of-view of others; (2) Fantasy assesses the application of empathic responding to fictional characters; (3) Empathic Concern assesses other-oriented feelings of sympathetic responding; (4) Personal Distress assesses self-oriented feelings of anxiety. It should be noted that six overlapping items appear on both the QCAE and the IRI: five items from QCAE Online Simulation appear on IRI Perspective Taking, and one item from QCAE Peripheral Responsivity scale appears on IRI fantasy.

2.2.2. Empathic accuracy

In the empathic accuracy task (Kern et al., 2013) participants watch 9 video clips (2.0–2.5 min each) of people discussing positive or negative autobiographical events and provide continuous ratings (via button presses on a keyboard) of how positive or negative they believe the individual ("target") is feeling throughout the clip based on a 9-point scale (ranging from 1 = extremely negative, to 9 = extremely positive). The primary dependent measure is the mean correlation across clips between the participant's ratings of the targets' emotions and the targets' ratings of their own emotions calculated in 2-sec time epochs throughout the clip.

2.2.3. Non-social cognition

Non-social cognition was assessed using the MATRICS Consensus Cognitive Battery (MCCB) (Nuechterlein and Green, 2006). Although the overall composite score from the MCCB normally includes one measure of social cognition, this test was excluded from our composite score so that the overall composite score reflects only non-social cognition and includes the domains of: speed of processing, verbal memory, visual memory, working memory, reasoning and problem solving, and attention/vigilance.

2.2.4. Functional measures

2.2.4.1. Community functioning. For patients and controls, community functioning was assessed via a total score summing the four subscales of the Role Functioning Scale (RFS) (McPheeters, 1984): work functioning, independent living, family network, and social functioning. Ratings were based on a semi-structured interview that used standardized probe questions. Each scale is rated from 1 to 7 with higher RFS scores indicating better functioning.

2.2.4.2. Functional capacity. The patient group completed the Maryland Assessment of Social Competence (MASC) (Bellack et al., 1994) is a measure of social skills comprising four short role-play scenarios designed to measure participants' ability to solve common interpersonal problems in people with severe mental illnesses. Each scenario was coded by specially trained raters certified for reliability using three 5-point Likert scales: Verbal Skill, Non-Verbal Skill, and Overall Effectiveness, which were summed to create a total score. MASC raters received training from the developers of this task or individuals the developers had certified and achieved intraclass correlation coefficients exceeding .85 for all the MASC variables on a set of 10 videos that were derived from a separate sample.

2.3. Data analyses

Initial analyses examined group differences on demographic characteristics and descriptive statistics for clinical characteristics within the patients. Primary data analyses were conducted in three phases. The goal of phase one was to determine if the two-factor structure of the QCAE reported by Reniers et al. (2011) generalizes to individuals with schizophrenia. We began by partitioning items into the five proposed content domains corresponding to the five QCAE subscales. Within each content domain, we examined the polychoric correlations among the items, conducted hierarchical clustering, and fit a one-factor model using minres extraction. These analyses provided a preliminary exploration of whether the items were holding together as markers of a single construct within each domain. Second, we conducted exploratory factor analyses, extracting (minres) factors with oblique Oblimin rotation. Our interest centered on the consistency of the factor solutions with the five a priori content domains and the two more general constructs of affective and cognitive empathy.

Finally, and based on the above analyses, using procedures similar to Reniers et al. items were combined into two-item parcels to deal with non-normally distributed indicators and nuisance variance associated with content redundancy among items (Little et al., 2013). A parcel represented the mean of item pairs or triplets assumed to be conceptually similar and psychometrically unidimensional (Hall et al., 1999; Nasser and Wisenbaker, 2003). To ensure that the items within parcels were related to the same underlying construct, the pairs and triplets were chosen based on the results of the earlier analyses. After identifying item parcels, confirmatory factor analysis was conducted using M*plus* software (Muthén and Muthén, 2011). Specifically, a two correlated factors model was evaluated using the comparative fit index (CFI), the standardized residuals, and the root-mean-square error of approximation (RMSEA).

