COGNITIVE NEUROPSYCHIATRY
2007, 12 (2), 128–143

Psychology Press
Taylor & Francis Group

The Ambiguous Intentions Hostility Questionnaire (AIHQ): A new measure for evaluating hostile social-cognitive biases in paranoia

Dennis R. Combs

Department of Psychology, University of Tulsa, Tulsa, OK, USA

David L. Penn, Melanie Wicher, and Evan Waldheter

Department of Psychology, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Introduction. This study reports on the development of a new measure of hostile social-cognitive biases for use in paranoia research, the Ambiguous Intentions Hostility Questionnaire (AIHQ). The AIHQ is comprised of a variety of negative situations that differ in terms of intentionality. Items were developed to reflect causes that were ambiguous, intentional, and accidental in nature.
Methods. Participants were 322 college students who completed the AIHQ along with measures of paranoia, hostility, attributional style, and psychosis proneness. The reliability and validity of the AIHQ was evaluated using both correlational and multiple regression methods.
Results. The AIHQ had good levels of reliability (internal consistency and interrater reliability). The AIHQ was positively correlated with paranoia and hostility and was not correlated with measures of psychosis proneness, which supported the convergent and discriminant validity of the scale. In addition, the AIHQ predicted incremental variance in paranoia scores as compared to the attributional, hostility, and psychosis proneness measures. Ambiguous items showed the most consistent relationships with paranoia.
Conclusions. The AIHQ appears to be a reliable and valid measure of hostile social cognitive biases in paranoia. Recommendations for using the AIHQ in the study of paranoia are discussed.

Correspondence should be addressed to Dennis R. Combs, Department of Psychology, Lorton Hall, Room 308, University of Tulsa, 600 South College Ave., Tulsa, OK 74104, USA. E-mail: dennis-combs@utulsa.edu

The authors appreciate the input of Kenneth Dodge, PhD during the initial development of The AIHQ. We also thank the members of Dr Penn's laboratory who coded the AIHQ for the analyses. Preparation of this manuscript was supported by a Faculty Summer Development Fellowship from the University of Tulsa to DC. Copies of the AIHQ can be obtained from Dennis R. Combs at the above address.

http://www.psypress.com/cogneuropsychiatry DOI: 10.1080/13546800600787854

Research on paranoia and persecutory delusions has emphasised the social-cognitive deficits and biases associated with these clinical conditions (Penn, Corrigan, Bentall, Racenstein, & Newman, 1997). Individuals with persecutory delusions tend to make decisions using less evidence (i.e., jumping to conclusions bias) on probabilistic and social reasoning tasks and are impaired on Theory of Mind (ToM) tasks when inferring the intentions and motivations of others (Garety & Freeman, 1999; Moritz & Woodward, 2005). In addition, persons with persecutory delusions differ in attributional style relative to control participants (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001). Attributional style refers to the manner in which a person generates causal explanations for positive and negative outcomes, and may be a precursor to the formation of persecutory delusions (Bentall, 2001). Persons with persecutory delusions tend to exhibit a "personalising" bias in which they tend to blame others rather than situations for negative outcomes (Kinderman & Bentall, 1996, 1997). This personalising bias appears to be more characteristic of the paranoid thought process than other attributional biases (i.e., externalising biases; Garety & Freeman, 1999). There has been much debate about the function of attributions in paranoia. Previous theories have proposed that external attributions protect the self from negative evaluations (reduce self-discrepancies), but this idea has not had consistent research support (see Bentall et al., 2001, for a review). Current models of attributions emphasise the dynamic and reciprocal interaction between events, attributions, and self-representations (Bentall et al., 2001).

A limitation of research that has examined social cognitive biases in paranoia is that none have evaluated a core feature of paranoia, namely the tendency to infer/perceive hostility where none exists (Freeman & Garety, 2004). Extant measures of social-cognitive biases in paranoia, such as the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) and the Internal, Personal, Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) measure the locus of social cognitive biases (e.g., whether a particular outcome is caused by oneself, others, or situations), not whether a perceived threat is present and intended, which is important in paranoia. In addition, current measures of hostility such as the Buss-Durkee Hostility Scale (Buss & Durkee, 1958), and the Aggression Questionnaire (Buss & Perry, 1992) assess self-reported *feelings* of hostility (e.g., I feel resentful and angry) rather than *perceived* hostility (i.e., whether others are acting in a hostile manner toward oneself). Finally, neither the IPSAQ nor the ASQ evaluate social cognitive biases for outcomes in which intention is ambiguous. Although there are a number of scales that measure hostile social cognition according to the intentionality of the situation, these scales were developed for children (de Castro, Slot, Bosch, Koops, & Veerman, 2003; Graham, Hudley, & Williams, 1992). Tremblay and Belchevski (2004)

developed a scale that measures the presence of behavioural aggression for intentional, ambiguous, and unintentional situations, but this scale does not measure the hypothesised hostile social-cognitive biases found in paranoia, and it focuses on trait aggression as a personality characteristic.

