Utility of Social Cognition and Insight in the Prediction of Inpatient Violence Among Individuals With a Severe Mental Illness

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Abstract: The purpose of this study was to assess the utility of social cognition and insight in the prediction of violence in a psychiatric inpatient sample. Violence history, demographic information, symptomatology, neuropsychological functioning, social cognition (i.e., attributional style), and insight were assessed in 29 inpatients with severe mental illness. Greater posttest violence was associated with greater pretest violence, less education, greater psychiatric distress, neuropsychological impairment, and hostile attributional and personalizing biases. Hierarchical multiple regression analyses showed that history of violence contributed the most variance to posttest violence. Hostile attributional and personalizing biases were also uniquely associated with posttest violence. Overall, this study supported the modest utility of attributional style measures in the prediction of inpatient violence. The predictive value of insight in this context appears limited.

Key Words: Social cognition, insight, violence prediction.

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Mental health clinicians are often asked to predict an individual's future dangerousness (Heilbrun and Kramer, 2001), typically in a legal context (Janofsky et al., 1988). Accurate assessment of an individual's risk for aggressive behavior is especially important within the hospital setting because a large number of violent incidents occur on psychiatric inpatient units (Kraus and Sheitman, 2004). Indeed, individuals with severe mental disorders such as schizophrenia, major affective disorders, or serious personality disorders (e.g., antisocial personality) are more likely than other individuals with mental illness to commit violent acts (Bergman et al., 2000; Junginger, 1996; Swanson et al., 1990).

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It has been argued that the single best predictor of violence is a prior history of violent behavior (Robinson et al., 1999; Walsh et al., 2004; see Dinakar and Sobel, 2001; Palermo et al., 1991 for dissenting opinions). Additional risk factors for violence include demographic variables such as male gender (McNeil et al., 1998; Silver et al., 1999; Wessely, 1997; see Kraus and Sheitman, 2004 for contradictory findings) and fewer years of education (Stueve and Link, 1997); symptoms such as agitation, hostility, and motor tension (Flannery et al., 2003; Robinson et al., 1999; Roy et al., 1987); neuropsychological deficits (Cohen et al., 2003; Krakowski et al., 1989; Teichner et al., 2001; Young et al., 1999; see Krakowski et al., 1997; Roy et al., 1987 for contradictory findings); substance use (Bergman et al., 2000; Heilbrun and Kramer, 2001; Swartz et al., 1998; Walsh et al., 2004); medication noncompliance (Bartels et al., 1991; Swartz et al., 1998); and social skills deficits (Guite, 1994). In fact, noncompliance with treatment is frequently found among individuals with low insight into their disorder (Torrey, 1998), and deficits in social skills are related to impairments in social cognition (Penn et al., 1997). Thus, these are two domains that may potentially enhance our understanding and prediction of violence and merit additional study.

Social cognition refers to "the cognitive processes involved in how [people] think about themselves, other people, social situations, and interactions" (Penn et al., 1997, p. 114). One element of social cognition that has been associated with aggression is attributional style. Attributional style is defined as the ways in which one consistently explains events or the intentions of others around him or her (Crick and Dodge, 1994). A hostile attributional bias, the tendency to attribute hostile intent to others in (typically ambiguous) situations with a negative outcome, has been consistently shown to be integral to the aggressive behavior of children and adolescents (see Dodge and Pettit, 2003 for a review). Research also supports the role of a hostile attributional bias in aggressive adults in a variety of contexts, such as marital violence (Eckhardt et al., 1998), aggressive driving (Matthews and

Norris, 2002), psychopathy (Serin and Kuriychuk, 1994), and workplace aggression (Homant and Kennedy, 2003). Further, McNeil et al. (2003) have operationalized this phenomenon in the context of psychiatric patients, labeling it the "aggressive attributional style."

