SOCIAL COGNITION AND AGGRESSION IN FORENSIC PSYCHIATRIC PATIENTS

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Abstract

While there is an established link between untreated psychosis and aggression, the role of social cognition has been relatively neglected. This study examined various aspects of social cognitive functioning among forensic patients deemed not criminally responsible for acts of violence due to a psychotic disorder. The study sample—25 forensic patients (10 recently aggressive and 15 not-recently aggressive) and 20 healthy controls—completed the Reading the Mind in the Eyes Task-Revised (RMET), Toronto Empathy Questionnaire (TEQ), and Interpersonal Perception Task-15 (IPT-15). There were no significant differences on the RMET and TEQ based on violent index offence and recent aggressive behaviour. However, a pattern of misperceptions about interpersonal scenarios was identified utilizing the IPT-15 measure. Implications are discussed for a better clinical understanding of cues that might provoke and possibly escalate situational violence in individuals diagnosed with psychosis, as well as the potential for future research employing virtual reality technologies.

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Social Cognition and Aggression in Forensic Psychiatric Patients

Public acceptance of mental illness, often fragile at best, has been further negatively impacted by the much-publicized acts of violence by some individuals with serious mental disorders (Coverdale et al., 2002; Cutcliffe & Hannigan, 2008). A prominent psychiatrist in the field, Fuller-Torrey (2011) argues that, in fact, a key source of public stigma of mental illness arises from violent episodes caused by untreated psychosis. Although most individuals with mental illness are not violent, certain facets of psychotic disorders—namely 'positive' symptoms—have been found to be predictive of increased risk of aggression (Douglas et al., 2009). In turn, concerned public attitudes and political pressures have led to mental health law and policy reforms (Schneider et al., 2007) that require those individuals with psychosis to receive adequate and at times mandated treatment, typically in specialized hospital units for offenders.

Inpatient forensic settings themselves have become places of concern for displays of aggression, where individuals diagnosed with psychotic disorders are placed due to court-ordered verdicts of "not-criminally responsible on account of mental disorder" (NCRMD; Crocker et al., 2015). Aggression in this hospital context endangers both staff and patients, increases seclusion of offenders, increases staff absence and burnout, and delays offender reintegration into society (Bader et al., 2014; Keski-Valkama et al., 2010; Little et al., 2019; Urheim et al., 2014). Missing from these concerns about the prevalence of violence among the seriously mentally ill are more concerted research efforts that explore determinants of aggression among individuals with psychosis. Elucidating these factors could lead to improved treatment and rehabilitation of offenders and prevent violence, so as to reduce the stigma associated with mental illness. Indeed,

there is also the potential to inform first responder practices in dealing with mental health crises, leading to better outcomes for both first responders and individuals with mental illness, in turn improving public perceptions of safety. In an attempt to identify factors associated with aggression within the forensic setting, this study will take a social cognitive approach, seeking to analyze the mental abilities of forensic patients with psychosis in appraising social situations.

Forensic Psychiatry: Individuals who are determined to be NCRMD

The focus of this research are those individuals who perpetrate violence but would be considered 'insane' at the time of the act. 'Insanity' is a colloquial—not legal—term, so in this regard, and in the forensic psychiatry context, it is important to provide a legal definition of NCRMD for the purposes of this literature review and empirical study. In Canada, "no person is criminally responsible for an act committed or an omission made while suffering from a mental disorder that rendered the person incapable of appreciating the nature and quality of the act or omission or of knowing that it was wrong" (*Criminal Code*, 1985a). Under these circumstances, the legal system will deem the offender to be NCRMD. If the offender is believed to be a continued threat to society, the individual will be sent to secure hospital facilities for treatment for an indeterminate amount of time (i.e., release is determined by balancing treatment progress and protection of society; *Criminal Code*, 1985b).

As noted above, these secure hospital facilities are specialized 'forensic' psychiatry units which have been designed to both assess and treat forensic patients deemed NCRMD. This is distinguished from: a) the broader correctional services which refers to the general prison system. Studies utilizing broad correctional samples may include offenders seeking psychological treatment in correctional hospitals/treatment facilities or undergoing assessment

for courts. While these individuals may indeed suffer from a mental disorder, they have not been deemed NCRMD. Thus, samples may be derived from both forensic and correctional hospital settings, but there is a clear differentiation between participants drawn from the two in terms of the distinctive relation of their mental disorder to the criminal index offence. Further, the forensic system is also distinguished from: b) general inpatient schizophrenia units. While these patients may have exhibited acts of aggression, they have not been deemed by the courts to have committed an index offence. A study in Germany identifies a number of factors in identifying patients on general schizophrenia units who are at risk for progression into the forensic system: low social adjustment, impulsivity, delinquency and substance use, as well as manipulative behaviour and pestering (Freyberger et al., 2008).

Overall, Canada is seeing a rise in the number of NCRMD verdicts, which further underscores the need to study this unique population (Justice, 2006). Between 2000 and 2005 in Ontario—where the current study was conducted—80% of offenders deemed NCRMD held a diagnosis of a psychotic spectrum disorder (Crocker et al., 2015). At the time of the offence, 72% of offenders were displaying psychotic symptoms—with 24% experiencing hallucinations and 53% experiencing delusions—and 22% were under the influence of substances (Crocker et al., 2015). Notably, family members are the most common victims of violence, with over 30% of those NCRMD offending against a family member or partner (Crocker et al., 2015).

