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Short Communication

Increased social cognitive bias in subclinical paranoia

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Recent initiatives have shifted the emphasis from studying pathological illnesses as separate diagnostic entities to examining specific symptoms on a continuum from healthy, to subclinical, to clinical levels (i.e. RDoC, Clark et al., 2017). One of these symptoms, paranoia, has been extensively reported in severe mental illnesses such as schizophrenia, but has also been reported to exist at elevated levels in approximately 10–15% of individuals in general population (Freeman, 2007). Higher levels of subclinical paranoia have been associated with greater social anxiety (Tone et al., 2011), as well as greater depression, self-consciousness, and lower self-esteem (Combs and Penn, 2004). Individuals higher in subclinical paranoia also show measurable deficits as compared to those low in subclinical paranoia, most notably socially relevant domains including emotion perception (Combs et al., 2013) and occupational and social functioning (Rössler et al., 2007).

Analyses from the Social Cognition Psychometric Evaluation (SCOPE) study have revealed significant, specific relationships between measures of social cognitive bias and increased paranoia in individuals with schizophrenia (Buck et al., 2016; Pinkham et al., 2016). We seek to expand this literature by examining the relationship between subclinical paranoia and social cognitive biases to determine if similar symptom specific deficits are present in a nonclinical population. Consistent with the previous findings from patients, we expect to find a unique association between social cognitive bias and subclinical paranoia that does not extend to social cognitive capacity or neurocognitive performance.

One hundred twenty-three undergraduate students were recruited to participate in return for class credit. Participants completed assessments of subclinical paranoia, depression, and anxiety, as well as the same social cognitive and neurocognitive assessments used in the initial SCOPE study. Demographic information for the sample is listed in Table 1.

To measure subclinical paranoia, participants completed the self-report Paranoia Scale (PS; Fenigstein and Vanable, 1992), which contains 20 items that are rated on a 1–5 Likert scale representing how much each statement applies to the participant. Higher scores indicate more paranoid ideation.

To assess distinct aspects of depression and anxiety, the Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007) was utilized, specifically the dysphoria and social anxiety subscales. These subscales are most directly related to social aspects of depression and anxiety, and therefore, may be most relevant to subclinical paranoia.

All participants completed assessments of neurocognitive abilities and IQ. Neurocognitive abilities, specifically speed of processing and working memory, were assessed using subsets of the MATRICS Consensus Cognitive Battery (Nuechterlein et al., 2008). The Wide Range Achievement Test 3 (WRAT-3; Wilkinson, 1993) was used as a brief estimate of IQ.

All participants also completed a broad battery of social cognitive tasks spanning emotion recognition, Theory of Mind, social perception, and attributional style. Measures of social cognition were those identified by RAND panel of experts as part of initial stages of the Social Cognition Psychometric Evaluation (SCOPE) study (Pinkham et al., 2014).

Two tests of emotion recognition were used. The Bell Lysaker Emotion Recognition Test (BLERT; Bell et al., 1997) measures the ability to use vocal and visual cues to determine expressed emotion (happiness, sadness, fear, disgust, surprise, anger, or no emotion) in 21 videos. The Penn Emotion Recognition Test (ER-40, Kohler et al., 2003) utilizes 40 photographs to assess the ability to assess static emotional expression (happiness, sadness, anger, fear, or neutral expression). Performance on both tasks is assessed as total number correct.

Three measures were used to assess Theory of Mind. The Reading the Mind in the Eyes Test (Eyes; Baron-Cohen et al., 2001) evaluates the ability to infer the mental state of another based on static photographs of eyes. The Awareness of Social Inferences Test, Part III (TASIT; McDonald et al., 2003) evaluates the ability to detect lies and sarcasm in videos of complex social situations. Each video is followed by questions regarding the true intention and beliefs of the individuals in the video. The Hinting Task (Corcoran et al., 1995) measures the ability to infer passive suggestions or requests from ten passages in which one of two characters hints at an underlying intention. If the participant is initially incorrect, a second hint is given. For all three assessments, performance is indexed as the total number of correct responses.

Social perception ability was assessed with the Relationships Across Domains task (RAD; Sergi et al., 2009), which measures social perception through assessment of likely outcomes based on 15 vignettes

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Table 1
Demographic characteristics of study participants. Participant age ranged from 18 to 34.

Demographics	N (%)
Female	104 (84.6%)
Race	
Caucasian	98 (79.7%)
African American	7 (5.6%)
Native American	0 (0%)
Asian	17 (13.8%)
Other	1 (1%)
	N (%) / Mean (SD)
Ethnicity	
Hispanic	9 (7.3%)
Non-Hispanic	114 (92.7%)
Age (years)	20.9 (2.8)
Education (years)	13.7 (1.1)
WRAT-3	108.9 (9.2)
PS score	34.8 (12.8)

describing different relational models (communal sharing, authority ranking, equality matching, and market pricing). After reading each vignette, participants answered 3 yes/no questions about future behavior based upon the relationship described, and performance is based on the total number correct.