Research suggests that it is in ambiguous situations, where situational cues are lacking, that social cognitive biases may be strongest. For example, in hypothetical situations with negative outcomes, aggressive and emotionally disturbed youth (i.e., those with conduct disorder) were more likely than controls to demonstrate the presence of a hostility bias (i.e., a tendency to infer hostile intent in others' behaviour) for ambiguous situations (Crick & Dodge, 1994). A similar hostility bias has been observed in social anxiety (Constans, Penn, Ihnen, & Hope, 1999), in response to racism (Combs, Penn, et al., 2006), among children, adolescents, and adults high in aggression (de Castro et al., 2003; Epps & Kendall, 1995; Graham et al., 1992), and in individuals who aggress on the road (Mathews & Norris, 2002) and in the workplace (Homant & Kennedy, 2003). Therefore, a social cognitive bias to interpret hostility, where none exists, has been demonstrated across a variety of samples and contexts.

The above findings are consistent with theoretical accounts of persecutory delusions, which posit that ambiguous situations are difficult to interpret and may be misperceived as hostile and threatening (Freeman, Dunn, et al., 2005; Freeman & Garety, 2003; Freeman, Garety, Kuipers, Fowler, & Bebbington, 2002; Green & Phillips, 2004; Turkat, Keane, & Thompson-Pope, 1995). That may be one reason why persons with persecutory delusions (or persecutory ideation) spend extra time looking at ambiguous scenes (Phillips, Senior, & David, 2000), and why they perceive neutral experimenter behaviour in a negative manner (Combs & Penn, 2004). And, in fact, the perception of threat has also been found in ambiguous social interactions in a virtual reality environment (Freeman, Garety, Bebbington, Slater, et al., 2005). Therefore, a measure that includes negative outcomes of ambiguous intent may enhance our understanding of social cognition and paranoia.

The purpose of this study was to examine the psychometric properties of a new measure sensitive to hostile social cognitive biases in paranoia: the Ambiguous Intentions Hostility Questionnaire (AIHQ) in a sample of nonclinical participants. The use of a nonclinical sample is justified by findings indicating that similar social-cognitive biases and behavioural characteristics are present in both clinical and nonclinical samples, which supports the idea that paranoia and other psychotic-like symptoms exists on a continuum (Combs, Michael, & Penn, 2006; Combs, Penn, & Mathews, 2003; Costello, 1994; Ellett, Lopes, & Chadwick, 2003; Freeman, Dynn, et al., 2005; Johns & van Os, 2001; Martin & Penn, 2001). We examined convergent validity of the AIHQ by assessing the association between the

AIHQ with measures of paranoia, hostility, and attributional style. We hypothesised that a greater hostility bias, particularly for situations of ambiguous intent, will be associated with higher paranoia, hostility, and a personalising bias on the IPSAQ. To assess discriminant validity, we examined the association between the AIHQ with measures of psychosis proneness (i.e., the Chapman Perceptual Aberration Scale; Chapman, Chapman, & Raulin, 1976; Magical Ideation Scale; Eckbald & Chapman, 1983), as they have not been theoretically linked to hostility. Finally, to lend support to the construct validity of the AIHQ, we examined whether the AIHQ contributes incremental variance to the prediction of paranoia beyond that associated with attributional, hostility, and psychosis proneness measures.

METHOD

Participants

A total of 322 undergraduate college students participated in the study. The sample comprised 166 males and 156 females. With respect to ethnicity, there were 219 Caucasian participants and 103 non-Caucasian participants. The mean age and educational level of the sample was 19.55 ($SD = 1.23$) and 13.67 years ($SD = 0.23$), respectively.

Measures

The Ambiguous Intentions Hostility Questionnaire. Two academic psychologists who have conducted research on attributional style and psychosis (DRC and DLP) generated 25 short vignettes that reflected negative outcomes that varied in intentionality (i.e., intentional, accidental, and ambiguous intentions). Negative situations were specifically chosen due to their relevance in the paranoid thought process. These 25 vignettes were administered to a sample of 200 undergraduate students who were asked to rate each of them on a 1–7 intentionality scale, anchored by 1 (“accidental”) and 7 (“intentional”); the midpoint (4) was labelled as “uncertain”. The five situations with the highest ratings were labelled as “intentional situations.” These situations had mean intentionality ratings of 6.25, 6.28, 6.31, 6.47, and 6.55. The five situations with an average closest to the mid-point of 4 were labelled as “ambiguous situations”. These situations had mean intentionality ratings of 3.89, 3.89, 3.95, 4.00, and 4.23. The five situations with the lowest ratings were labelled as the “accidental situations”. These situations had mean intentionality ratings of 1.31, 1.61, 1.65, 1.75, and 2.22. These 15 situations comprised the final version of the AIHQ (see Tremblay & Belchevski, 2004, for a similar process of item selection).

