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Revisiting the validity of measures of social cognitive bias in schizophrenia: Additional results from the Social Cognition Psychometric Evaluation (SCOPE) study

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Abstract

Objective—The ongoing Social Cognition Psychometric Evaluation (SCOPE) study is in the process of forming a gold-standard battery of social cognition tests for use in clinical trials. Previous SCOPE phases have not acknowledged key differences between social cognition skills and biases, and psychometric validity analyses might provide important information if tailored to bias-related outcomes. This study aims to validate these measures with such bias-related outcomes.

Methods—Two measures of social cognitive bias – the Ambiguous Intention Hostility Questionnaire (AIHQ; hostile attribution bias) and Trustworthiness Task (distrust bias) – were reviewed according to their relationships to (1) current and prospective symptom levels, (2) questionnaires of trait paranoia and hostility and informant-rated hostility, (3) interpersonal conflict, as well as (4) relationships to measures of trait paranoia, hostility, and interpersonal conflict above and beyond the influence of clinically rated symptoms.

Results—Results supported hypotheses that social cognitive bias provides information about cognition, symptoms, and functioning related to interpersonal conflict. Each bias demonstrated relationships to trait paranoia questionnaires, hostility, or interpersonal conflict outcomes, and these persisted above and beyond the influence of clinically rated symptoms. Hostile attribution bias also predicted change in symptom levels over a brief interval.

Conclusions—Overall, the current bias-specific psychometric analysis provides support for continued study of social cognitive biases.

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Supporting Information

The following supporting information may be found in the online edition of the article:

Social cognition is impaired in schizophrenia (Savla, Vella, Armstrong, Penn, & Twamley, 2013). It is separable from neurocognition (Nuechterlein *et al.*, 2004) and negative symptoms (Sergi *et al.*, 2007), predicts a range of real-world outcomes (Fett *et al.*, 2011), and mediates the relationship between neurocognition and functioning (Schmidt, Mueller, & Roder, 2011; Vauth, Rüsch, Wirtz, & Corrigan, 2004). While social cognition has become a critical area of study in schizophrenia (Green & Leitman, 2008), no consensus exists on the subdomains that comprise it (Green *et al.*, 2008), and questions remain regarding its factor structure (Mancuso, Horan, Kern, & Green, 2011; Silverstein, 1997). Additionally, concerns have been raised regarding the psychometric properties of existing measures in this area (Green *et al.*, 2008), including excessive heterogeneity (Hoekert, Kahn, Pijnenborg, & Aleman, 2007; Yager & Ehrmann, 2006) and ceiling effects (Bora, Yucel, & Pantelis, 2009).

The ongoing Social Cognition Psychometric Evaluation (SCOPE; Pinkham *et al.*, 2014; Pinkham, Penn, Green, & Harvey, 2016) study is addressing these limitations. It aims to establish consensus on the domains of social cognition in schizophrenia and to compile a battery to assess these domains. Three phases of SCOPE – expert survey, RAND panel evaluation, and initial psychometric study – led to the recommendation that five tasks continue to be evaluated for inclusion in the final battery. Despite recognition that social cognition includes (1) abilities to correctly interpret social information, or *social cognition skills* and (2) specific patterns in open-ended interpretations of social situations, or *social cognitive bias* (Buck, Healey, Gagen, Roberts, & Penn, 2016; Mancuso *et al.*, 2011; Roberts & Pinkham, 2013), no assessments of social cognitive bias were advanced to the next study phase. Instead, both bias measures in SCOPE – The Trustworthiness Task (Adolphs, Tranel, & Damasio, 1998), and the Ambiguous Intentions Hostility Questionnaire (AIHQ-A; Combs, Penn, Wicher, & Waldheter, 2007) – were not recommended for further study primarily because they did not meet the pre-set criterion of relationships to functional outcomes.