Social cognitive biases were measured with two tasks. Attributional style/bias was assessed using The Ambiguous Intentions and Hostility questionnaire (AIHQ; Combs et al., 2007). Participants read a perceived negative event, and then indicate how intentional the event was, as well as how much the incident would anger them, and how much they would blame the individual in the vignette for what occurred. An overall "blame score" was calculated by averaging ratings of intentionality, anger, and blame across vignettes and then summing together. Participant also completed the Trustworthiness Task (Trust; Adolfs et al., 1998), which assesses social judgments of trust via participants' ratings of 42 faces. Faces are rated on a scale of −3 (very untrustworthy) to 3 (very trustworthy), and the average of all ratings is used as the primary outcome variable. Thus, for AIHQ, higher scores indicate greater social cognitive bias, and for the Trust task, lower scores indicate greater bias towards untrustworthiness.

Using bivariate correlations, we observed the relationship between subclinical paranoia and our measures of depression, anxiety, neurocognition, and social cognition. Overall, subclinical paranoia was significantly positively correlated with depression, $r = 0.643$, $p < .001$, and anxiety, $r = 0.559$, $p < .001$. We observed no significant correlations between subclinical paranoia and neurocognitive capabilities.

The strongest correlation observed for our measures of social cognition was between paranoia ratings and attributional bias (AIHQ blame score; $r = 0.435$, $p < .001$). As paranoia increased, so too did the tendency to make hostile and blaming attributions. Small negative correlations were observed between paranoia scores and the social cognitive abilities of emotion recognition (ER40; $r = -0.198$, $p = 0.028$) and Theory of Mind (TASIT $r = -0.208$, $p = 0.021$) indicating that as paranoia increased, performance decreased. A small negative correlation was also evident for trustworthiness judgments such that increased paranoia was associated with decreased ratings of trustworthiness (Trust; $p = -0.182$, $p = 0.044$).

In order to account for the potential effects of anxiety or depression, partial correlations were calculated using the IDAS dysphoria and social anxiety subscales as covariates. A significant, moderate partial correlation remained between ratings of paranoia and hostile/blaming attributions (AIHQ blame score; $r = 0.325$, df = 108, $p = 0.001$). Additionally, small partial correlations were observed between paranoia and emotion recognition (ER40; $r = -0.220$, df = 108, $p = 0.021$) and Theory of Mind (TASIT; $r = -0.243$, $p = 0.011$; Hinting $r = -0.217$, df = 108, $p = 0.023$), though the correlation with judgments of trustworthiness was attenuated and no longer significant (Trust; $r = -0.050$, $p = 0.601$). All calculated correlations and partial correlations are provided in Table 2.

Table 2
Descriptive statistics and correlations between individual measures and PS scores of subclinical paranoia. Partial correlations calculated controlling for IDAS dysphoria and IDAS social anxiety subscales.

	M (SD)	Range	*r*
PS	34.8 (12.8)	20–79	–
IDAS Dysphoria	21.87 (8.60)	10–44	0.643**
IDAS social anxiety	8.58 (3.73)	5–20	0.559**
WRAT	108.85 (9.21)	76–123	0.021
MATRICS			
TMT	22.10 (6.26)	10.15–48.56	−0.048
Symbol coding	66.07 (11.29)	43–110	0.082
HVLT	28.83 (3.42)	19–35	0.063
LNS	16.86 (2.75)	8–24	0.108
AF	25.59 (5.71)	11–42	0.105

	M (SD)	Range	*r* (partial *r*)
Social cognitive measures			
AIHQ	7.73 (1.81)	4.2–13.0	0.435**(0.325*)
ER40	35.03 (2.62)	26–40	−0.198† (−0.220**)
TASIT	56.39 (3.82)	36–63	−0.208† (−0.243**)
Trust	0.26 (−0.64)	−2–2	−0.182† (−0.050)
Eyes	27.31 (3.35)	19–34	0.018 (−0.138)
Hinting	16.95 (2.17)	7–20	−0.167 (−0.217†)
BLERT	18.37 (1.82)	14–21	0.044 (−0.015)
RAD	33.98 (4.27)	22–43	0.012 (−0.122)

† $p < 0.05$.
* $p < 0.01$.
** $p < 0.001$.

Similar to previous findings in patients with schizophrenia (Buck et al., 2016; Pinkham et al., 2016), these results demonstrate positive links between increased subclinical paranoia and social cognitive bias. These results are seen even after controlling for symptoms of depression and anxiety, indicating a unique contribution of subclinical paranoia on social cognitive biases. Contrary to our hypothesis and previous observations in patients with schizophrenia, we observed small negative correlations between subclinical paranoia and social cognitive capacity (i.e., performance on emotion recognition tasks and theory of mind tasks). Together, these results suggest that paranoia exerts a similar effect on social cognitive bias across a continuum spanning from healthy to pathological, but that the effect of paranoia on social cognitive capacity may be qualitatively different pending severity of paranoid ideation.