The final 15-item version of the AIHQ was completed in the following manner (a copy of the AIHQ and scoring criteria can be obtained from the authors). First, participants were asked to read each vignette, to imagine the scenario happening to her or him (e.g., "You walk past a bunch of teenagers at a mall and you hear them start to laugh"), and to write down the reason why the other person (or persons) acted that way toward you. Two independent raters subsequently coded this written response for the purpose of computing a "hostility index" (described below). The participant then rated, on Likert scales, whether the other person (or persons) performed the action on purpose (1 "definitely no" to 6 "definitely yes"), how angry it would make them feel (1 "not at all angry" to 5 "very angry"), and how much they would blame the other person (or persons) (1 "not at all" to 5 "very much"). Finally, the participant was asked to write down how she or he would respond to the situation, which was later coded by two independent raters to compute an "aggression index" (described below). The AIHQ items, Likert scales, scoring methods, and use of both participant-rated and independent-rater coding were modelled on previous scales designed to measure hostile social-cognitive biases in children (de Castro et al., 2003; Graham et al., 1992).

For the hostility and aggression indices, two research assistants independently rated each participant's responses on 5-point Likert scales. Prior to rating the AIHQ, the raters were provided examples of high and low scores on the Hostility and Aggression indices (see Combs, Penn, et al., 2006). The scales for the hostility and aggression indices were from 1 ("not at all hostile") to 5 ("very hostile"), and 1 ("not at all aggressive") to 5 ("very aggressive"), respectively. Consistent with current research, the aggression index ratings included ratings for both verbal and physical aggression in the scoring criteria (Buss & Perry, 1992). Across the intentional, ambiguous, and accidental situations, the average intraclass correlation coefficients (ICCs) were high for both the hostility bias (range .91–.99) and aggression bias ratings (range .93–.99).

As the three items pertaining to participant ratings of intentionality, blame, and anger were highly intercorrelated (all rs $>.70$), we collapsed across these three items and computed a mean score of "blame", for the intentional, ambiguous, and accidental situations separately. The blame scores showed good levels of internal consistency for intentional (alpha = .85), ambiguous (alpha = .86), and accidental situations (alpha = .84).

Internal, Personal, and Situational Attributions Questionnaire. The Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) is a 32-item questionnaire that is comprised of 16 positive social situations and 16 negative social situations. The participant has to select if the outcome (e.g., someone pays them a complement) is due

to them (internal attribution), other people (external-personal attribution), or situational factors (external-situational attribution). The primary index of performance on the IPSAQ for this study was computation of a "Personalising Bias" (PB), which reflects the tendency for the person to blame others, rather than situations, for negative outcomes. We used the personalising bias instead of the externalising bias score, as the former is more characteristic of attributional style in paranoia (Garety & Freeman, 1999). For this study, the IPSAQ had an adequate level of internal consistency (alpha = .70).

Paranoia Scale. The Paranoia Scale (PS; Fenigstein & Vanable, 1992) is a 20-item scale that measures nonclinical paranoid ideation that results from normal everyday experiences. The PS is scored on a 1–5 Likert scale with scores ranging from 20 to 100. Higher scores reflect higher levels of nonclinical paranoia. Although the PS was developed for use in analogue samples and was not intended for diagnostic use, it has been used in clinical samples (Smari, Stefansson, & Thorgilsson, 1994). The scale has demonstrated good internal consistency (alpha = .84) and stability ($r = .70$), and has been shown to be sensitive to experimental manipulations of paranoia, such as two-way mirrors (Fenigstein & Vanable, 1992). For the current study, the PS showed good internal consistency (Cronbach's alpha = .87).

Structured Clinical Interview for DSM-IV Personality Screening Questionnaire–II. The Structured Clinical Interview for the DSM-IV Personality Screening Questionnaire–II (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1995) is a 110 item-screening test that assesses for the presence of personality characteristics based on DSM-IV criteria. In the present study, items that reflected the DSM-IV paranoid personality disorder were used. Items are scored in a dichotomous "yes" or "no" format. Responses are then summed to give a total score for the subscale. The SCID-II paranoia subscale scores can range from 0 to 8 with higher scores reflecting more of the personality characteristic being assessed. The SCID-II screening questionnaire has good reliability and validity data (Ekselius et al., 1994; Jacobsberg, Perry, & Frances, 1995). For the current study, the internal consistency of the SCID-II paranoia subscale was moderate (alpha = .68).

Paranoia/Suspiciousness Questionnaire. The Paranoia/Suspiciousness Questionnaire (PSQ; Rawlings & Freeman, 1996) is a 47-item scale designed to measure paranoid ideation in nonclinical samples. For this study, we used the hostility subscale score to measure hostility (i.e., "I feel bitter about things"). Although we acknowledge the relationship between paranoia and hostility, we chose this subscale to provide a measure of hostility that is relatively independent (based on factor analysis) from the other components

of paranoia (e.g., anger, wariness, negative affect; see Morey, 1991; Rawlings & Freeman, 1996). The hostility subscale contains 15 items and participants answer each item using a "yes" or "no" format. Hostility subscale scores range from 0 to 15 and higher scores indicate greater levels of hostility. The PSQ was developed using both item analysis and factor analytic methods in a large sample of undergraduate students ($N = 561$). In previous research, the PSQ demonstrated excellent internal consistency (alpha = .89) and test-retest reliability over a 12-week period was good ($r = .82$; Rawlings & Freeman, 1996). For the current study, the PSQ hostility subscale score showed good internal consistency (Cronbach's alpha = .82).