The selected functional outcomes in SCOPE primarily assess performance in activities of daily living, employment, and interpersonal communication. While these outcomes are critical, they may be inappropriate as criterion outcomes for hostile attribution and distrust biases. Previous research suggests that these social cognitive biases impact outcomes related to interpersonal conflict, and none of these outcomes were directly evaluated in the SCOPE psychometric study. Hostile attributional biases are linked with positive symptoms (Mancuso *et al.*, 2011), paranoia (Combs, Finn, Wohlfahrt, Penn, & Basso, 2013; Combs *et al.*, 2007, 2009), suspiciousness (An *et al.*, 2010), social disengagement (Kanie *et al.*, 2014), and episodes of violence (Waldheter, Jones, Johnson, & Penn, 2005). Distrust is similarly related to paranoia (Couture, Penn, Addington, Woods, & Perkins, 2008; Pinkham, Hopfinger, Pelphrey, Piven, & Penn, 2008). Thus, while social cognitive skills are related to global functional outcomes (Mancuso *et al.*, 2011; Pinkham *et al.*, 2016), social cognitive biases appear to provide different information about cognitions involved in paranoia, hostility, and interpersonal conflict.

Continued examination of social cognitive bias is warranted for a number of reasons. First, no clear model exists of which outcomes social cognitive bias might predict. A model of the relationship between social cognitive bias and outcomes is required before evaluating the

effectiveness of assessment instruments of this domain. Second, it is possible that assessment of social cognitive bias might provide unique clinical information not provided in assessments of neurocognition, social cognition skills, or symptoms. Social cognitive biases are thought to underlie interpersonal conflict and social disengagement (Kanie *et al.*, 2014; Waldheter *et al.*, 2005). It is possible that hostile attribution bias or distrust bias might predict these outcomes above and beyond the influence of symptoms. Third, while these are considered to measure cognitions that contribute to development of psychosis (Combs *et al.*, 2007), no study has addressed whether baseline social cognitive biases might provide information about future development or severity of symptoms.

This study sought to more fully evaluate the predictive and convergent validity of the social cognitive bias measures utilized in the early phases of the SCOPE study. Our goals were twofold: (1) to re-examine the utility of these measures and (2) to further our understanding of the construct of social cognitive bias. First, we hypothesized that both measures of social cognitive bias would be cross-sectionally related to positive, emotional discomfort, and hostility symptoms. These hypotheses are supported by previous research in attributional biases (An *et al.*, 2010; Combs *et al.*, 2007, 2013 Mancuso *et al.*, 2011). Second, given their proposed role as an underlying contributor to psychopathology (Combs *et al.*, 2007), we hypothesized that bias measures would prospectively predict changes in levels of symptoms when measured at a follow-up visit. Third, we hypothesized that these social cognitive biases would be cross-sectionally related to trait hostility, trait paranoia, and interpersonal conflict across informant and self-reported forms. Fourth, we examined the cross-sectional relationships of these measures to outcomes beyond measures of psychotic symptoms, hypothesizing that social cognitive biases are related to these outcomes beyond the influence of clinically rated symptoms. Finally, as a supplemental analysis, we also examined whether social cognitive bias would account for additional variance in present trait paranoia and informant rated hostility and social acceptability beyond social cognitive skill measured by the skill-based measures included in the SCOPE (Pinkham *et al.*, 2016).

Methods

Participants

Data collection was completed as a part of two phases of the SCOPE study, phases 3 and 4. During phase 3 (Pinkham *et al.*, 2016), one hundred and seventy-nine (n = 179) participants were recruited to two different research sites, both at university medical centres in the southern United States. Full recruitment procedures as well as inclusion and exclusion criteria are provided elsewhere (Pinkham *et al.*, 2016). Using identical inclusion and exclusion criteria and recruitment procedures, forty-seven (n = 47) participants with schizophrenia or schizoaffective disorder were recruited to phase 4, which focused on modifying and pilot testing those measures identified in phase 3 as promising but still requiring some improvement. In anticipation of the current study, the social cognitive bias measures were included in phase 4, and additional outcomes (MOAS and PID5-HS, described below in section 2.2.3) were assessed. Data from phase 4 have not previously been published. Social cognitive bias measures were not modified; thus, where measures overlapped between phases 3 and 4, data were combined as duplicate participants (e.g.,

those included in both phases 3 and 4) had their phase 4 data excluded ($n = 6$). Thus, in total, the sample includes 220 participants. (See Table 1 for demographic information). The sample sizes for analyses including only phase 4 data are indicated in the corresponding tables.

