

Theory of mind, neurocognition, and functional status in schizotypy

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Abstract

The present study is the first to concurrently examine social cognition, neurocognition, and social functioning in psychometric schizotypes. Screening of 2108 undergraduates with the Schizotypal Personality Questionnaire–Brief (SPQ-B) identified 52 persons high in schizotypy and 40 persons low in schizotypy. All participants were administered a test battery designed to assess two elements of neurocognition, verbal secondary memory (California Verbal Learning Test) and executive functioning (Wisconsin Card Sorting Test), two elements of social cognition, emotion perception (The Awareness of Social Inference Test—Part 1) and theory of mind (The Awareness of Social Inference Test—Parts 2 and 3), and social functioning (Social Adjustment Scale–Self Report). Although the persons with high schizotypy were impaired in social functioning relative to the persons with low schizotypy, they were not impaired in theory of mind, emotion perception, verbal secondary memory, or executive functioning. Theory of mind and verbal secondary memory were correlated in persons with high schizotypy. The present findings suggest that psychometric schizotypes are not impaired in the domains of social cognition and neurocognition examined.

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1. Introduction

Social cognition refers to the ability to construct mental representations about others, oneself, and relations between others and oneself (Adolphs, 2001). Theory of mind (ToM), an aspect of social cognition, refers to the ability to represent the mental states of others and/or to make inferences about the intentions of oneself and others (Baron-Cohen, 1995). Persons with schizophrenia are impaired in many aspects of social cognition including ToM (e.g., Corrigan and Green, 1993; Greig

et al., 2004; Penn et al., 2002; Roncone et al., 2002, Toomey et al., 2002), and ToM deficits may contribute to the impaired social functioning experienced by patients (Brune, 2005a; Roncone et al., 2002). ToM and the other aspects of social cognition (e.g., emotion processing, social perception, social knowledge) are gaining visibility in the schizophrenia literature because correlational and structural equation modeling analyses strongly suggest that social cognition mediates relations between neurocognition and social functioning in schizophrenia (e.g., Brekke et al., 2005; Sergi et al., 2006; Vauth et al., 2004).

Schizotypy is conceptualized as a non-clinical manifestation of the same underlying biological factors that give rise to schizophrenia and other schizophrenia-spectrum disorders (Claridge, 1994; Claridge and Beech, 1995). Investigators interested in identifying the key

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features of schizophrenia value studies of persons with schizotypy (psychometric schizotypes or persons diagnosed with schizotypal personality disorder) because performance impairments in these persons cannot be explained by confounds often present in schizophrenia samples such as antipsychotic medication usage, social isolation, and recurrent hospitalization.

1.1. Neurocognition in schizotypy

Psychometric schizotypes and persons with schizotypal personality disorder often evidence neurocognitive deficits, suggesting that neurocognitive impairments are a key feature of schizophrenia. Such schizotypy samples consistently display impairments in attention/vigilance (e.g., Chen et al., 1998; Lenzenweger et al., 1991; Lenzenweger, 2001; Obiols et al., 1992; Roitman et al., 1997) and spatial working memory (Roitman et al., 2000; Park et al., 1995; Park and McTigue, 1997). Deficits in executive functioning have been observed in schizotypes when this construct was assessed with the Wisconsin Card Sorting Test (e.g., Raine et al., 1992; Poreh et al., 1995; Suhr, 1997; Gooding et al., 1999, 2001), but not when it was assessed with the Trail Making Test (Mitropoulou et al., 2002; Suhr, 1997) and the Tower of Hanoi Test (Suhr, 1997). Schizotypy studies that find impairments in verbal secondary memory (e.g., Bergman et al., 1998; Voglmaier et al., 1997) are matched in number by those that find no group differences in performance on measures such as the California Verbal Learning Test (Lenzenweger and Gold, 2000; Mitropoulou et al., 2002). Neurocognitive deficits have also been observed in “at risk” persons. The unaffected biological relatives of persons with schizophrenia appear to experience impairments in attention (e.g., Keefe et al., 1997; Michie et al., 2000; Schubert and McNeil, 2005), verbal memory (e.g., Cannon et al., 1994; Lyons et al., 1995; Faraone et al., 1995; Toomey et al., 1998; Keri et al., 2001), and executive functioning (e.g., Franke et al., 1992, 1993; Yurgelun-Todd and Kinney, 1993; Faraone et al., 1995; Toomey et al., 1998; Egan et al., 2001).