Phase two evaluated between-group differences on the QCAE subscales with ANOVAs. Phase three examined, on an exploratory basis, within-group correlates of QCAE scores, including alternative measures of empathy, neurocognition, symptoms, and functioning.

3. Results

3.1. Participant characteristics

As shown in Table 1, the two groups did not differ in age, parental education, sex, ethnicity, or race. As expected, patients had significantly lower education than controls. For patients, the mean

Table 1
Demographic and clinical characteristics in schizophrenia (n = 145) and control (n = 45) groups.

	Schizophrenia		Control		Statistic
	Mean	SD	Mean	SD	
Age (years)	40.9	(12.4)	43.3	(11.4)	$t = -1.11$
Education	12.5	(1.8)	14.2	(2.1)	$t = -5.17^{***}$
Parental education	13.5	(3.0)	12.8	(2.8)	$t = 1.26$
Sex (% male)	75%		71%		$\chi^2 = .28$
Ethnicity (% Hispanic)	7.0%		12.2%		$\chi^2 = .28$
Race (%)					$\chi^2 = 2.50$
Asian	4.2%		4.9%		
Native Hawaiian/Pacific is.	.7%		.0%		
Black	43.4%		31.7%		
White	48.3%		31.0%		
More than one	3.5%		2.4%		
Age of onset (years)	21.0	(7.0)			
BPRS positive	2.5	(1.0)			
BPRS depression	2.2	(1.0)			
BPRS total	49.1	(13.6)			
SANS experiential	2.7	(1.0)			
SANS expressive	1.4	(1.0)			

Note: $^{***}p < .001$.

age of onset was typical and symptom levels were low in this clinically stable sample.

3.2. Structural analyses of the QCAE within the schizophrenia group

Coefficient alpha for the five a priori parcels were: .74 for Emotional Contagion, .74 for Proximal Responsivity, .89 for Perspective Taking, .81 for Online Simulation, and .28 for Peripheral Responsivity. For the first four factors, hierarchical clustering and 1-factor solutions suggested the items reasonably cohere as expected (see Supplemental Tables 2 and 3, and Supplemental Fig. 1). The four items for Peripheral Responsivity, on the other hand, were essentially uncorrelated with each other (inter-item correlations = .13, −.03, .22, −.03, .07, .07), suggesting they are not appropriate indicators of a single construct. Further scrutiny revealed that these items also did not correlate meaningfully with any of the remaining 27 QCAE items. For these reasons, we dropped these four items from the subsequent analyses.

Because we eliminated Peripheral Responsivity from further consideration, we were no longer interested in the five-factor solution. Instead, we considered four (based on the four individual remaining subscales) and two (based on the cognitive versus affective empathy distinction) factor solutions. As detailed in Supplemental Table 4, the four factor solution was problematic because factor four is merely one item (#15) and the items from Emotional Contagion and Proximal Responsivity all load on a single factor. Table 2 displays the two factor exploratory solution organized by subscale. The data are much more consistent with the two factor solution, with a few notable exceptions. Specifically, four items appear problematic. Item #23 (friends talk to me about their problems as they say I'm very understanding), is double-barreled and loads on the wrong factor. Items #5 ("when I'm upset at someone, I usually try to 'put myself in his shoes' for a while") and #6 ("Before criticizing somebody, I try to imagine how I would feel if I was in their place") cross-load on both factors and the higher loading is on the wrong factor. Finally, Item #31 ("Before I do something I try to consider how my friends will react to it") has substantial cross loadings across factors.

Table 2
Two factor analysis of QCAE subscales in the schizophrenia group.