Measures

Social cognitive biases—The Ambiguous Intentions Hostility Questionnaire, Ambiguous Items (AIHQ; Combs *et al.*, 2007) consists of five second-person vignettes of negative social situations with ambiguous cause (e.g., 'you are walking by a group of young people who laugh as you pass by'). Participants rate the following on Likert scales: the intentionality of the other's action, how angry it would make the participant feel, and how much he or she would blame the other. These are totalled for an overall 'blame score'. Responses to each item are averaged across scenario and summed; thus, total scores range from 3 to 16 with higher scores indicating greater blame. Although previous versions of the AIHQ-A also include two interviewer-rated scales (hostility bias and aggression bias), we only used the Blame score for two reasons: (1) the Hostility and Aggression Biases did not meet sufficient levels of test–retest reliability (see Pinkham *et al.*, 2016), and (2) previous literature on this measure has not demonstrated consistent incremental validity beyond the blame scale in including these measures as predictors of symptoms or outcome (Combs *et al.*, 2007, 2009).

The Trustworthiness Task (Adolphs *et al.*, 1998) is a 42-item assessment of participants' immediate social judgments about the trustworthiness of men and women of a range of diverse ethnic backgrounds depicted in black and white photographs. Participants are required to provide a rating ranging from +3 (strongly trust) to −3 (strongly distrust) about how much they would trust the individual depicted in the photograph. Total scores are the average response and thus range from −3 to +3 with higher scores depicting a greater bias towards trusting others.

We examined the intercorrelations between the Trustworthiness Task and the AIHQ Blame score and found that the two were uncorrelated ($r = .03$, $p = .67$), supporting the separation of these two biases as orthogonal.

Social cognitive skills—The Penn Emotion Recognition Task (ER-40; Kohler *et al.*, 2003) is a 40-item assessment of emotion perception. Each item consists of a colour photograph of a face that is expressing one of four states, happy, sad, angry, afraid, or neutral. Items represent a balanced presentation of gender, age, ethnicity, and intensity of emotion expressed. Participants are instructed to identify the emotion expressed as soon as possible after seeing the face. Scores on this task range from 0 to 40, with each score representing the number of items answered correctly.

The Reading the Mind in the Eyes Task (Eyes; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) is a 36-item assessment of theory of mind. Each item is presented as the eyes region of the face expressing a complex mental state. Participants are asked to determine what mental state is being depicted. Four options are presented with each photograph.

Scores range from 0 to 36, with each score representing the number of items answered correctly.

The Bell Lysaker Emotion Recognition Task (BLERT; Bell, Bryson, & Lysaker, 1997) assesses participants' ability to correctly affect in one actor presenting the same statement with varying emotional tones: happy, sad, afraid, disgusted, surprised, angry, or neutral. Each item is a ten-second clip of the face and shoulders of a male actor expressing the same statement with one of the affective tones. Scores range from 0 to 21 on this task, with higher scores indicating the number of correctly identified items (ranging from 0 to 21).

The Hinting Task (Corcoran, Mercer, & Frith, 1995) involves participants interpreting ten brief written stories that require them to identify and make inferences involving others' mental states. Scores range from 0 to 20 on this task, with higher scores indicating better performance.

The Awareness of Social Inference Test – Social Inference: Minimal Subscale (TASIT, McDonald, Flanagan, Rollins, & Kinch, 2003) consists of Yes/No questions related to four video-taped social vignettes requiring participants to infer individual motives which may contradict verbal communication (e.g., sarcasm or 'white lies'). The TASIT is scored based on number of correct responses out of 60 possible and includes subscales that distinguish between simple sarcasm (sarcastic phrases with a meaning that matches the utterance) and paradoxical sarcasm (phrases that imply the opposite of what they appear to express). While these both require the participant to represent the internal state of the speaker to infer meaning, paradoxical items require a more complex judgment of meaning. Performance is indexed as total number correct.

Psychiatric symptoms—The Positive and Negative Syndrome Scale (PANSS, Kay, Fiszbein, & Opler, 1987) is an interview-based measure comprised of 30 items assessing for positive and negative symptoms of schizophrenia, as well as general psychopathology symptoms. These interviews were conducted and rated by experienced research assistants who were trained to adequate reliability (ICC > .80 with a gold-standard rater). In this study, we generated the five-factor solution subscales proposed by Bell, Lysaker, Beam-Goulet, Milstein, & Lindenmayer (1994): cognitive, emotional discomfort, hostility, positive, and negative symptoms, along with the specific item related to suspiciousness/persecution symptoms. Totals for each factor as calculated by Bell *et al.* (1994) are examined, as well as the specific score on the suspiciousness/persecution item separately.