1.2. Social cognition in schizotypy

Do studies of social cognition in schizotypy suggest that impaired social cognition is a key feature of schizophrenia? Studies of emotion recognition in schizotypy samples (psychometric schizotypes and persons with schizotypal personality disorder) have yielded mixed results. Studies finding impairments in emotion recognition (Poreh et al., 1994; Mikhailova et al., 1996; Platek et al., 2005) are matched in number by those

finding no differences between schizotypes and comparison participants (Toomey and Schuldberg, 1995; van't Wout et al., 2004; Waldeck and Miller, 2000). In contrast, studies of ToM in schizotypy regularly observe impairments (e.g., Pickup and Frith, 2001; Pickup, 2006). Schizotypal personality traits in non-clinical populations appear to be related to deficits in understanding false-beliefs and attributing mental states to others (Langdon and Coltheart, 1999, 2001; Platek et al., 2003a), as well as impairments in the ability to detect deception (Malcolm and Keenan, 2003), appreciate ironical statements (Langdon and Coltheart, 2004), and process information about the self (Platek and Gallup, 2002; Platek et al., 2003b). Moreover, studies have found that first-degree relatives of schizophrenia patients are impaired in social perception and ToM (Toomey et al., 1999; Janssen et al., 2003) but not in facial affect recognition (Loughland et al., 2004; Kee et al., 2004; Kelemen et al., 2004; Toomey et al., 1999). No studies have examined ToM in schizotypy using a videotape-based measure that requires participants to infer the motives of others.

The primary aim of the present study was to examine theory of mind skills in persons with schizotypy. Undergraduates identified as high or low in schizotypy were administered The Awareness of Social Inference Test (TASIT; McDonald et al., 2003), a videotape-based measure that assesses emotion recognition and theory of mind skills with many interpersonal vignettes. Although the TASIT has not been used with schizophrenia spectrum populations, it is a developmentally appropriate measure designed to assess cognitively impaired adults. Another asset of the TASIT is that it involves videotaped interpersonal interactions rather than simple photographs or stories. We hypothesized that persons high in schizotypy would be impaired in theory of mind and emotion recognition relative to those low in schizotypy. The second aim of this study was to examine executive functioning and verbal secondary memory in persons with schizotypy. Executive functioning and verbal secondary memory, although only two of many other potential areas of cognitive impairment in schizotypy, were selected as neurocognitive constructs because they are often impaired in schizophrenia spectrum disorders. The California Verbal Learning Test (CVLT) and the Wisconsin Card Sorting Test (WCST), used to examine verbal secondary memory and executive functioning respectively, are well-recognized measures that are frequently used in studies of schizophrenia. We hypothesized that persons high in schizotypy would be impaired in executive functioning and verbal secondary memory relative to those low in schizotypy. The third aim of this study was to examine differences in functional status

(academic functioning, peer relationships, family relationships) between persons high and low in schizotypy. We hypothesized that persons high in schizotypy would report lower functioning than persons low in schizotypy. Given the links observed between social cognition, neurocognition, and social functioning in schizophrenia studies (e.g., Sergi et al., 2006; Vauth et al., 2004), we further hypothesized that associations between social cognition, neurocognition, and social functioning would be found in persons high in schizotypy.