Psychosis proneness. The Chapman Perceptual Aberration scale (Chapman et al., 1976) and the Chapman Magical Ideation scale (Eckbald & Chapman, 1983) measure the presence of unusual beliefs and experiences among nonclinical participants. The Perceptual Aberration scale is a 35-item scale that measures psychotic-like sensory experiences; items are rated using a "yes" or "no" format. The Magical Ideation scale is a 30-item scale that measures the presence of unusual beliefs and thoughts and are also rated using a "yes" or "no" format. The Chapman Scales have a long history of use in the psychosis proneness research and have demonstrated excellent reliability and validity. In the present study, the internal consistency of the Perceptual Aberration scale (alpha = .88) and Magical Ideation scale (alpha = .82) were very good.

Procedure

The participants enrolled for a study entitled "Forming Impressions of Others" using a university-based research computerised sign-up system. Each participant received a packet of questionnaires, which averaged about 2 hours for completion. All participants received 2 hours of credit for their participation.

RESULTS

Summary scores and scale properties

Means scores for the study measures are presented in Table 1. Scores on the PS (kurtosis = 0.74, skewness = 1.0), SCID paranoia (kurtosis = −0.32, skewness = 0.57, and Magical ideation (kurtosis = −0.31; skewness = 0.43) scales showed acceptable levels of kurtosis and skewness ($< +/- 1$; Peters, Joseph, & Garety, 1999). Consistent with previous research, scores from the Perceptual Aberration Scale were non-normal (kurtosis = 1.4) and positively

TABLE 1
Summary of measures

Measure	*Mean (SD)*	*Sample range*
Paranoia scale	40.7 (11.2)	20–86
SCID Paranoia	2.8 (2.0)	0–8
PSQ Hostility subscale	5.6 (2.8)	0–12
IPSAQ Personalising Bias index	0.59 (0.25)	0–1
Perceptual Aberration	6.7 (6.0)	0–29
Magical Ideation	9.8 (5.4)	0–27
AIHQ Index scores		
Blame Ambiguous	3.0 (0.67)	1.0–4.6
Blame Intentional	4.3 (0.55)	2.3–5.3
Blame Accidental	2.0 (0.49)	1.0–3.7
Hostility Ambiguous	2.5 (0.68)	1.0–4.3
Hostility Intentional	3.5 (0.88)	1.4–5.0
Hostility Accidental	1.1 (0.22)	1.0–2.3
Aggression Ambiguous	2.0 (0.36)	1.0–3.0
Aggression Intentional	2.4 (0.56)	1.2–4.4
Aggression Accidental	1.3 (0.33)	1.0–3.0

PSQ = Paranoia/Suspiciousness Questionnaire; IPSAQ = Internal, Personal, and Situational Attributions Questionnaire; AIHQ = Ambiguous Intentions Hostility Questionnaire.

skewed (skewness = 1.3), but because this reflects a population characteristic we did not transform this score (see Bell, Halligan, & Ellis, 2006; Johns & van Os, 2001). Since the Paranoia scale and SCID Paranoia subscale were significantly correlated ($r = .60$, $p = .0001$) and to reduce the number of paranoia measures, a composite paranoia score was computed by transforming the scores into standardised Z-scores and then computing a mean. This composite paranoia score was used in the analyses as our dependent variable of interest. Based on the range of paranoia scores presented in Table 1, the sample contained participants with high and low levels of paranoia (see Combs & Penn, 2004, for comparison scores on paranoia measures).

Since paranoia and psychotic-like symptoms tend to be higher among non-Caucasian and male participants (Combs, Penn, et al., 2006; Combs, Penn, & Fenigstein, 2002; Spauwen, Krabbendam, Lieb, Wittchen, & van Os, 2003), we examined the effect of gender and ethnicity on these measures: Non-Caucasian participants showed significantly higher paranoia scores than Caucasian participants (Z-score $M = 0.24$ vs. $M = -0.10$), $t(309) = 3.2$, $p = .001$. In terms of gender, males showed higher paranoia scores than females ($M = 0.09$ vs. $M = -0.11$), $t(318) = 2.2$, $p = .02$. We also examined gender and ethnic differences on the AIHQ Blame, Hostility, and Aggression scores. Non-Caucasian participants showed greater Blame scores for accidental situations than Caucasians ($M = 2.1$ vs. $M = 1.9$), $t(307) = 2.7$,

$p = .006$; no other ethnic differences on the AIHQ were found. For gender, males showed greater Hostility scores for ambiguous ($M = 2.9$ vs. $M = 2.4$), $t(307) = 3.4$, $p = .001$, and intentional situations ($M = 3.9$ vs. $M = 3.6$), $t(307) = 2.8$, $p = .005$, and greater aggression scores for intentional situations ($M = 2.5$ vs. $M = 2.3$), $t(307) = 2.2$, $p = .02$; no other gender differences on the AIHQ were found.

Because we expected "intentional" items to show higher scores (on blame, hostility, and aggression) than "ambiguous" and "accidental" items, we conducted a series of repeated measures ANOVAs to examine participants' ratings across AIHQ scores. The analyses revealed that Blame scores were significantly higher for intentional situations than ambiguous and accidental ones, $F(2, 626) = 2693$, $MSE = 0.167$, $p < .0001$. Similarly, hostility, $F(2, 642) = 1617$, $MSE = 0.297$, $p < .0001$, and aggression, $F(2, 642) = 777$, $MSE = .134$, $p < .0001$, biases were higher for intentional situations than both ambiguous and accidental ones.