In psychiatric populations, individuals with persecutory delusions typically show a personalizing bias, which is the tendency to blame other people, rather than situational factors, for negative outcomes (Blackwood et al., 2001; Garety and Freeman, 1999). However, the specific association between a personalizing bias and violent behavior in individuals with a mental illness has not been widely studied thus far; the presence of such a bias may increase the risk of retaliatory aggression in response to the perception of having been wronged by another person. This is consistent with previous research that has linked persecutory delusions with an increased risk of violence (e.g., Link et al., 1992; Wessely et al., 1993).

With respect to insight, Torrey (1998) reviewed research that examined the relationship between insight and violent behavior and concluded, "lack of insight may play a significant role in predicting the violence of patients with severe mental illnesses" (p. 280). This domain is highly relevant to inpatients with severe mental illness, given that more than 50% of people with schizophrenia may lack insight into their illness (Amador et al., 1994). Individuals experiencing command hallucinations, for example, might be more likely to act on those commands if they do not recognize that those auditory hallucinations are a symptom of an illness. Indeed, Arango et al. (1999) determined that the best predictor of violence among individuals with schizophrenia was lack of insight into psychotic symptoms (see Swartz et al., 1998; Yen et al., 2002 for contradictory findings).

The purpose of this study was to evaluate the relative contributions of attributional style and insight to inpatient violence among individuals with a severe mental illness. It was hypothesized that greater inpatient violence over a 3-month period would be associated with a greater number of violent acts in the past, male gender, fewer years of education, greater psychiatric symptomatology, greater neuropsychological impairment, a greater hostile attributional bias (particularly in ambiguous situations), a greater personalizing bias, and less insight into one's mental illness. Our primary hypothesis was that social cognitive and insight variables would add unique incremental predictive utility over and above more traditional predictors.

METHODS

Participants

The sample comprised 29 inpatients from a large state psychiatric hospital. Individuals with diagnoses reflecting a severe mental illness (i.e., schizophrenia-spectrum disorders, mood disorders, severe personality disorders) were eligible to participate in the study provided they had volunteered and participated in the informed consent process. Further, individuals must have been on the ward for at least 3 months prior to the beginning of the study to be eligible. Individuals with organic disorders (e.g., Huntington disease), mental retardation, or brain damage were excluded from consideration.

Table 1 summarizes the demographic and clinical characteristics of the sample. The majority of the sample was male, African American, and diagnosed with schizophrenia-spectrum disorders (based on chart review). The seven participants listed as having a diagnosis of "other" included individuals with substance abuse/dependence, antisocial personality disorder, borderline personality disorder, major depressive disorder, obsessive-compulsive disorder, bulimia nervosa, personality disorder NOS, and intermittent explosive disorder. Finally, most of the sample was on atypical antipsychotic medication.

Measures

Chart Review

Demographic characteristics (i.e., age, gender, ethnicity, and years of education), diagnosis, current medication usage, and incidents of violence (3 months pretest and 3

TABLE 1. Demographic and Clinical Characteristics of Sample ($N = 29$)

Gender (%)	
Males	86
Females	14
Ethnicity (%)	
Caucasian	14
African American	86
Age (years)[a]	33.1 ± 9.23
Education (years)[a]	10.6 ± 2.32
Diagnosis (%)	
Schizophrenia	41.4
Schizoaffective	24.1
Bipolar	10.3
Other	24.1
Medication usage	
Atypical antipsychotic (%)	86
Daily dosage (mg/d)[a,b,c]	698 ± 461
Conventional antipsychotic (%)	35
Daily dosage (mg/d)[a,b,c]	855 ± 596
Anticholinergic (%)	24

[a] $M \pm SD$.

[b] Dosages are reported in Chlorpromazine equivalents (based on conversion guidelines in Schatzberg et al., 2003).

[c] The difference between atypical and conventional antipsychotic dosages is nonsignificant (t [7] = –1.196; NS).

months posttest) were assessed through chart review. Neuroleptic dosages were converted to Chlorpromazine equivalents to standardize values for comparison (conversion guidelines derived from Schatzberg et al., 2003).