Original item number	Factor 1: cognitive	Factor 2: affective	h^2	u^2	Com	Parcel number
Emotional contagion						
8	−.20	.72	.45	.55	1.2	1
9	−.06	.58	.31	.69	1.0	1
13	.06	.62	.42	.58	1.0	2
14	.08	.68	.51	.49	1.0	2
Proximal responsivity						
7	.11	.56	.38	.62	1.1	3
10	.10	.67	.51	.49	1.0	3
12	.12	.62	.46	.54	1.1	3
23	.58	.21	.47	.53	1.3	
Perspective taking						
15	.57	.13	.40	.60	1.1	4
16	.67	.00	.44	.56	1.0	4
19	.61	.04	.39	.61	1.0	5
20	.70	.13	.59	.41	1.1	5
21	.68	.02	.48	.52	1.0	6
22	.62	.14	.48	.52	1.1	6
24	.49	.23	.38	.62	1.4	7
25	.59	−.03	.34	.66	1.0	7
26	.86	−.14	.66	.34	1.1	8
27	.71	−.14	.44	.56	1.1	8
Online simulation						
1	.34	−.24	.11	.89	1.8	9
3	.51	.00	.26	.74	1.0	9
4	.43	.16	.26	.74	1.3	10
5	.14	.34	.18	.82	1.3	
6	.26	.31	.23	.77	1.9	
18	.41	.18	.26	.74	1.4	10
28	.54	−.02	.29	.71	1.0	11
30	.50	−.09	.22	.78	1.1	11
31	.37	.25	.27	.73	1.7	

Table 3
Confirmatory factor analyses of QCAE item parcels in the schizophrenia group.

Parcel number	Estimate: cognitive empathy	Estimate: affective empathy	SE	Estimate/SE
1		.61	.07	9.42***
2		.71	.06	11.25***
3		.83	.06	14.77***
4	.70		.05	13.75***
5	.81		.04	21.06***
6	.75		.04	17.13***
7	.64		.06	11.43***
8	.70		.05	14.05***
9	.37		.08	4.72***
10	.57		.06	8.96***
11	.53		.07	7.88***

Since the initial analyses revealed several problematic items and failed to find an independent cluster structure, we attempted to reduce the noise by judiciously selecting parcels. Specifically, to mark the first factor we formed two two-item parcels (8 & 9) and (13 & 14), and one three item parcel (7, 10, & 12). Item #23 was not used. For the second factor, we formed eight two-item parcels, leaving Items 5, 6, and 31 out of any parcel. The resulting two factor confirmatory model had a chi-square of 92.27 (df = 43, $p < .00$), RMSEA = .089 (.064–.11), CFI = .910, SRMR = .069 (Table 3). These values can be considered adequate under traditional benchmarks, but point to problems in achieving an independent cluster solution. The correlation among the factors was estimated to be .52. Thus, these confirmatory factor analyses confirm the presence of two moderately correlated factors, and justify considering separate cognitive and affect empathy scores in schizophrenia. For the remaining analyses, we focus on the two original QCAE Cognitive Empathy subscales and two (excluding Peripheral Responsivity) Affective Empathy subscales, including all of original subscale items. For the sake of completeness, we also re-ran all of the analyses based on the four QCAE subscales with suboptimal items excluded. As shown in Supplemental Tables 5–7, the overall pattern of results was essentially the same.[1]

3.3. Between-group differences on the QCAE

As shown in Table 4, patients reported lower total Cognitive Empathy scores than controls. This difference reflected lower scores on both Cognitive Empathy subscales in the patient group. The magnitudes of these differences were all in the medium range. In contrast, patients reported higher total Affective Empathy scores than controls. This difference reflected significantly elevated Emotional Contagion (large effect size) in the patients, accompanied by non-significant group differences for Proximal Responsivity (small effect size). Internal consistencies were acceptable to good in both groups, with higher alpha coefficients found for the Cognitive Empathy scales.