Convergent and discriminant validity analyses

The correlations for the AIHQ, paranoia, hostility, IPSAQ, and psychosis proneness measures are presented in Table 2. Due to the number of correlations, a corrected probability level was set a priori at .001 (i.e., .05/45), and correlations falling above that level were considered to be nonsignificant.

Support was found for the convergent validity of the AIHQ. As predicted, a greater tendency to blame others across ambiguous, intentional, and accidental situations was significantly associated with higher levels of paranoia and hostility as measured by the PSQ. To detect differences among the correlation coefficients for Blame, paranoia, and hostility, we used Steiger's Z-test for dependent correlations (based on the r to z transformation; Steiger, 1980). The results showed that the correlation coefficients between Blame scores for ambiguous situations were significantly higher than those for intentional and accidental situations for both paranoia and hostility (all Z-scores $2.0+$, $p < .05$). Thus, there was a stronger relationship between blame with paranoia and hostility when the situation was ambiguous in intent. In addition, greater ratings on the Hostility index for ambiguous situations were significantly correlated with higher levels of paranoia. Finally, a greater Aggression index rating for accidental situations was associated with higher levels of paranoia.

With respect to discriminant validity, as expected, there were no significant relationships between the AIHQ and the Chapman Perceptual Aberration and Magical Ideation Scales at corrected probability levels.

TABLE 2
Validity correlations of the AIHQ

Measure	*Blame Ambiguous*	*Blame Intentional*	*Blame Accidental*	*Hostility Ambiguous*	*Hostility Intentional*	*Hostility Accidental*	*Aggression Ambiguous*	*Aggression Intentional*	*Aggression Accidental*
Convergent measures									
Paranoia	.442**	.263**	.292**	.289**	.065	.120	.122	.140	.210**
PSQ Hostility	.354**	.251**	.219**	.122	−.043	.070	.146	.112	.120
IPSAQ PB	.117	.060	−.012	.015	.022	.035	.009	−.021	−.032
Discriminant measures									
Perceptual Aberration	.128	−.015	.131	.067	.033	.156	.072	.042	.108
Magical Ideation	.085	−.008	.06	−.024	−.103	.125	.132	.115	.059

PSQ = Paranoia Suspiciousness Questionnaire; IPSAQ PB = Internal, Personal, and Situational Attributions Questionnaire Personalising Bias index.
**$p < .001$ (corrected p level).

Construct validity analyses

A hierarchical regression analysis was conducted to examine the construct validity of the AIHQ. We expected that the AIHQ would predict incremental variance in paranoia scores above that accounted for by gender, ethnicity, the IPSAQ, PSQ hostility subscale, and psychosis proneness measures. Gender and ethnicity were included based on the importance of these variables in paranoia (see results above). From the AIHQ, we chose to enter the Blame, Hostility, and Aggression index scores for ambiguous situations due to the hypothesised importance of ambiguity in paranoia. The dependent variable in the analysis was the composite paranoia score.

Gender and ethnicity was entered in Block 1 and accounted for a significant amount of variance in paranoia scores, $R = .207$, $R^2 = .043$, $F(2, 296) = 6.6$, $p = .002$. Block 2 consisted of the IPSAQ PB score, PSQ hostility subscale score, and the PA and MI scales, and was found to be statistically significant, $R^2 = .439$, $R^2\ \Delta = .396$, $F(3, 292) = 51.0$, $p = .0001$. Block 3 consisted of the AIHQ Blame, Hostility, and Aggression scores for ambiguous situations and predicted significant amount of incremental variance over Blocks 1 and 2, $R^2 = .495$, $R^2\ \Delta = .06$, $F(3, 289) = 10.2$, $p = .0001$. Significant individual predictors of paranoia scores were PSQ hostility subscale score ($p = .0001$), ethnicity ($p = .001$), AIHQ Blame score for ambiguous situations ($p = .001$), and AIHQ Hostility bias score for ambiguous situations ($p = .009$). No other variables emerged as significant predictors of paranoia.

DISCUSSION

The purpose of this study was to report on the development and psychometric properties of a new measure of hostile social cognitive bias in paranoia, the Ambiguous Intentions Hostility Questionnaire (AIHQ). Regarding the reliability of the AIHQ, the scale demonstrated very good levels of internal consistency for self-rated Blame scores and the interrater reliability of the hostility and aggression index scores were excellent. Based on these results, the AIHQ appears to be a reliable measure.