Brief Psychiatric Rating Scale—Expanded Version

The Brief Psychiatric Rating Scale—Expanded Version (BPRS-E; Lukoff et al., 1986) is a 24-item interview measure designed to assess a wide range of symptoms in psychiatric patients. The BPRS-E has demonstrated adequate reliability and validity (Hafkenscheid, 1991). Acceptable interrater reliability for the present study was defined as ICC $\geq$.70 with a gold standard rater (D. L. P.). In this study, four symptom factor scores were computed by averaging individual item scores within each category: affect (somatic concern, anxiety, guilt, depressive mood, and hostility), anergia (emotional withdrawal, motor retardation, blunted affect, and uncooperativeness), thought disorder (grandiosity, suspiciousness, hallucinatory behavior, and unusual thought content), and disorganization (conceptual disorganization, tension, and mannerisms/posturing; Mueser et al., 1997).

Repeatable Battery for the Assessment of Neuropsychological Status

The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 1998) is a neuropsychological screening battery that measures attention, language, visuospatial/constructional abilities, immediate memory, and delayed memory. Scaled scores are generated for each of these five domains. Internal consistency for the five scales is good. The average split-half reliability coefficients are as follows: immediate memory = .88, visuospatial/constructional = .80, attention = .85, language = .82, and delayed memory = .83. Construct validity has been demonstrated through correlations with selected Wechsler Adult Intelligence Scale—Revised (Wechsler, 1981) subtests (arithmetic, similarities, picture completion, digit-symbol), as well as immediate and delayed memory sections from the Wechsler Memory Scale—Revised (Wechsler, 1987). For this study, the following index scores were used in data analyses: immediate memory (list learning and story memory tasks), visuospatial/constructional ability (figure copy and line orientation tasks), language ability (picture naming and semantic fluency tasks), and attention (digit span and digit-symbol coding tasks).

Ambiguous Intentions Hostility Questionnaire

The Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al. 2005) is an attributional style questionnaire in which participants are presented with 15 hypothetical situations that involve another person committing an act toward the respondent that results in a negative outcome. An example of an item is, "A friend of yours slips on the ice, knocking you onto the ground." For each situation, participants are asked to write down the reason why the person in the vignette acted the way that they did (i.e., their intent). Based on a norming sample of 141 participants, the 15 items in the AIHQ were reliably divided into three categories that differed in the degree of intentionality. Five items were rated as clearly intentional, five were rated as clearly accidental, and five were rated as ambiguous.

For this study, research assistants independently coded participants' responses to each item on a 5-point Likert scale anchored by "not at all hostile" and "very hostile" (to assess the presence of the hostile attributional bias). Raters were trained to ICCs of $\geq$.70. Actual ICC values ranged from .87 to 1.00. Upon the determination of satisfactory interrater reliability, independent ratings were averaged together, resulting in average hostility bias scores for intentional, accidental, and ambiguous situations.

Internal, Personal, and Situational Attributions Questionnaire

The Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman and Bentall, 1996) is a 32-item self-report questionnaire that assesses attributional style. It is designed to measure the degree to which individuals generate internal (something to do with the respondent), personal (something to do with another person), or situational (something to do with the situation or chance) causal attributions for both positive and negative events. A personalizing bias (PB) score is derived from participants' responses by dividing the number of personal attributions by the sum of both personal and situational attributions for negative events. A PB score greater than .5 indicates a greater tendency to make external-personal attributions for negative events. Reliability and validity of the IPSAQ are adequate. The mean internal consistency for the measure as a whole (Cronbach α) is .675. Internal consistency for the positive outcome subscales is generally adequate (Cronbach α values range from .605 to .717), as is internal consistency for the negative outcome subscales (Cronbach α values range from .629 to .755).

Research assistants independently coded participants' written responses on the IPSAQ (regarding perceived causality of a positive or negative event). Acceptable interrater reliability was predetermined to equal ICC $\geq$.70. Actual ICC values ranged from .84 to 1.00. Upon determination of satisfactory interrater reliability, independent ratings were averaged together, and an average PB score was calculated for each participant.