2. Method

2.1. Participants

Undergraduates ($N=2108$) were screened for schizotypy with an administration of the Schizotypal Personality Questionnaire–Brief Version (SPQ–B; Raine and Benishay, 1995). The 104 participants who scored 16 or higher on the SPQ–B (the top 4.8% of the sample) received phone calls inviting them to participate in further testing. About half of these persons were interested in completing the assessment battery. The 153 participants who scored 2 or lower on the SPQ–B (the bottom 7.2% of the sample) received phone calls inviting them to complete the assessment battery until the number of the low schizotypes tested ($N=46$) approximated that of the high schizotypes ($N=54$). The data of two persons high in schizotypy and six persons low in schizotypy were excluded from the analyses because they had less than 5 years of education in an English-speaking country and/or because their age was significantly higher than that of the rest of the sample (e.g., 50 years or greater). Thus, the final sample consisted of 52 persons high in schizotypy and 40 persons low in schizotypy. The high schizotypy group consisted of 23 males (44.2%) and 29 females (55.8%), whereas the low schizotypy group consisted of 15 males (37.5%) and 25 females (62.5%). The groups did not differ in age (persons high in schizotypy: mean=19.7 years, $SD=2.7$ years; persons low in schizotypy: mean=20.5 years, $SD=3.4$ years) or education (persons high in schizotypy: mean=12.9 years, $SD=1.1$; persons low in schizotypy: mean=13.1 years, $SD=1.1$ years). All participants agreed to participate in the current study after reading and signing an informed consent form approved by California State University, Northridge's Standing Advisory Committee for the Protection of Human Subjects.

2.2. Procedure

Participants were individually administered a 90-min test battery that included measures of verbal secondary

memory (California Verbal Learning Test), executive functioning (Wisconsin Card Sorting Test-64), emotion perception (The Awareness of Social Inference Test—Part 1), theory of mind (The Awareness of Social Inference Test—Parts 2 and 3), and social functioning (Social Adjustment Scale–Self Report). Research assistants, unaware of the schizotypy status of the participants, administered the assessment battery. They were extensively trained in the standardized procedures of each measure by the second author, an expert in measures of neurocognition and social cognition.

2.3. Measures

2.3.1. Social cognition

The Awareness of Social Inference Test (TASIT; McDonald et al., 2003) is a videotape-based measure that assesses emotion perception and theory of mind. Part 1 of the TASIT (Emotion Evaluation Test) assesses emotion perception. Participants view 28 (15–60 s) videotape segments of different actors displaying social cues (e.g., facial expressions, voice tones, gestures) consistent with specific emotional states. Twelve segments suggest a positive emotional state and 16 segments suggest a negative emotional state. After each videotape segment, the participant selects from a list of emotions (Fear, Anger, Sadness, Revulsion, Surprise, Happiness, and Neutral) the emotion perceived to be expressed by the “target” person in the videotape segment. The TASIT Part 1 variables used to assess emotion perception were positive emotions items correct, negative emotions items correct, and total items correct.

Parts 2 and 3 of the TASIT assess theory of mind. In Part 2 of the TASIT (Social Inference–Minimal) participants view 15 videotape segments (20–60 s each) of different actors performing scripts of conversational interactions that might occur between a couple, two friends, or two work colleagues. Five of these videotape segments involve sincere verbal exchanges in which the literal meaning of the words spoken is consistent with the situational context and the social cues displayed by the actors. Ten of the segments involve sarcastic verbal exchanges where one of the actors means the opposite of what he or she is saying and intends the recipient to understand this. Five of the 10 sarcasm segments involve simple sarcasm, where the literal message is contrary to the actual message the speaker wishes to convey, and it is only by appreciating the voice tone that the participant can discern the sarcasm. The other 5 sarcasm segments involve paradoxical sarcasm, where the verbal exchange does not make sense unless it is understood that one of the speakers is being sarcastic. During Part 3 of the TASIT (Social Inference–Enriched), participants view 16