Self-report of trait paranoia, aggression, and hostility—The Paranoia Scale (Fenigstein & Vanable, 1992) is a 20-item self-report scale designed to assess subclinical paranoia. Items describe traits or behaviours related to paranoia to which participants respond with a Likert scale response (scale 1–5) identifying the extent to which they identify with each item. Scores range from 20 to 100 with higher scores indicating higher levels of paranoia.

The Modified Overt Aggression Scale (MOAS, Kay, Wolkenfeld, & Murrill, 1988) is a self-reported assessment of overt aggression in four areas: verbal aggression, destruction of

property, physical aggression towards others, and auto-aggression (or aggression towards oneself). These are rated with successive points added for each degree of severity of aggression (e.g., 1 point for 'shouting angrily, cursing mildly', 2 points for 'cursing viciously or being severely insulting', etc.), and total scores are weighted according to severity of category such that total scores range from 1 to 100, with higher scores indicating higher levels of overt aggression. The MOAS was only completed in phase 4 data collection and thus is gathered on a subset of participants ($n = 47$).

The Personality Inventory for DSM-5 (PID-5, Krueger, Derringer, Markon, Watson, & Skodol, 2012) is a 220-item self-report questionnaire evaluating potentially pathological personality dimensions related to DSM-5 disorders. Items consist of statements related to behaviours or personality dimensions and Likert scale (0–3) responses for participants. In the present study, participants were administered the ten items related to the Hostility Scale of the PID-5 (PID-5-HS). Total scores thus ranged from 0 to 30, with higher scores indicating greater hostility. The PID-5 was also added at phase 4 and thus is gathered on a subset of participants ($n = 47$).

Informant report of hostile or aggressive behaviour—The Observable Social Cognition: A Rating Scale (OSCARS; Healey, Gibson, & Penn, 2015) is a rating scale of the participant's performance in a number of arenas related to social cognition, including, for example, correctly understanding others' thoughts and intentions or jumping to conclusions. There are eight items with accompanying Likert scale responses (1 = no evidence of difficulty to 7 = evidence of extreme difficulty). In this study, we used the hostility item, which assesses whether the individual has difficulty 'interpreting social interactions in a malevolent or hostile manner'. For the current study, the informant-rated scale was used. Informants were identified by the participants and were high contact clinicians, family members, or close friends.

The Specific Levels of Functioning Scale (SLOF; Schneider & Struening, 1983) is a 31-item informant-rated measure of social functioning, community functioning, and effectiveness in activities of daily living. This study examined the social acceptability subscale, which comprises the following items: regularly arguing with others, having physical fights with others, destroying property, physically abusing self, being fearful/crying/clinging, and taking property from others without permission. Ratings on the SLOF are made on a Likert scale as well (1–5, with higher scores indicating better functioning). Informants were the same as those selected for collection of the OSCARS.

Procedure

Both study phases comprised two study visits, to examine test–retest reliability of various study measures. Thus, for each participant, data collection took place across two study visits, which were separated by an interval of 2–4 weeks (mean interval = 17.02 days, $SD = 5.06$). All social cognition tasks and task blocks were counterbalanced. All data reported here are from the first visit, with the exception of PANSS time 2 data, which were collected at the second visit.

Data analytic plan—First, to examine relationships between social cognitive biases and symptoms, we planned simple Pearson correlations between each bias measure and each symptom category of the five-factor version of the PANSS (Bell *et al.*, 1994). Second, to examine whether these biases predict changes in symptom levels over time, we examined the partial correlations between each bias measure and each symptom category at follow-up controlling for the baseline level of each symptom category. Third, to examine the relationships between the bias measures and paranoia, hostility and interpersonal conflict outcomes, we computed simple Pearson correlations between each bias measure and the Paranoia Scale, the PID-5-HS, MOAS, SLOF Social Acceptability, and OSCARS Hostility subscale. Finally, to determine whether these relationships existed above and beyond the influence of symptoms, we repeated each of these correlations with outcomes as partial correlations, controlling for all five symptom categories of the PANSS (Bell *et al.*, 1994). In our exploratory analysis, we examined the predictive power of social cognitive biases above and beyond the influence of the gold-standard measures of social cognition skills by performing a hierarchical linear regression predicting all outcome variables (Paranoia Scale, OSCARS Hostility, SLOF Social Acceptability)[1] from social cognitive biases (both Trustworthiness Task and AIHQ) after having entered social cognition skill entered at step one.