Insight Scale

The Insight Scale (IS; Birchwood et al., 1994) is a self-report measure that assesses insight into one's mental disorder composed of the following dimensions: one's recognition of illness, relabeling of psychosis, and recognition of the need for treatment. A low score on any of these dimensions indicates

limited insight into one's disorder. The mean internal consistency for the measure is .75. In this study, three items on the IS (items 2, 3, and 6) were reverse-coded such that higher responses were indicative of greater insight. Following this, averaging individual item responses within each category created three subscale scores: one's recognition of illness, relabeling of psychosis, and recognition of the need for treatment (as outlined in Birchwood et al., 1994). Finally, a total score was derived for each participant by adding up individual item scores. Due to the high intercorrelations between the IS subscale and total scores (r = .61–.96), the total score was used as the primary insight variable in our analyses.

Modified Overt Aggression Scale

The Modified Overt Aggression Scale (MOAS; Kay et al., 1988) is a nonintrusive scale designed to document and measure specific aspects of aggressive behavior based on observable criteria. Aggressive behaviors are divided into four categories: verbal aggression, aggression against property, aggression against self, and physical aggression against others. Within each category, there are five clearly described levels of severity (0–4). For each category, the highest applicable rating point is assigned to describe each act of aggression committed by the patient during the specific observation period. The total score is a weighted sum of all of the violent acts committed during an observation period, with more severe acts receiving a higher weight. Adequate internal consistency has been demonstrated (coefficient of concordance, W = .68), and the MOAS has also been shown to successfully distinguish aggressive versus nonaggressive patients, supporting its criterion-related validity.

In this study, two research assistants conducted a chart review, independently coded each violent event according to MOAS anchor points, and consequently determined the following measures of violence for each participant: frequency of violent acts for the 3 months both pretest and posttest, and severity of violent acts (i.e., the sum of MOAS weighted scores) for the 3 months pretest and posttest. Acceptable interrater reliability was predetermined to equal ICC ≥.70. Actual ICC values ranged from .98–.99. Upon the determination of satisfactory interrater reliability, independent ratings were averaged for the MOAS frequency and severity ratings (pretest and posttest).

Procedure

Hospital staff identified patients that were appropriate for the study based on current level of functioning (i.e., patient was not highly disorganized) and individual characteristics (e.g., diagnosis reflecting severe mental illness). Research assistants, working in conjunction with hospital staff, explained the study to these potential participants and gained the informed consent of those interested in participating. The majority of patients approached about the study agreed to participate. After consent was obtained, research assistants administered the study measures (i.e., the BPRS-E, the RBANS, the AIHQ, the IPSAQ, and the IS).

Retrospective chart review procedures were used to gather demographic and clinical information, as well as to document instances of violent behavior conducted by participants over two distinct observation periods: the 3 months prior to testing (i.e., history of violence) and the 3 months posttesting.

Overview of Data Analysis

One-way analyses of variance were conducted to detect any significant between-group differences in violence with respect to diagnosis (i.e., schizophrenia, schizoaffective disorder, bipolar disorder, and other), ethnicity (i.e., African American and Caucasian), and type of antipsychotic medication taken at the time of assessment (i.e., atypical, conventional, both, or neither). Correlations between average MOAS frequency and severity scores (i.e., reflecting the dependent variables of violence frequency and severity in the 3 months posttest) and all continuous predictor variables were then computed (Table 2).