Limitations of the current work include the disproportionately small number of males in our sample and that our sample was limited to relatively high-functioning undergraduates. Despite a relatively low average paranoia score for our sample, a good degree of variability was present (range 20–79), and our results highlight a distinct and observable association between social cognitive biases and paranoia. Additional studies examining paranoia on a continuum with a more diverse sample are likely to provide valuable information regarding the potential mechanisms and consequences of this important symptom by revealing shared deficits or distinct characteristics that define clinical and subclinical presentations.

Conflict of interest

Authors report no conflicts of interests.

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References

Adolfs, R., Tranel, D., Damasio, A., 1998. The human amygdala in social judgment. Nature 393, 470–474.
Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., Plumb, I., 2001. The 'Reading the mind in the eyes' Test revised version: a study with normal adults and adults with Asperger syndrome or high-functioning autism. Journal of Child Psychology and Pychiatry 42, 241–251.
Bell, M., Bryson, G., Lysaker, P., 1997. Affect recognition in schizophrenia: a function of global impairment or a specific cognitive deficit. Psychiatry Res. 72, 105–113.
Buck, B., Pinkham, A., Harvey, P., Penn, D., 2016. Revisiting the validity of measures of social cognitive bias in schizophrenia: additional results from the Social Cognition Psychometric Evaluation (SCOPE) study. Br. J. Clin. Psychol. 55 (4), 441–454.
Clark, L., Cuthbert, B., Lewis-Fernandez, R., Narrow, W., Reed, G., 2017. Three approaches to understanding and classifying mental disorder: ICD 11, DSM-5, and the National Institute of Mental Health's Research Domain Criteria (RDoC). Psychol. Sci. Public Interest 18 (2), 72–145.
Combs, D., Penn, D., 2004. The role of subclinical paranoia on social perception and behavior. Schizophr. Res. 69, 93–104.
Combs, D., Penn, D., Wicher, M., Waldheter, E., 2007. The Ambiguous Intentions Hostility Questionnaire (AIHQ): a new measure for evaluating hostile social-cognitive biases in paranoia. Cogn. Neuropsychiatry 12, 128–143.
Combs, D., Finn, J., Wohlfahrt, W., Penn, D., Basso, M., 2013. Social cognition and social functioning in nonclinical paranoia. Cogn. Neuropsychiatry 18 (6), 531–548.
Corcoran, R., Mercer, G., Frith, C., 1995. Schizophrenia, symptomatology and social inference: investigating "theory of mind" in people with schizophrenia. Schizophr. Res. 17, 5–13.
Fenigstein, A., Vanable, P., 1992. Paranoia and self-consciousness. J. Pers. Soc. Psychol. 62 (1), 129–138.
Freeman, D., 2007. Suspicious minds: the psychology of persecutory delusions. Clin. Psychol. Rev. 27, 425–457.
Kohler, C., Turner, T., Bilker, W., Brensinger, C., Siegel, S., Kanes, S., ... Gur, R., 2003. Facial emotion recognition in schizophrenia: intensity effects and error pattern. Am. J. Psychiatry 160, 1768–1774.
McDonald, S., Flanagan, D., Rollins, J., Kinch, J., 2003. TASIT: a new clinical tool for assessing social perception after traumatic brain injury. J. Head Trauma Rehabil. 18, 219–238.
Nuechterlein, K., Green, M., Kern, R., Baade, L., Barch, D., Cohen, J., ... Marder, S., 2008. The MATRICS Consensus Cognitive Battery, Part 1: test selection, reliability, and validity. Am. J. Psychiatry 165 (2), 203–213.
Pinkham, A., Penn, D., Green, M., Buck, B., Healy, K., Harvey, P., 2014. The Social Cognition Psychometric Evaluation Study: results of the expert survey and RAND panel. Schizophr. Bull. 40 (4), 813–823.
Pinkham, A.E., Harvey, P.D., Penn, D.L., 2016. Paranoid individuals with schizophrenia show greater social cognitive bias and worse social functioning than non-paranoid individuals with schizophrenia. Schizophr. Res. 3, 33–38.
Rössler, W., Riecher-Rössler, Angst, J., Murray, R., Gamma, A., Eich, D., van Os, J., Gross, V., 2007. Psychotic experiences in the general population: a twenty-year prospective community study. Schizophr. Res. 92, 1–14.
Sergi, M., Fiske, A., Horan, W., Kern, R., Kee, K., Subotnik, K., ... Green, M., 2009. Development of a measure of relationship perception in schizophrenia. Psychiatry Res. 166, 54–62.
Tone, E., Goulding, S., Compton, M., 2011. Associations among perceptual anomalies, social anxiety, and paranoia in a student sample. Psychiatry Res. 188, 258–263.
Watson, D., O'Hara, M., Simms, L., Kotov, R., Chmielewski, M., McDade-Montez, E., ... Stuart, S., 2007. Development and validation of the Inventory of Depression and Anxiety Symptoms (IDAS). Psychol. Assess. 19 (3), 253–268.
Wilkinson, G.S., 1993. WRAT3: Wide Range Achievement Test Administration Manual. Wide Range, Inc., 15 Ashley Place, Suite 1A. Wilmington, DE.