Table 1
Measures of neurocognition and social functioning

Measure	Construct	Description	Variables
California Verbal Learning Test (CVLT; Delis et al., 1983)	Verbal secondary memory	This word list learning task asks participants to recall 16 words from four taxonomic categories presented over a series of five trials. Participants are later asked to recall words from the list after short and long delays, with and without taxonomic cues.	List words recalled in the five learning trials; in the short delay, free recall condition; in the short delay, cued recall condition; in the long delay, free recall condition; in the long delay, cued recall condition.
Wisconsin Card Sorting Test (WCST; Heaton et al., 1993)	Executive functioning	Participants use performance feedback to match individually presented stimulus cards to one of four key cards based on the shape, number, or color of the symbols on each card. Computer version used.	Categories completed; cards sorted correctly; perseverative errors; conceptual level responses.
Social Adjustment Scale–Self Report (SAS–SR; Weissman et al., 1978)	Social functioning	This self-report scale assesses several areas of functioning with questions measuring instrumental and expressive role performance over the past 2 weeks.	Academic functioning; peer relationships; family relationships.

videotape segments (15–60 s) of different actors performing scripts of conversational interactions similar to those of Part 2. Different from Part 2, the videotape segments of Part 3 are “enriched” with additional evidence of the true state of affairs or the true beliefs of the “target” actor. Eight of the 16 segments provide visual evidence of the true state of affairs (the visual evidence is seen only by the “target” actor in the lie segments, while the visual evidence is seen by both the “target” actor and the other actor in the sarcasm segments). In the other eight segments, a prologue or epilogue segment is displayed in which the actor reveals his or her true thoughts or feelings to a third party. After each videotape segment in Parts 2 and 3, the participant is asked to draw conclusions about (a) the

communicative intention of the “target” actor (what they intend to *do* to their conversational partner), (b) whether the “target” actor wants the literal or non-literal meaning of his or her message to be believed (what they *say*), (c) the beliefs and knowledge of the “target actor” about the situation (what they *think*), and (d) the emotional state of the “target” actor (what they *feel*). The TASIT Part 2 variables used to assess theory of mind were sincere items correct, simple sarcasm items correct, paradoxical sarcasm items correct, and total items correct. The TASIT Part 3 variables used to assess theory of mind were lie items correct, sarcasm items correct, and total items correct. The best evidence of the TASIT’s reliability is that Mann–Whitney *U* tests suggest that the alternate forms of the

Table 2
Social cognitive performance of persons high and low in schizotypy

	Schizotypy Status		Total items	<i>t</i>	<i>p</i>
	High (<i>N</i> =50)	Low (<i>N</i> =40)			
	M (SD)	M (SD)			
TASIT—Part 1					
Positive emotions	9.9 (1.5)	10.4 (1.2)	12	1.59	.12
Negative Emotions	13.6 (1.9)	13.8 (1.5)	16	.56	.57
Total	23.5 (2.9)	24.2 (2.1)	28	1.22	.23
TASIT—Part 2					
Sincere	15.7 (3.4)	16.8 (2.6)	20	1.58	.12
Simple Sarcasm	17.1 (2.5)	16.3 (2.3)	20	−1.46	.15
Paradoxical Sarcasm	17.7 (1.9)	17.6 (2.1)	20	−.25	.80
Total	50.6 (5.0)	50.7 (4.5)	60	.17	.86
TASIT—Part 3					
Lies	26.3 (3.6)	25.8 (2.6)	32	−.76	.45
Sarcasm	26.9 (3.4)	27.5 (2.7)	32	.98	.33
Total	53.2 (4.7)	53.3 (4.0)	64	.14	.89

TASIT = The Awareness of Social Inference Test.