Two hierarchical multiple regression analyses were performed: one model included violence frequency (3 months posttest) as the dependent variable, and a second model included violence severity (3 months posttest) as the depen-

TABLE 2. Correlations Between Violence Ratings and Continuous Predictor Variables (N = 29)

	Violence ratings (post test)	
Predictor variables	**MOAS frequency**	**MOAS severity**
MOAS frequency (history)	.826**	NA
MOAS severity (history)	NA	.884**
Age (years)	–.038	.103
Education (years)	–.255	–.325*
BPRS-E thought disturbance factor	.198	.036
BPRS-E anergia factor	–.035	.000
BPRS-E affect factor	.440**	.209
BPRS-E disorganization factor	.324*	.139
RBANS immediate memory index	–.206	–.183
RBANS visuospatial index	–.420*	–.375*
RBANS language index	–.520**	–.370*
RBANS attention index	–.097	–.022
AIHQ hostility bias—ambiguous	.053	.106
AIHQ hostility bias—intentional	–.010	.129
AIHQ hostility bias—accidental	.407*	.368
IPSAQ personalizing bias	.269	.326*
IS total score	–.042	.088

*$p < 0.05$, one-tailed; **$p < 0.01$, one-tailed.

dent variable (Tables 3 and 4, respectively). Selection of predictors in the models (i.e., violence history, demographic characteristics, symptoms, neuropsychological functioning, social cognitive functioning, and insight) was based on the study hypotheses (i.e., not the bivariate correlations between predictor and violence outcome variables).

RESULTS

Group Differences in Violence as a Function of Diagnosis, Ethnicity, and Neuroleptic Usage

One-way analyses of variance were conducted to examine group differences in violence as a function of diagnosis, ethnicity, and the type of antipsychotic medication patients were taking at the time of assessment. There were no significant between-group differences for diagnosis (F [3,25] = .099; NS), ethnicity (F [1,27] = .810; NS), or type of antipsychotic medication (F [3,25] = .569; NS) on MOAS violence frequency scores. Similarly, there were no significant between-group differences for diagnosis (F [3,25] = .261; NS), ethnicity (F [1,27] = 1.415; NS), or type of antipsychotic medication (F [3,25] = 1.206; NS) on MOAS violence severity scores. Therefore, data were collapsed across diagnosis, ethnicity, and medication type for all subsequent analyses.

TABLE 3. Summary of Hierarchical Regression Analysis for Variables Predicting Violence Frequency (N = 24)[a]

Variable	B	*SE* B	β	ΔR^2
Step 1				
MOAS frequency— history	.700	.107	.812**	.659**
Step 2				
Gender	–1.973	.816	–.314*	.098*
Education	–.223	.106	–.246*	
Step 3				
BPRS-E affect factor	.368	.311	.166	.025
BPRS-E disorganization factor	.263	.703	.060	
Step 4				
RBANS immediate memory index	.015	.024	.103	.052
RBANS visuospatial index	.014	.019	.117	
RBANS language index	–.037	.019	–.265	
RBANS attention index	.008	.019	.065	
Step 5				
AIHQ hostility bias—ambiguous	.304	.558	.090	.008
IPSAQ personalizing bias	.852	1.200	.110	
Step 6				
IS total score	–.011	.056	–.029	.001
Final model				
MOAS frequency—history	.721	.139	.836**	
Gender	–2.744	1.270	–.437	
Education	–.241	.156	–.266	
BPRS-E affect factor	.596	.390	.268	
BPRS-E disorganization factor	.147	.865	.033	
RBANS immediate memory index	.023	.029	.158	
RBANS visuospatial index	.021	.023	.174	
RBANS language index	–.044	.023	–.313	
RBANS attention index	.006	.023	.054	
AIHQ hostility bias—ambiguous	.311	.582	.092	
IPSAQ personalizing bias	.855	1.251	.110	
IS total score	–.011	.056	–.029	

*$p < 0.05$; **$p < 0.01$.
[a]Final model R^2 = .843**.