[1] Despite the similarity of the results, the poor performing items must ultimately be adding nuisance variation and therefore detract from our understanding of the construct and its relation with other variables.

Table 4
Descriptive and between-group comparisons on the QCAE.

	Schizophrenia			Control			t	d
	Mean	SD	Alpha	Mean	SD	Alpha		
Cognitive empathy total	53.5	10.3	.87	60.0	8.7	.90	−3.69***	.63
Perspective taking	27.0	6.8	.88	30.2	5.8	.92	−2.80**	.48
Online simulation	26.5	5.1	.77	29.7	4.0	.75	−3.80***	.65
Affective empathy total	22.2	5.1	.78	20.4	4.4	.77	2.06*	.35
Emotion contagion	11.2	2.9	.69	9.0	2.9	.82	4.17***	.72
Proximity responsivity	11.0	2.8	.69	11.4	2.3	.60	−.73	.12

Notes. Means are based on total subscale scores. The Affective Empathy Total score does not include the Peripheral Responsivity subscale.

Table 5
Correlations among QCAE subscales, IRI, empathic accuracy in the schizophrenia and control groups.

	IRI perspective taking		IRI fantasy		IRI empathic concern		IRI personal distress		Empathic accuracy	
	SCZ	CON	SCZ	CON	SCZ	CON	SCZ	CON	SCZ	CON
QCAE cognitive empathy	.43***	.53***	.36***	.26	.32**	.53***	−.06	−.27	.01	.23
QCAE perspective taking	.30***	.27	.26**	.24	.28***	.35*	−.06	−.19	−.05	−.21
QCAE online simulation	.47***	.74***	.39**	.23	.28**	.63***	−.04	−.32*	.08	.20
QCAE affective empathy	.21*	.01	.21**	.22	.24**	.33*	.33***	.51***	.08	−.23
QCAE emotion contagion	.09	−.10	.14	.19	.14	.19	.40***	.57***	.02	−.24
QCAE proximity responsivity	.29***	.15	.24**	.19	.29***	.40**	.18*	.25	.12	−.13

Note: *p < .05; **p < .01; ***p < .001.

3.4. Correlational analyses

3.4.1. Associations with other empathy measures

The QCAE showed a mixed pattern of correlations with alternative empathy measures (Table 5). Correlations with the IRI subscales were generally positive, with some evidence of relatively higher correlations between conceptually related QCAE and IRI scales in both groups. For instance, QCAE Cognitive Empathy scales significantly correlated with IRI Perspective Taking (believed to assess cognitive empathy) but showed relatively small correlations with IRI Personal Distress (believed to assess affective empathy), whereas QCAE Affective Empathy tended to show the opposite pattern. However, the QCAE subscales showed relatively similar patterns of correlation with the other two IRI subscales in both groups.

In contrast, there was no evidence for an association between the QCAE and performance on the Empathic Accuracy task. All correlations were small and non-significant in patients. For controls, all correlations were also non-significant; for Affective Empathy, the correlations were in an unexpected negative direction.

3.4.2. Associations with neurocognition, symptoms and functioning

As shown in Table 6, the QCAE showed small, non-significant correlations with the MCCB in both groups. For symptom ratings and the MASC, which were completed only by patients, there were a few small, significant correlations. Higher Cognitive Empathy (particularly Online Simulation) correlated with lower levels of SANS Experiential negative symptoms and with better functional capacity on the MASC. Higher Online Simulation also correlated with lower overall BPRS symptoms. Higher Affective Empathy (both subscales) correlated with higher levels of BPRS depression symptoms. Finally, in both patients and controls, higher Cognitive Empathy correlated with better community functioning on the RFS.