The validity evidence for the AIHQ supports its use as a novel measure of hostile social-cognitive bias in paranoia. In terms of the convergent validity, we expected the AIHQ to positively correlate with paranoia, hostility, and a personalising attributional style. As predicted, we found that the self-rated Blame scores for ambiguous situations had stronger relationships with paranoia and hostility than responses to intentional and accidental situations (see Freeman et al., 2002). However, these differences are based on Steiger's Z and should be interpreted cautiously as inferential statistical

methods are generally lacking for this type of analysis. Thus, in situations where contextual cues regarding intention are lacking, persons with higher levels of paranoia tend to perceive more hostility and assign more blame to others for the negative outcomes (Combs & Penn, 2004; Turkat et al., 1995). The validity evidence for the AIHQ hostility index was mixed as the hostility index for ambiguous situations was significantly related to paranoia, but not significantly related to hostility as measured on the PSQ. This may reflect differences between perceived hostility, which is more cognitive in nature and measured by the AIHQ, as compared to self-reported feelings of hostility, which are more emotional. Such a distinction is consistent with psychometric studies of hostility measures (Buss & Perry, 1992; Whaley, 2004).

The aggression index showed weak relationships with paranoia and hostility. It is possible that the use of nonclinical participants, who will have lower rates of aggressive behaviours than clinical samples due to lower base rates of aggression or a social desirability bias (not measured in the current study), may have influenced the results. Unexpectedly, there was a weak relationship between the AIHQ and the IPSAQ. However, the AIHQ measures whether perceived hostility is present while the ISPAQ measures the locus of attributional judgements (self, others, situations) and thus may be less comparable.

The discriminant validity of the scale was supported as the AIHQ was not related to psychosis proneness. Thus, the scale seems to specifically measure hostility and blame and not the presence of unusual beliefs and experiences. Finally, the construct validity of the AIHQ was strongly supported by the hierarchical regression results. The AIHQ Blame scores predicted incremental variance in paranoia scores over gender, ethnicity, the IPSAQ, and the two psychosis proneness measures. More importantly, it predicted significant variance after accounting for a measure of hostility, and both the Blame and Hostility index scores for ambiguous situations were significant individual predictors of paranoia.

Based on the results of this study, we can offer a few recommendations on the use and interpretation of the AIHQ. The data supports the use of the AIHQ as a measure of hostile social cognitive bias in paranoia and the scale seems to capture the blame and perceived hostility found in paranoia, a bias distinct from attributional style (locus of blame). Ambiguous items appear to be more sensitive to paranoia than intentional and accidental items, which support their use in paranoia research. In addition, the participant rated scores (Blame) had more consistent relationships with paranoia than the rater-derived scores (Hostility and Aggression indices). This is consistent with research on the importance of subjective perceptions/interpretations of the intentions and motives of others in paranoia (Bentall et al., 2001; Freeman & Garety, 2004). There has been mixed evidence on the usefulness of rater-derived scores in attributional research and it can be argued that

independent raters may not process these responses in the same manner as do the actual participants (see Bentall et al., 2001; Martin & Penn, 2002).

There are several limitations of the study that should be addressed. First, we did not collect data on the test-retest stability of the AIHQ. Bentall et al. (2001) argued that attributions may be a dynamic construct that can vary over time and that developing attributional measures that have good temporal stability may be difficult. Although most of the research on the temporal stability of attributions comes from mood disorders, there has been little study of this issue in paranoia research (Bentall, 2001). Nevertheless, this is an important component of the test development process and should be pursued in future research. Second, although the use of nonclinical samples is becoming more common in paranoia research due to the performance similarities on social-cognitive measures between subclinical and clinical samples (Combs & Penn, 2004; Combs et al., 2003), it is critical that the AIHQ be validated in clinical samples. In fact, preliminary findings have been promising, as the AIHQ has been shown to be predictive of violence and aggression among inpatients with schizophrenia (Waldheter, Jones, Johnson, & Penn, 2005) and it is sensitive to a treatment program for schizophrenia designed to improve social cognition (Penn et al., 2005). Thus, the AIHQ seems to possess clinical validity as the responses on the scale are linked to actual behaviours. Thirdly, the use of self-report measures of paranoia may be problematic as the Paranoia Scale contains a few items that may not directly assess paranoia (e.g., "my family finds fault with me and people often disappoint me"), which may lead to an overendorsement of paranoid characteristics. However, in previous research, the paranoia measures used in this study have been subjected to external validation in the form of a greater expression of paranoid behaviours and less effective coping strategies (Combs & Penn, 2004; Freeman, Garety, Bebbington, Smith, et al., 2005). And finally, the study would have been strengthened if an independent measure of hostility (i.e., one that is not part of a paranoia scale) and social anxiety were included. Social anxiety has received increased attention in paranoia research and may be related to both the formation and maintenance of paranoid beliefs (Freeman & Garety, 1999; Freeman, Garety & Kuipers, 2001).

In sum, the results of the current study lend preliminary support to the reliability and validity of the AIHQ. The findings underscore the importance of assessing participant responses to ambiguous situations, and suggest that the AIHQ may be a useful measure of the social cognitive biases associated with paranoia.

Manuscript received 4 January 2006
Revised manuscript received 3 May 2006

REFERENCES

Bell, V., Halligan, P. W., & Ellis, H. D. (2006). The Cardiff Anomalous Perception Scale (CAPS): A new validated measure of anomalous perception experience. *Schizophrenia Bulletin*, *32*, 366–377.

Bentall, R. P. (2001). Social cognition and delusional beliefs. In P. W. Corrigan & D. L. Penn (Eds.), *Social cognition in schizophrenia* (pp. 123–148). Washington, DC: American Psychological Association.