TABLE 4. Summary of Hierarchical Regression Analysis for Variables Predicting Violence Severity ($N = 24$)[a]

Variable	B	*SE* B	β	ΔR^2
Step 1				
MOAS severity—history	.929	.107	.879**	.773**
Step 2				
Gender	–6.316	2.508	–.264*	.057
Education	–.404	.353	–.117	
Step 3				
BPRS-E affect factor	1.612	1.051	.190	.020
BPRS-E disorganization factor	–1.380	2.175	–.082	
Step 4				
RBANS immediate memory index	–.028	.068	–.049	.054
RBANS visuospatial index	.136	.057	.300*	
RBANS language index	–.059	.055	–.110	
RBANS attention index	–.031	.057	–.067	
Step 5				
AIHQ hostility bias—ambiguous	2.763	1.273	.214†	.038†
IPSAQ personalizing bias	6.609	2.737	.224*	
Step 6				
IS total score	.198	.117	.131	.012
Final model				
MOAS severity—history	1.189	.104	1.125**	
Gender	–11.023	2.679	–.460**	
Education	–.131	.348	–.038	
BPRS-E affect factor	2.341	.865	.276*	
BPRS-E disorganization factor	–.781	1.739	–.046	
RBANS immediate memory index	.072	.061	.128	
RBANS visuospatial index	.187	.048	.414**	
RBANS language index	–.123	.048	–.231*	
RBANS attention index	–.091	.049	–.199	
AIHQ hostility bias—ambiguous	2.681	1.185	.207*	
IPSAQ personalizing bias	6.597	2.546	.223*	
IS total score	.198	.117	.131	

*$p < 0.05$; **$p < .01$; †Approaching significance.
[a]Final model $R^2 = .953$**.

Correlations Between Violence Scores and Predictor Variables

Pearson correlations were computed to assess the relationships between the predictor variables and average MOAS violence frequency and severity scores (Table 2).

Greater frequency of posttest violence was significantly associated with a greater frequency of past violent acts, increased levels of psychiatric distress (e.g., hostility or anxiety) and disorganization (e.g., mannerisms/posturing), impaired visuospatial functioning and language abilities, and a greater hostile attributional bias (in accidental situations on the AIHQ).

Greater severity of posttest violence was significantly associated with more severe acts of past violence, lower levels of education, impaired visuospatial functioning and language abilities, a greater personalizing bias, and a greater hostile attributional bias (in accidental situations on the AIHQ).

Hierarchical Multiple Regression Analysis 1: MOAS Violence Frequency Scores

The following predictor variables were entered into a hierarchical multiple regression model, with MOAS frequency of violence 3 months posttest as the dependent vari-

able: (1) MOAS violence frequency from 3 months pretest (i.e., violence history), (2) gender and years of education, (3) BPRS-E affect and disorganization factor scores, (4) RBANS index scores (i.e., immediate memory, visuospatial ability, language ability, and attention), (5) AIHQ hostility bias for ambiguous situations and IPSAQ personalizing bias, and (6) IS total score (i.e., insight; Table 3).

The overall model was significant (F [12,11] = 4.910; $p < 0.01$) and accounted for approximately 84% of the total variance in posttest violence frequency. MOAS pretest violence frequency contributed the most unique variance to the model, accounting for approximately 66% of the total model R^2 (F [1,22] = 42.516; $p < 0.01$).

The other predictors that collectively contributed a significant amount of variance to the model were years of education and gender, accounting for approximately 10% of unique variance, controlling for violence history (F [2,20] = 4.008; $p < 0.05$). Regression results indicate that male gender and fewer years of education were associated with a greater frequency of violence in this sample. However, because of the composition of the sample (i.e., predominantly male), findings regarding gender should be interpreted with caution.

The contributions of the remaining predictors (BPRS-E affect and disorganization factor scores, RBANS neuropsychological indices, AIHQ hostility bias for ambiguous situations, IPSAQ personalizing bias, and IS total score) were all statistically nonsignificant.

Once all of the predictors were entered into the model, only MOAS pretest violence frequency had a significant unique relationship with posttest violence frequency ($\beta = .836$; $p < 0.01$).

Hierarchical Multiple Regression Analysis 2: MOAS Violence Severity Scores

The following predictor variables were entered into a hierarchical multiple regression model, with MOAS severity of violence 3 months posttest as the dependent variable: (1) MOAS violence severity from 3 months pretest (i.e., violence history), (2) gender and years of education, (3) BPRS-E affect and disorganization factor scores, (4) RBANS index scores (i.e., immediate memory, visuospatial ability, language ability, and attention), (5) AIHQ hostility bias for ambiguous situations and IPSAQ personalizing bias, and (6) IS total score (i.e., insight; Table 4).