4. Discussion

The current study provides new insight into the structure of self-reported empathy in schizophrenia, as well as an evaluation of the suitability of a new scale for empathy in this population. Across a comprehensive set of exploratory and confirmatory factor analyses of the QCAE, we found consistent support for a two-factor solution in individuals with schizophrenia. This structure corresponds to the cognitive and emotional empathy dimensions previously reported in healthy individuals (Reniers et al., 2011). At a more fine-grained level, the creation of item parcels indicated that some specific items show relatively low associations with their corresponding subscales; this information could be useful in future efforts to refine empathy scales. Nonetheless, comparable overall structures in patients and controls are essential for meaningful between-group comparisons. These findings justify the use of separate self-reported cognitive and affective empathy constructs in this clinical population.

Table 6
Correlations among QCAE subscales and symptoms, neurocognition, and functioning in the schizophrenia and control groups.

	BPRS positive	BPRS depression	BPRS total	SANS experiential	SANS expressive	MCCB		RFS total		MASC total
	SCZ	SCZ	SCZ	SCZ	SCZ	SCZ	CON	SCZ	CON	SCZ
QCAE cognitive empathy	−.15	−.03	−.16	−.26**	−.07	.01	−.02	.26**	.40**	.20*
QCAE perspective taking	−.11	−.03	−.11	−.16	−.06	−.01	−.08	.19*	.22	.15
QCAE online simulation	−.16	.03	.18*	−.32***	−.08	.03	.06	.28**	.53**	.21*
QCAE affective empathy	−.02	.23*	.06	−.05	−.01	.04	.00	.04	−.17	.02
QCAE emotion contagion	−.04	.21*	.07	.03	.04	.01	−.18	−.02	−.23	−.03
QCAE proximity responsivity	−.01	.19*	.04	−.13	−.05	.05	.23	.09	−.04	.07

Note: *p < .05; **p < .01; ***p < .001.

An important caveat regarding the use of the QCAE in schizophrenia concerns the Peripheral Responsivity subscale. We found that this scale did not meet minimal psychometric requirements for meaningful use in schizophrenia, consistent with findings from Michaels et al. (2014). It could be the case that the items on this subscale, which focus on how one responds while viewing films or plays (e.g., emotionally detached, objectively, deeply involved), are confusing or not particularly relevant to many individuals with schizophrenia. Alternatively, three of the four reverse-coded QCAE items appear on this particular four-item subscale, and the wording of these items may have contributed to confusion among patients. Based on these considerations, Peripheral Responsivity was not considered in the subsequent analyses.

As a group, patients reported lower Cognitive Empathy but higher Affective Empathy than controls. For Cognitive Empathy, patients had lower scores on both the Perspective Taking and Online Simulation subscales, consistent with Michaels et al. (2014). The subscale label, "Online Simulation," is potentially confusing because the term "simulation" is often used to describe automatic mirroring processes associated with affective empathy (e.g., Preston and deWaal, 2002). In contrast, this subscale refers to making efforts to understand others' emotions and partly overlap with items on the IRI Perspective Taking scale, which is consistently decreased in schizophrenia. A benefit of the QCAE Cognitive Empathy subscales is that they focus more on understanding and mentally representing others' emotions than the IRI, which more broadly assesses perspective taking in non-emotional contexts. Beyond self-report measures, the current findings also converge with impairments consistently seen in schizophrenia on behavioral and neuroimaging cognitive empathy tasks see (Derntl et al., 2009, 2012; Langdon et al., 2006; Smith et al., 2015).

In contrast to the patients' diminished QCAE Cognitive Empathy, they reported higher overall Affective Empathy than controls, a pattern that replicates that found by Michaels et al. The patients' elevated Emotional Contagion scores may seem surprising in light of impaired performance in schizophrenia on tasks that assess this construct, such as spontaneous mimicry of others' observable expressions or behaviors (e.g., yawning) (Haker and Rossler, 2009; Sestito et al., 2013; Varcin et al., 2010). This apparent discrepancy, however, reflects differences in the processes that these measures assess. The QCAE Emotional Contagion subscale actually focuses on the extent to which one's internal emotional experience (particularly for unpleasant emotions) matches the emotions of those around him/her, whereas behavioral measures focus on the degree of congruence of outward expressions among people. The current findings, therefore, suggest that some aspects of affective empathy are not diminished in schizophrenia (also see Horan et al., 2014a,b).