Bentall, R. P., Corcoran, R., Howard, R., Blackwood, N., & Kinderman, P. (2001). Persecutory delusions: A review and theoretical integration. *Clinical Psychology Review*, *21*, 1143–1192.

Buss, A., & Durkee, A. (1957). An inventory for assessing different kinds of hostility. *Journal of Consulting Psychology*, *21*, 343–349.

Buss, A., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *64*, 452–459.

Chapman, L. J., Chapman, J. P., & Raulin, M. L. (1976). Scales for physical and social anhedonia. *Journal of Abnormal Psychology*, *87*, 374–407.

Combs, D. R., Michael, C. O., & Penn, D. L. (2006). Paranoia and emotion perception across the continuum. *British Journal of Clinical Psychology*, *45*, 19–31.

Combs, D. R., & Penn, D. L. (2004). The role of sub-clinical paranoia on social perception and behavior. *Schizophrenia Research*, *69*, 93–104.

Combs, D. R., Penn, D. L., Cassisi, J., Michael, C. O., Wood, T. D., Wanner, J., & Adams, S. D. (2006). Perceived racism as a predictor of paranoia among African Americans. *Journal of Black Psychology*, *32*(1), 87–104.

Combs, D. R., Penn, D. L., & Fenigstein, A. (2002). Ethnic differences in sub-clinical paranoia: An expansion of norms of the paranoia scale. *Cultural Diversity and Ethnic Minority Psychology*, *8*, 248–256.

Combs, D. R., Penn, D. L., & Mathews, R. (2003). Implicit learning in non-clinical paranoia: Does content matter? *Personality and Individual Differences*, *34*, 143–157.

Constans, J., Penn, D. L., Ihnen, G., & Hope, D. A. (1999). Interpretation biases in social anxiety. *Behavior Research and Therapy*, *37*, 643–651.

Costello, C. G. (1994). Two dimensional views of psychopathology. *Behavior Research and Therapy*, *32*, 391–402.

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74–101.

De Castro, B. O., Slot, N. W., Bosch, J. D., Koops, W., & Veerman, J. W. (2003). Negative feelings exacerbate hostile attributions of intent in highly aggressive boys. *Journal of Clinical Child and Adolescent Psychology*, *32*, 56–65.

Eckbald, M. L., & Chapman, L. J. (1983). Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology*, *51*, 215–225.

Ekselius, L., Lindstrom, E., von Knorring, L., Bodlund, O., & Kullgren, G. (1994). SCID-II interviews and the SCID screening questionnaire as diagnostic tools for personality disorders on the DSM-III-R. *Acta Psychiatrica Scandinavica*, *90*, 120–123.

Ellett, L., Lopes, B., & Chadwick, P. (2003). Paranoia in a non-clinical population of college students. *Journal of Nervous and Mental Disease*, *191*, 425–430.

Epps, J., & Kendall, P. C. (1995). Hostile attributional bias in adults. *Cognitive Therapy and Research*, *19*, 159–178.

Fenigstein, A., & Vanable, P. A. (1992). Paranoia and self-consciousness. *Journal of Personality and Social Psychology*, *62*, 129–138.

First, M. B., Gibbon, M., Spitzer, R. L., Williams, J. B., & Benjamin, L. J. (1995). *User's guide for the structured interview for DSM-IV personality disorders*. New York: New York State Psychiatric Research Institute. Biometrics Research Department.

Freeman, D., Dunn, G., Garety, P. A., Bebbington, P. E., Slater, M., Kuipers, E., et al. (2005). The psychology of persecutory ideation I: A questionnaire survey. *Journal of Nervous and Mental Disease*, *193*, 302–308.

Freeman, D., & Garety, P. A. (1999). Worry, worry processes, and dimensions of delusions: An exploratory investigation of a role for anxiety processes in the maintenance of delusional distress. *Behavioural and Cognitive Psychotherapy*, *27*, 47–62.

Freeman, D., & Garety, P. A. (2003). Connecting neurosis and psychosis: The direct influence of emotion on delusions and hallucinations. *Behavior Research and Therapy*, *41*, 923–947.

Freeman, D., & Garety, P. A. (2004). *Paranoia: The psychology of persecutory delusions*. New York: Psychology Press.

Freeman, D., Garety, P. A., Bebbington, P. E., Slater, M., Kuipers, E., Fowler, D., et al. (2005). The psychology of persecutory ideation: II. A virtual reality experimental study. *Journal of Nervous and Mental Disease*, *193*, 309–315.

Freeman, D., Garety, P. A., Bebbington, P. E., Smith, B., Rollinson, R., Fowler, D., et al. (2005). Psychological investigation of the structure of paranoia in a non-clinical population. *British Journal of Psychiatry*, *186*, 427–435.

Freeman, D., Garety, P. A., & Kuipers, E. (2001). Persecutory delusions: Developing the understanding of belief maintenance and emotional distress. *Psychological Medicine*, *31*, 1293–1306.

Freeman, D., Garety, P., Kuipers, E., Fowler, D., & Bebbington, P. E. (2002). A cognitive model of persecutory delusions. *British Journal of Clinical Psychology*, *41*, 331–347.