Table 3
Neurocognitive performance of persons high and low in schizotypy

	Schizotypy Status		<i>t</i>	<i>p</i>
	High (<i>N</i> =51)	Low (<i>N</i> =39)		
	M (SD)	M (SD)		
CVLT				
T1–5	58.7 (8.4)	56.6 (9.1)	−1.16	.25
SDFR	12.3 (2.5)	11.9 (2.6)	−.84	.40
SDCR	12.6 (2.4)	12.3 (2.5)	−.66	.51
LDFR	12.8 (2.2)	12.1 (2.6)	−1.46	.15
LDCR	12.8 (2.3)	12.4 (2.5)	−.90	.37
WCST				
CSC	50.3 (7.9)	48.9 (8.7)	−.81	.42
CLR	47.3 (10.8)	44.7 (13.4)	−1.05	.29
CC	3.9 (1.2)	3.7 (1.5)	−.81	.42
PE	6.6 (3.1)	6.8 (3.3)	.30	.76

CVLT = California Verbal Learning Test; T1–5 = Learning Trials 1 through 5; SDFR = Short Delay Free Recall; SDCR = Short Delay Cued Recall; LDFR = Long Delay Free Recall; LDCR = Long Delay Cued Recall; WCST = Wisconsin Card Sorting Test; CSC = Cards Sorted Correctly; CLR = Conceptual Level Responses; CC = Categories Completed; PE = Perseverative Errors.

Table 4
Functional status of persons high and low in schizotypy

	Schizotypy Status		<i>t</i>	<i>p</i>
	High (<i>N</i> =52)	Low (<i>N</i> =40)		
	M (SD)	M (SD)		
SAS–SR				
Student	2.00 (.56)	1.63 (.33)	3.65	<.001
Social and Leisure	2.97 (.68)	2.06 (.41)	7.41	<.001
Extended Family	2.33 (.56)	1.74 (.44)	5.50	<.001

SAS–SR = Social Adjustment Scale–Self Report; Student = Academic Functioning; Social and Leisure = Peer Relationships; Extended Family = Family Relationships.

TASIT are comparable for all three parts of the measure (McDonald et al., 2003).

2.3.2. Neurocognition and social functioning

The measures used to assess neurocognition and social functioning are displayed in Table 1.

2.4. Data analyses

Two-tailed *t*-tests were employed to examine differences between the persons high and low in schizotypy on the measures of social cognition, neurocognition, and social functioning. The requisite of equality of variances was met for all *t*-tests. Correlational analyses were used

to examine associations between the measures of social cognition, neurocognition, and social functioning. All correlational analyses used Pearson *r* coefficients.

3. Results

3.1. Group differences in social cognition

Table 2 displays the participants' performance on the TASIT. Persons with high schizotypy did not differ from those with low schizotypy in emotion perception (TASIT Part 1 Total, $t(88)=1.22$, $p=.23$) and theory of mind (TASIT Part 2 Total, $t(88)=0.17$, $p=.86$; TASIT Part 3 Total, $t(88)=0.14$, $p=.89$).

3.2. Group differences in neurocognition

Table 3 displays the participants' performance on the CVLT and the WCST. Persons with high schizotypy did not differ from those with low schizotypy in all indices of verbal secondary memory and executive functioning analyzed.

3.3. Group differences in functional status

Table 4 displays the participants' performance on the SAS–SR. Persons with high schizotypy were impaired

Table 5
Zero order correlations between the social cognitive, neurocognitive, and social functioning variables for the persons high in schizotypy