Results

Relationships to psychiatric symptoms

With regard to symptoms and the AIHQ, a greater tendency to blame others was significantly related to current emotional discomfort and suspiciousness/persecution symptoms. This blame bias also demonstrated prospective relationships to emotional discomfort and hostility (and an unexpected prospective relationship to cognitive symptoms). On the Trustworthiness Task, a greater likelihood to trust others had a significant negative relationship to hostility, positive, and suspiciousness symptoms, but was uncorrelated with symptom categories prospectively. All effects were of small to moderate size. These correlations are fully reported in Table 2.

Relationships to trait hostility and paranoia

A higher tendency to blame others on the AIHQ was associated with both levels of paranoia and trait hostility. A greater tendency to trust on the Trustworthiness Task was negatively associated with self-reported paranoia. These effects were of moderate size. No other self-report measures of hostility or paranoia were collected on the sample on which the Trustworthiness Task was conducted. These correlations can be found in Table 3.

Relationships to interpersonal conflict outcomes

A greater tendency to blame others was negatively correlated with social acceptability as measured by the SLOF but was not related to the OSCARS Hostility Item. The correlation between blame and MOAS was .20 indicating a small effect; however due to the smaller

[1]PID-5 Hostility and MOAS Total were excluded because the phase during which they were collected did not include collection of the Trustworthiness Task.

sample available for the MOAS analysis, this was not statistically significant. A greater tendency to trust on the Trustworthiness Task was negatively associated with hostility reported by informants and approached significance predicting social acceptability. Data were not available examining the Trustworthiness Task correlation with self-reported aggression on the MOAS. These correlations can be found in Table 3.

We repeated these correlations controlling for all symptom categories (cognitive, emotional disturbance, hostility, negative, positive; Bell *et al.*, 1994), and AIHQ was no longer significantly related to social acceptability. All other relationships remained unchanged and of comparable magnitude with the exception of the correlation between AIHQ Blame Score and trait hostility which now qualified as a large effect ($r = .53$).

Supplemental analyses; Predicting outcomes beyond social cognition skills

To examine the extent to which social cognitive biases added variance in predicting outcomes above and beyond the measures of social cognition skills, we conducted hierarchical linear regression entering both social cognitive biases at step two after having entered all SCOPE social cognition skill variables at step 1. With regard to the Paranoia Scale ($\Delta R^2 = .17$, $p < .001$) and the OSCARS Hostility Item ($\Delta R^2 = .06$, $p = .004$), social cognition biases added significant variance beyond the influence of all SCOPE social cognition skills measures. Further, the relationship between social cognition skill predictors and the Paranoia Scale only approached significance ($p = .06$). However, social cognitive bias measures did not significantly improve model fit in models predicting the SLOF Social Acceptability Scale ($\Delta R^2 = .02$, $p = .15$). These full analyses can be found in the Table S1.

Discussion

The present study examined the utility of the hostile attribution bias and distrust bias in schizophrenia by assessing the convergent and predictive validity of the AIHQ Blame Score and Trustworthiness task. Results supported hypotheses that social cognitive bias would provide information about symptoms, cognition, and functioning. In general, these biases showed relationships to positive, hostility, suspiciousness, and emotional discomfort symptoms, as well as outcomes related to hostility, paranoia, and interpersonal conflict. Relationships were strongest for more proximal outcomes (e.g., reports of hostility or paranoia) and were weaker for distal outcomes (e.g., informant reports of functioning). Social cognitive biases also added variance in predicting some interpersonal conflict outcomes above and beyond social cognition skills. Generally, the present study provides evidence in support of continued study of these biases; each appears to contribute its own specific information related to clinical and functional outcomes.