The patients' normal Proximal Responsivity (emotional responses to close personal contacts) and elevated Emotional contagion (emotional response to others in one's general social environment) could be interpreted to suggest that Affective Empathy is an area of relatively preserved function and a social cognitive strength in schizophrenia. Alternatively, patients' sensitivity to others' emotions could contribute to social difficulties, particularly if patients become overwhelmed by negative emotions that are not appropriately modulated. Such a hyper-responsivity interpretation would be consistent with evidence that patients report heightened negative emotions to unpleasant and neutral stimuli (Cohen and Minor, 2008), often report elevated scores on the IRI Personal Distress scale (Achim et al., 2011; Corbera et al., 2013; Smith et al., 2012), and show hyper-responsive mirror neuron system activity in certain conditions (McCormick et al., 2012). Furthermore, schizophrenia is associated with impaired emotion regulation (Henry et al., 2008; Horan et al., 2013), as well as self-other distinction (Ebisch et al., 2014; Liepelt et al., 2012). If patients are sensitive to others emotions, yet unable to down-regulate or distinguish their own emotions from others', this could contribute to overwhelming emotions that impede adaptive empathic behavior.

QCAE scores were not significantly correlated with performance on an empathic accuracy task in either group, replicating prior findings in schizophrenia (Lee et al., 2011) Similar dissociations are commonly seen in healthy individuals (Levenson and Ruef, 1992; Ickes et al., 1990; Zaki et al., 2008; Ames and Kammrath, 2004), indicating that self-reported beliefs about one's own empathic characteristics are often not tightly coupled with how well people actually demonstrate their understanding of others' affective states. It has been suggested that further consideration of such empathic belief-ability gaps may be important for understanding social behavior difficulties in non-clinical and clinical populations (e.g., Devlin et al., 2014; Zaki et al., 2008).

There were minimal correlations with neurocognition in both groups, suggesting that self-reported empathic disturbances in schizophrenia do not merely reflect cognitive impairment. Among patients, Cognitive Empathy significantly correlated with experiential negative symptoms, functional capacity, and real-world functioning. Although the magnitude of these associations was relatively small, these results further support an association between cognitive empathy and functional outcome in schizophrenia (Michaels et al., 2014; Smith et al., 2012, 2014). Cognitive Empathy also correlated relatively strongly with real-world functioning among controls, providing additional support for external validity. Aside from a small, positive correlation with depressive symptoms, Affective Empathy was not associated with the external variables examined in this study.

Some limitations should be considered. First, this study was conducted in chronically ill, medicated outpatients, and the findings may not generalize to other schizophrenia samples. Second, the cross-sectional design prevents us from inferring a direct causal relationship between empathy and social functioning. Third, our measure of community functioning was based solely on patient self-reports without information from collateral informants, which could limit the validity of these ratings (Leifker et al., 2011). Fourth, the correlational analyses should be considered exploratory since the relatively large number of correlations examined was not corrected for multiple comparisons. Notwithstanding these limitations, our findings support efforts to target cognitive empathy in social cognitive training programs as a means to enhancing the generalizability of such interventions to improvements in symptoms and functioning (Kurtz and Richardson, 2012). They also contribute to emerging evidence that at least some aspects of affective empathy are relatively intact or hyper-responsive in schizophrenia.

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Contributors

All authors contributed to the conceptualization of the study. WPH wrote the first draft. SPR conducted the statistical analyses. All authors contributed to and have approved the final manuscript.

Conflict of interest

Dr. Green reports consulting for AbbVie, DSP, Forum, and Roche; is on the Scientific Board for Mnemosyne; and received research

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jpsychires.2015.04.016.

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