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
CVLT															
1. T1–5	–														
2. SDFR	.69**	–													
3. SDCR	.66**	.82**	–												
4. LDFR	.71**	.86**	.84**	–											
5. LDCR	.66**	.76**	.94**	.78**	–										
WCST															
6. TCR	.13	.20	.11	.10	.08	–									
7. CLR	.16	.21	.14	.14	.12	.98**	–								
8. CC	.23	.22	.21	.18	.16	.90**	.92**	–							
9. PE	.01	–.07	.05	.05	.10	–.83**	–.83**	–.77**	–						
TASIT															
10. Part-1	.07	.19	.08	.08	.08	.13	.13	.02	–.05	–					
11. Part-2	.11	.12	.24	.18	.16	.03	.05	.02	.10	.22*	–				
12. Part-3	.26	.26	.36**	.32*	.38**	.09	.10	.08	.10	.41**	.52**	–			
SAS–SR															
13. Student	.03	.03	.08	.08	.12	–.14	–.12	–.09	.18	–.18	–.04	.12	–		
14. Social	.10	–.02	.005	–.06	.01	.05	.07	.14	–.11	–.24	–.15	.04	.44**	–	
15. Family	–.19	–.05	–.06	–.02	–.02	.001	–.002	.03	.04	–.11	–.23	.02	.41**	.22	–

* $p<.05$; ** $p<.01$; two-tailed

CVLT = California Verbal Learning Test; T1–5 = Learning Trials 1 through 5; SDFR = Short Delay Free Recall; SDCR = Short Delay Cued Recall; LDFR = Long Delay Free Recall; LDCR = Long Delay Cued Recall; WCST = Wisconsin Card Sorting Test; CSC = Cards Sorted Correctly; CLR = Conceptual Level Responses; CC = Categories Completed; PE = Perseverative Errors; TASIT = The Awareness of Social Inference Test; SAS–SR = Social Adjustment Scale–Self Report; Student = Academic Functioning; Social = Peer Relationships; Family = Family Relationships.

relative to those with low schizotypy in all three areas of functioning examined, even after a Bonferroni correction was employed to minimize the risk of type I error. The academic functioning of persons with high schizotypy was worse than that of persons with low schizotypy, $t(88)=3.65$, $p<.001$, indicating that they were less able to keep up with schoolwork, less able to attend class regularly, more likely to feel upset at school, and more likely to argue with people at school. Likewise, the peer relationship functioning of persons with high schizotypy was worse than that of persons with low schizotypy, $t(90)=7.41$, $p<.001$, indicating that they more often felt bored or lonely, more often felt uncomfortable around others, socialized with friends less frequently, and had more problems or arguments with friends. The family relationship functioning of persons with high schizotypy was worse than that of persons with low schizotypy, $t(90)=5.50$, $p<.001$, indicating that they more often experienced conflicts and arguments with family members, more often worried about events in their family, and more often thought that their family had let them down.

3.4. Associations between social cognition, neurocognition, and functional status in persons with high schizotypy

Table 5 displays the zero order correlations between performance indicators from the TASIT, CVLT, WCST, and SAS–SR for the persons with high schizotypy. Few significant correlations were observed. A link between theory of mind and verbal secondary memory is suggested by three significant correlations between CVLT variables and the total score of TASIT Part 3. Interestingly, more associations indicating relationships between neurocognition and both social cognition and social functioning were observed in the persons with low schizotypy.

4. Discussion

Psychometric schizotypes did not differ from healthy participants in theory of mind and emotion perception skills. When presented with the theory of mind tasks of The Awareness of Social Inference Test (TASIT), the persons with high schizotypy appeared quite able to appreciate scenes depicting sarcastic, sincere, and untruthful interpersonal interactions. This finding contrasts with previous findings of poor theory of mind in individuals with schizotypy, findings indicating impairments in the ability to detect irony (Langdon and Coltheart, 2004) and deception (Malcolm and Keenan,

2003). However, the present finding is not inconsistent with the mixed findings generated by studies of emotion perception in schizotypy (e.g., Toomey and Schulberg, 1995; van't Wout et al., 2004).

Contrary to our expectations, persons high in schizotypy did not differ from those low in schizotypy in executive functioning as assessed with the Wisconsin Card Sorting Test (WCST) or in verbal secondary memory as assessed with the California Verbal Learning Test (CVLT). The lack of impairment on the WCST conflicts with studies that have found WCST-based evidence of executive functioning deficits in schizotypy (e.g., Suhr, 1997; Gooding et al., 1999, 2001). In contrast, the lack of impairment on the CVLT is not inconsistent with the mixed findings generated by studies of verbal secondary memory in schizotypy (e.g., Lenzenweger and Gold, 2000; Mitropoulou et al., 2002).