A tendency to interpret others' actions as intentional and to react with feelings of anger and blame was related to current clinician-rated emotional discomfort and suspiciousness, self-reported paranoia and personal feelings of hostility, an informant's report of the client's social acceptability, and future emotional discomfort and hostility. Controlling for all symptom categories, this bias also remained significantly related to self-reported hostility and paranoia. Such a hostile attribution bias appears to coincide with negative affective symptoms and exaggerate cognitions related to hostility and paranoia. This bias might

potentially exacerbate symptoms over time as well, suggesting that when individuals are biased towards hostile social information, they experience more distress and express greater hostility and paranoia. This relationship is not wholly explained by symptoms, however, as the relationship of hostile attribution bias to reports of hostility and paranoia persist when controlling for all categories of psychiatric symptoms.

A distrust bias on the Trust task was related to present levels of clinician-rated hostility, suspiciousness and positive symptoms, but had no prospective relationships to symptoms. A bias to distrust others also was related to levels of self-reported paranoia and informant reports of hostility, and these relationships persisted when controlling for all symptom categories. This tendency to rate others as unworthy of trust may relate to paranoid or hostile thoughts about others in general. Interestingly, it captures some aspects of paranoia and hostility that are not accounted for in a comprehensive interview of psychiatric symptoms.

Our supplemental analyses examined the specific contributions of social cognitive biases to interpersonal conflict outcomes. Indeed, social cognitive biases improved variance above and beyond all gold-standard SCOPE measures of social cognition skills (Pinkham *et al.*, 2016) in predicting informant rated hostility and self-rated paranoia. Importantly, all social cognitive skill measures together did not predict self-reported trait paranoia, whereas social cognitive biases were highly predictive of this. However, again, the more distal outcome of social acceptability as rated by informants was not significantly predicted by either social cognitive skill or social cognitive biases.

The present study is limited primarily by its correlational nature. No conclusions can be drawn about the directionality of the relationships of these biases to functioning. Secondly, as most outcomes involve pencil-and-paper self-report, it could be argued that method invariance contributes to significant relationships (e.g., between the AIHQ and Paranoia scales). However, although both measures involve pencil-and-paper self-report, the AIHQ and Trustworthiness Task differ from all outcomes collected in that they present hypothetical cues prompting individuals to provide interpretations. Thus, we believe relationships between these measures and outcomes and outcomes provide additional information about the nature of disorder processes. Third, with regard to predicting symptom changes, a 2-to-4 week interval is brief, and ideally, measurements of clinical traits should not fluctuate widely over this time period. This may have limited our ability to test the predictive power of social cognitive biases; however, the fact that some relationships were found does demonstrate both a strength of social cognitive bias and a potential limitation of symptom interviews. Fourth, not all outcomes were collected at all phases of the study; thus, no information is provided related to the relationship of the distrust bias to one measure of interpersonal conflict and one hostility questionnaire. Finally, because initial SCOPE research questions did not examine relationships to interpersonal conflict outcomes, criterion measures in this area are subscales, and thus not an optimal choice. As a result, while the present study is a fine-grained review of these biases, it is not a comprehensive one. Continued research should examine the relationship of social cognitive bias to full interpersonal conflict and engagement measures.

Overall, as a follow-up to the findings in SCOPE (Pinkham *et al.*, 2016), this analysis suggests that social cognitive biases are worthy of future study. First, social cognitive biases do show relationships to functional outcomes that are more consistent with their theoretical basis. These relationships were weaker than those with assessments of symptoms, paranoid, and hostile thinking, although this is consistent with prior conclusions that cognitive performance variables are more robustly related to proximal rather than distal outcomes (Green, Kern, & Heaton, 2004). While no conclusions about directionality can be drawn, this implies that these biased thinking patterns emerge with interpersonal difficulties. Second, hostile attribution bias predicted changes in symptom levels over a brief interval. This suggests that these biases might play a contributory role to symptoms and also that assessment and treatment of this domain could aid interventions to prevent decompensation. Third, social cognitive bias measures provided additional information related to hostility and paranoia that was not captured by traditional, interview-based symptom assessment. This calls for continued work to develop an understanding of the relationship between social cognition and symptoms. Specifically, research should identify the ways in which the two domains are overlapping and/or separable. While an improved model of what is measured by 'non-symptom' hostility or paranoia in psychosis should be developed, it is of note that social cognitive bias yields information about this construct. In this way, these biases appear to provide information about personality characteristics or traits not regarded as clinical symptoms, but still relevant to functioning. Finally, social cognitive biases provide additional information not provided by social cognition skill measures in predicting criterion outcomes more consistent with theoretical models of social cognitive biases. This provides particular support for the study of social cognitive biases in the continued study of the relationship of social cognition with functioning in schizophrenia.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Practitioner points