Garety, P. A., & Freeman, D. (1999). Cognitive approaches to delusions: A critical review of theories and evidence. *British Journal of Clinical Psychology*, *38*, 113–154.

Graham, S., Hudley, C., & Williams, E. (1992). Attributional and emotional determinants of aggression among African-American and Latino young adolescents. *Developmental Psychology*, *28*, 731–740.

Green, M. J., & Phillips, M. L. (2004). Social threat perception and the evolution of paranoia. *Neuroscience and Biobehavioral Reviews*, *28*, 333–342.

Homant, R. J., & Kennedy, D. B. (2003). Hostile attribution in perceived justification of workplace aggression. *Psychological Reports*, *92*, 185–194.

Jacobsberg, L., Perry, S., & Frances, A. (1995). Diagnostic agreement between the SCID-II screening questionnaire and the personality disorder examination. *Journal of Personality Assessment*, *65*, 428–432.

Johns, L. C., & van Os, J. (2001). The continuity of psychotic experiences in the general population. *Clinical Psychology Review*, *21*, 1125–1141.

Kinderman, P., & Bentall, R. P. (1996). A new measure of causal locus: The Internal, Personal, and Situational Attributions Questionnaire. *Personality and Individual Differences*, *20*, 261–264.

Kinderman, P., & Bentall, R. P. (1997). Causal attributions in paranoia and depression: Internal, personal, and situational attributions for negative events. *Journal of Abnormal Psychology*, *106*, 341–345.

Martin, J. A., & Penn, D. L. (2001). Social cognition and sub-clinical paranoid ideation. *British Journal of Clinical Psychology*, *40*, 261–265.

Martin, J. A., & Penn, D. L. (2002). Attributional style in schizophrenia: An investigation in outpatients with and without persecutory delusions. *Schizophrenia Bulletin*, *28*, 131–141.

Mathews, B. A., & Norris, F. H. (2002). When is believing "seeing"? Hostile attribution bias as a function of self-reported aggression. *Journal of Applied Social Psychology*, *32*, 26–32.

Morey, L. (1991). *The Personality Assessment Inventory*. Lutz, FL: Psychological Assessment Resources.

Moritz, S., & Woodward, T. S. (2005). Jumping to conclusions in delusional and non-delusional schizophrenic patients. *British Journal of Clinical Psychology*, *44*, 193–207.

Penn, D. L., Corrigan, P. W., Bentall, R. P., Racenstein, J. M., & Newman, L. (1997). Social cognition in schizophrenia. *Psychological Bulletin*, *121*, 114–132.

Penn, D. L., Roberts, D., Munt, E. D., Silverstein, E., Jones, N., & Sheitman, B. (2005). A pilot study of social cognition and interaction training (SCIT) for schizophrenia. *Schizophrenia Research*, *80*, 357–359.

Peters, E. R., Joseph, S. A., & Garety, P. A. (1999). Measurement of delusional ideation in the normal population: Introducing the PDI (Peters et al., Delusions Inventory). *Schizophrenia Bulletin*, *25*(3), 553–576.

Peterson, C., Semmel, A., von Baeyer, C., Abramson, L., Metalsky, G., & Seligman, M. (1982). The Attributional style Questionnaire. *Cognitive Therapy and Research*, *6*, 287–300.

Phillips, M. L., Senior, C., & David, A. S. (2000). Perception of threat in schizophrenics with persecutory delusions: An investigation using visual scan paths. *Psychological Medicine*, *30*, 157–167.

Rawlings, D., & Freeman, J. L. (1996). A questionnaire for the measurement of paranoia/suspiciousness. *British Journal of Clinical Psychology*, *35*, 451–461.

Smari, J., Stefansson, S., & Thorgilsson, H. (1994). Paranoia, self-consciousness, and social cognition in schizophrenics. *Cognitive Therapy and Research*, *18*, 387–399.

Spauwen, J., Krabbendam, L., Lieb, R., Wittchen, H. U., & van Os, J. (2003). Sex differences in psychosis: Normal or pathological? *Schizophrenia Research*, *62*, 45–49.

Steiger, J. H. (1980). Tests for comparing elements of a correlation matrix. *Psychological Bulletin*, *87*, 245–251.

Tremblay, P. F., & Belchevski, M. (2004). Did the instigator intend to provoke? A key moderator in the relation between trait aggression and aggressive behavior. *Aggressive Behavior*, *30*, 409–424.

Turkat, I. D., Keane, S. P., & Thompson-Pope, S. K. (1995). Social processing errors among paranoid personalities. *Journal of Psychopathology and Behavioral Assessment*, *12*, 263–269.

Waldheter, E. J., Jones, N. T., Johnson, E. R., & Penn, D. L. (2005). Utility of social cognition and insight in the prediction of inpatient violence among individuals with a severe mental illness. *Journal of Nervous and Mental Disease*, *193*, 609–618.

Whaley, A. L. (2004). Paranoia in African-American men receiving inpatient psychiatric treatment. *Journal of the American Academy of Psychiatry and the Law*, *34*, 282–290.