Persons high in schizotypy were impaired in their social, family, and academic functioning relative to persons low in schizotypy. Consistent with this finding, Melley et al. (2002) found that scores on schizotypal personality scales were inversely related to social, family, and academic functioning as assessed by the Social Adjustment Scale–Self Report (SAS–SR). The degree of functional impairment in the schizotypy group is comparable to that of the depressed and schizophrenia samples reported in the SAS–SR manual.

The finding that theory of mind is related to secondary verbal memory in persons high in schizotypy is consistent with Greig et al. (2004)'s observation of an association between theory of mind and verbal memory in schizophrenia as well as the many schizophrenia studies that observe relationships between social cognition and neurocognition (e.g., Corrigan et al., 1994; Sergi and Green, 2003; Sergi et al., 2006; Wynn et al., 2005; Lancaster et al., 2003; Kee et al., 1998). However, neither neurocognition nor social cognition were significantly related to social functioning, which stands in contrast to schizophrenia studies reporting relations between those domains (e.g., Green, 1996; Green et al., 1999, 2000; Kee et al., 2003; Penn et al., 1996; Corrigan and Toomey, 1995).

The present study has several limitations. For one, all participants were undergraduates at a four-year university. The educational attainment of the sample limits our ability to generalize our finding of no group differences in social cognition and neurocognition to the broader schizotypy population. Such conclusions would require studies comparing community samples of persons high and low in schizotypy. Moreover, to the extent that educational attainment relates to neurocognitive ability

and neurocognitive ability relates to social cognitive performance, future studies should be careful to vary the educational achievement of their participants or treat education as a covariate. Another potential limitation of the study is that the high and low schizotypy groups included more females than males. However, analyses found no gender differences in social cognitive and neurocognitive performance for both the high and low schizotypy groups. Thus, the high number of females likely did not impact the null findings obtained. A third potential limitation of the current study concerns the screening procedure employed. The 22-item SPQ–B was used as a screener because it quickly assesses schizotypy. However, a more extensive battery of schizotypal measures such as the Chapman Scales, although less practical to administer to over 1000 undergraduates per semester, may have more clearly identified schizotypes who might have evidenced impairments in social cognition and neurocognition. Alternatively, including only the schizotypes who have a genetic risk for schizophrenia might have yielded different results as Johnson et al. (2003) found no relationship between schizotypy and impaired neurocognition in the absence of a family history. Another important limitation of the present study is that very few aspects of social cognition and neurocognition were assessed. Although theory of mind and emotion perception are important areas of social cognition, many other areas such as emotional intelligence, social knowledge, and social context processing were not studied. Likewise, while executive functioning and verbal memory are important areas of neurocognition, they represent only a subset of the many cognitive abilities that allow persons to function well. A final limitation concerns the measure we employed to study theory of mind and emotion perception. To our knowledge, the current study is the first to use the TASIT to study social cognition in persons with schizotypy. Although the TASIT has demonstrated sensitivity to social cognitive deficits after traumatic brain injury (McDonald et al., 2003), it may not be an ideal measure of emotion perception and second order false beliefs in persons with schizotypy. Further study is needed to determine whether the finding that schizotypes did not differ from persons low in schizotypy in theory of mind and emotion perception skills reflects the soundness of social cognition in schizotypy or a lack of sensitivity in the TASIT. Future studies of theory of mind in schizotypy might employ measures that have been used in schizophrenia studies such as picture-sequencing tasks; irony, metaphor, or real intention detection tasks; and/or connotation tasks involving short

text passages or humorous cartoon drawings (Brune, 2005b).

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