- Hostile attribution bias may play a role in important outcome variables given relationships to emotional discomfort and suspiciousness symptoms, trait paranoia and hostility, interpersonal conflict, as well as prospective hostility symptoms.
- Distrust bias may also impact real-world functioning, as it is related to hostility, suspiciousness, and positive symptoms, trait paranoia, and hostility.
- Relationships of social cognitive biases to interpersonal conflict outcomes exist independently of interview-rated symptoms and persist above and beyond the influence of social cognitive skills, which appear to demonstrate weaker relationships to these outcomes.
- Understanding and assessing the individual's biases towards distrust or blame might help practioners predict interpersonal conflict and future increases in symptoms.

Table 1

Demographic characteristics and social cognition variable totals in the full sample (n = 220)

	n* or *M	**% or *SD***
Demographics		
Age (in years)	42.26	11.91
Gender		
Male	138	62.7%
Female	82	37.3%
Race		
African American	119	54.1%
American Indian/Alaskan Native	1	0.5%
Caucasian	88	40.0%
Asian American	5	2.3%
Other	7	3.2%
Ethnicity		
Hispanic	45	20.5%
Non-Hispanic	175	79.5%
Years of Education (n = 220)	12.67	2.18
Social cognitive bias		
AIHQ Blame Score (n = 220)	8.83	2.87
Trustworthiness Task (n = 179)	−0.08	1.14

Table 2

Concurrent (Pearson correlations) and prospective (partial correlations with Time 2 symptoms controlling for Time 1 symptom variable) relationships between social cognitive bias measures and the five-factor derived PANSS scores from Bell *et al.* (1994) in the schizophrenia sample

	AIHQ		Trustworthiness	
	Current (*n* = 219)	**Prosp. (*n* = 209)**	**Current (*n* = 178)**	**Prosp. (*n* = 171)**
PANSS – Cognitive	−.07	.15*	−.02	.04
PANSS – Emotional Discomfort	.21**	.14*	−.11	.12
PANSS – Hostility	−.02	.21**	−.21**	−.07
PANSS – Suspiciousness/ Persecution	.16*	.10	−.27***	−.01
PANSS – Negative	.01	.02	−.09	.09
PANSS – Positive	.11	.10	−.21**	.02

Notes.

* $p < .05$;

** $p < .01$;

*** $p < .001$.

PANSS cognitive and PANSS negative totals are greyed out as these categories are not hypothesized to be significantly predicted by either the Trustworthiness Task or the AIHQ. One participant did not complete his/her PANSS interview at visit 1, and 10 participants did not complete the PANSS interview at visit 2 (8 of whom were a part of the cohort that completed the Trustworthiness Task); thus, participant totals vary from the overall total and are displayed in the above table.

Table 3

Criterion analyses of measures of social cognitive bias in the schizophrenia sample

	Social cognition Bias	
	AIHQ Blame	**Trustworthiness Task**
Trait questionnaires – Paranoia and Hostility		
Paranoia Scale Total	.31***	−.28***
PID-5 – Hostility Scale#	.47**	#
Real-world outcomes – Aggressive Behaviour		
MOAS Total# (self-report)	.27^	#
SLOF – Social Acceptability (informant report)	−.14*	.13^
OSCARS – Hostility Item (informant report)	.12^	−.21**

Notes.

^ $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

The MOAS and PID-5 were added to the SCOPE battery for the pilot testing of phase 4, a phase during which the Trustworthiness Task was not collected. Thus, the correlations listed here for the MOAS and PID-5 are for 41 participants, none of whom completed the Trustworthiness Task. The sample sizes for the remaining AIHQ Blame analyses are as follows: Paranoia Scale ($n = 220$), SLOF Social Acceptability ($n = 216$), OSCARS Hostility ($n = 215$). For Trustworthiness analyses, samples sizes are as follows: Paranoia Scale ($n = 179$), SLOF Social Acceptability ($n = 177$), OSCARS Hostility Item ($n = 177$).