The overall model was significant (F [12,11] = 18.729; $p < 0.01$) and accounted for approximately 95% of the total variance in posttest violence severity. Again, the violence history variable contributed the most unique variance to the model, with MOAS pretest violence severity accounting for approximately 77% of the total model R^2 (F [1,22] = 74.82; $p < 0.01$).

Education, gender, the BPRS-E affect and disorganization factors, and the RBANS neuropsychological indices all made statistically nonsignificant contributions to the model.

The social cognitive variables (i.e., AIHQ hostility bias for ambiguous situations and IPSAQ personalizing bias) collectively contributed approximately 4% of variance to the model, and this contribution approached statistical significance (F [2,12] = 3.844; $p = 0.051$). Finally, the IS total score contributed only 1% of variance to the model, which was not statistically significant (F [1,11] = 2.868; NS).

In the final model, examination of the β weights revealed several significant unique relationships with violence severity (i.e., controlling for other predictors). The MOAS pretest violence severity variable had a large, significant positive relationship with post-test violence severity ($\beta = 1.125$; $p < 0.01$). Gender had a significant negative relationship with posttest violence severity ($\beta = –.460$; $p < 0.01$), indicating that men were more likely to commit more severe acts of violence. However, as indicated, the composition of our sample precludes us from interpreting this finding with confidence. The BPRS-E affect factor had a significant positive relationship with posttest violence severity ($\beta = .276$; $p < 0.05$).

The RBANS language index score had a significant negative relationship with violence severity ($\beta = –.231$; $p < 0.05$), and the visuospatial index score had a significant positive relationship with violence severity ($\beta = .414$; $p < 0.05$). With respect to visuospatial ability, our findings (i.e., negative bivariate correlation and positive β) suggest a suppression effect, which is likely due to the high degree of collinearity among visuospatial ability and the other predictors. Thus, this variable's association with violence cannot be interpreted with confidence.

Finally, examination of the final model revealed a significant unique positive relationship between the IPSAQ personalizing bias and violence severity ($\beta = .223$; $p < 0.05$), as well as a significant unique positive relationship between the AIHQ hostility bias for ambiguous situations and violence severity ($\beta = .207$; $p < 0.05$).

DISCUSSION

The purpose of this study was to examine the incremental predictive utility of measures of social cognition and insight to violent behavior among inpatients with a severe mental illness. It was hypothesized that a positive history of violence, selected demographic characteristics (i.e., gender and education), psychiatric symptoms (e.g., hostility), and impaired neuropsychological functioning would be associated with more frequent (and more severe) violent behavior. It was also hypothesized that violence would be associated with a greater hostile attributional bias (in ambiguous situations), a greater personalizing bias, and lower levels of insight. These hypotheses were supported to varying degrees.

With respect to our primary variables of interest, social cognition and insight, our data revealed positive associations between hostile attributional and personalizing biases and violence; however, a relationship between lower insight and violence was not supported. These results are discussed in more detail below.

History of violence had the largest association with posttest violence, confirming the strong theoretical and empirical relationship between one's past violence and one's future violence. This finding is consistent with other violence prediction research (e.g., Walsh et al., 2004) and highlights the emphasis that clinicians should place on one's past behavior when attempting to predict one's future behavior. Demographic variables were significantly associated with violence. Correlational analyses indicated that individuals with fewer years of education were more likely to engage in ward violence. Further, regression analyses suggested that men were more likely than women to commit more severe acts of violence on the ward. These findings are consistent with past research (e.g., Silver et al., 1999; Stueve and Link, 1997). However, the sample in this study was predominantly (i.e., 86%) male, and this unbalanced composition significantly limits our ability to draw conclusions regarding the role of gender in this context. With respect to symptoms, higher levels of psychiatric distress and disorganization were associated with a greater frequency of violent incidents at posttest. Higher levels of distress were also associated with more severe posttest violence. These findings support the strong relationship between symptoms of psychiatric distress and aggression that has been reported in the literature (e.g., Flannery et al., 2003). However, once violence history and demographic characteristics were accounted for, symptoms contributed little unique variance to posttest violence. In addition, thought disorder was not significantly correlated with violence in this study, which is consistent with recent findings showing that delusions, particularly threat/control override delusions, were not associated with increased risk for violent behavior in both mixed and schizophrenia-specific samples (Appelbaum et al., 2000; Walsh et al., 2004). Neuropsychological deficits (specifically, impaired visuospatial and language abilities) were significantly associated with a higher likelihood of violence, as well as with more severe violent incidents on the ward. However, neuropsychological functioning contributed minimal unique variance to the models once violence history, demographic characteristics, and symptoms were accounted for. Further, statistical anomalies observed in our data preclude us from interpreting the nature of the relationship between visuospatial functioning and violence with confidence.

Our primary hypothesis was that individuals with a hostile attributional bias (especially in ambiguous situations) and a personalizing bias, as well as poor insight into their illness, would be more likely to engage in violent behavior. In general, there was partial support for this hypothesis. Our analyses indicated significant positive correlations between violence and both a personalizing bias and a hostile attributional bias (for accidental situations). Regression results supported the existence of unique positive relationships between violence and both a personalizing bias and a hostile attributional bias (for ambiguous situations), after controlling for other predictors. Further, our analyses suggested that these social cognitive variables add incremental predictive utility when predicting violence severity. Thus, this study suggests that individuals with a severe mental illness who have a tendency to blame others for negative events and/or attribute hostile intent to others are more likely to behave violently.

We found support for the role of a hostile attributional bias in both accidental and ambiguous situations. In addition to typically being associated with ambiguous situations (e.g., Crick and Dodge, 1994), researchers have linked a hostile attributional bias with violence in nonambiguous situations as well, and have indicated that aggressive individuals may be expected to attend selectively to a minimum of hostile environmental cues even in the presence of a preponderance of nonhostile cues (Epps and Kendall, 1995). Thus, this study further supports the relevance of a hostile attributional bias to violent behavior across a variety of situations.

Insight was not significantly associated with posttest violence in this study. Although this did not support our hypothesis, these findings are consistent with recent research examining the role of insight in violent behavior among individuals with mental illness (e.g., Yen et al., 2002). Therefore, it might be the case that low insight, when examined independently, is not likely to be associated with increased violence risk. For example, Swartz et al. (1998) found that a better overall predictor of aggressive behavior among individuals with a mental illness was a combination of substance abuse, medication noncompliance, and low insight.

This study had a number of limitations. First, due to practical concerns, the sample size was relatively small, which consequently reduced statistical power. Second, due to our limited power, Bonferroni correction was not applied to the results. Therefore, while the pattern of findings detected in our data is promising, results should be interpreted with caution. Third, the sample comprised inpatients with severe and persistent mental illness, which may limit generalizability of the findings to clinical populations who are more homogeneous with respect to diagnosis. Fourth, overall, there was not very much violence on the ward in the 3 months posttest. This reduced range of variance in the dependent variables likely decreased the ability to detect statistically significant findings. This is an ongoing problem in prediction research, given the low base rate of violence in general (Mulvey and Lidz, 1984). Finally, past violence research has categorized aggressive behavior into "reactive" and "proactive," and has found differential patient characteristics asso-

ciated with each type (e.g., a hostile attributional bias has been more strongly associated with reactive aggression in youth; Lochman and Dodge, 1994). The findings of this study may have been enriched had violent behavior been categorized in this way.

In conclusion, the results of this study indicate that the most robust predictor of violent behavior among inpatients with severe mental illness is previous violence history. However, even when considering the role of this factor, it appears that social cognition (i.e., attributional style) may be a relevant predictor, albeit a modest one, and warrants further study.

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