Social Cognitive Factors

In understanding the relation between psychotic disorders and aggression, social cognitive factors have been relatively neglected in empirical studies to date (Witt et al., 2013). A limited number of studies have separately explored possible neuropsychological and social

functioning links to violent behaviour (Witt et al., 2013), generally in the absence of a combined social cognitive model. A social cognitive approach to understanding violence builds on what we know from research on the mental abilities of individuals to effectively appraise social situations, and which will be detailed below more specifically, how people make judgments using theory of mind (ToM), empathy, and interpersonal perception. To increase our understanding of the interplay between social cognitive factors and aggression, and apply these to individuals with psychosis who have committed acts of violence, the current study aims to assess ToM, empathy, and interpersonal perception within a forensic psychiatric setting. These constructs, and the instruments developed to measure them, assess the ability to identify and utilize both overt and subtle verbal, non-verbal, and social cues.

Affective Theory of Mind

Looking to social cognitive variables, ToM is dichotomized into cognitive and affective components (e.g., Tager-Flusberg & Sullivan, 2000). The social-perceptual component, otherwise known as affective ToM—and sometimes called affective empathy—refers to understanding another's feelings and emotions (e.g., Baron-Cohen et al., 1997; Baron-Cohen et al., 2001). Findings from a number of studies and meta-analyses suggest impairment in affective ToM among individuals with schizophrenia in hospital, correctional, and forensic psychiatric settings (Abu-Akel & Abushua'leh, 2004; Addy et al., 2007; Bora et al., 2009; Murphy, 2006; Schiffer et al., 2017; Tang et al., 2016). In a meta-analysis of correctional settings, facial affect processing, or emotional recognition, was found to be impaired among incarcerated violent males, specifically related to processing expressions of fear, anger, and disgust (Chapman et al., 2018).

In terms of schizophrenia and violence, it is reported that patients on general schizophrenia units who have assaulted others show impairment on affective ToM tasks relative to their non-violent co-patients (Abu-Akel & Abushua'leh, 2004; Tang et al., 2016). Within forensic settings, studies utilizing the Reading the Mind in the Eyes Test-Revised (RMET; Baron-Cohen et al., 2001) suggest forensic patients with psychotic disorders generally show impairments in affective ToM (Addy et al., 2007), and perform equally as poorly as general (non-offending) patients with schizophrenia (Schiffer et al., 2017). The RMET is one measure of affective ToM and assesses the ability to recognize emotions in others. It is considered to be a useful instrument within forensic psychiatry where intellectual functioning varies widely, as it is believed to be less related to general intellectual functioning; many studies find no relation between the RMET and general intellectual functioning, with a meta-analysis suggesting a small positive relation ($r = 0.24$; e.g., Baker et al., 2014; Baron-Cohen et al., 1997; Baron-Cohen et al., 2001; Tager-Flusberg & Sullivan, 2000).

In identifying the implications of psychosis and paranoid thinking on the emotion processing capabilities of forensic patients, it has been suggested that individuals with psychosis may selectively attend to threat and are better at identifying negative emotions (Bentall & Taylor, 2006). Impairments in recognizing emotions in others (e.g., Kohler et al., 2009), or a potential bias towards viewing negative or threatening emotions (e.g., Bentall & Taylor, 2006), may increase the risk of aggressive behaviour among forensic patients. There remains a paucity of formal studies of affective ToM in NCRMD patients undergoing mandated treatment and a gap in the literature regarding the extent to which recent aggression in a forensic psychiatric setting might be related to problematic affective ToM.

Empathy

Affective ToM is considered to be positively correlated with—but not equivalent to—empathy (Spreng et al., 2009), with the notion that affective ToM is considered a prerequisite in the ability to empathize or feel guilt (Blair, 2005). The link between lack of empathy and aggression has been evident for decades in literary depictions, and both clinical and empirical accounts (e.g., Miller & Eisenberg, 1988). Specifically, impairments in empathy are clearly associated with the occurrence of violent and sexual offences (e.g., Jolliffe & Farrington, 2004; Marshall et al., 2001). It has been proposed that individuals with lower empathy commit more offences because they fail to appreciate the harmfulness of their actions (Feshbach, 1975). Abu-Akel and Abushua'leh (2004) suggest violent inpatients on general schizophrenia units perform worse on empathy tasks than their non-violent counterparts, in line with their findings on affective ToM. Within the forensic psychiatric sphere, there remains a paucity of empirical studies focussed on individuals with psychosis, though there has been a suggestive case study report of a forensic patient with schizophrenia with empathy impairments (Addy et al., 2007).

Overall, a systematic review (Bragado-Jimenez & Taylor, 2012) asserts that research has separately linked impairments in empathy and violence in the broader population (e.g., Miller & Eisenberg, 1988), has shown impaired empathy in some individuals with schizophrenia (e.g., Bonfils et al., 2016), and has shown that individuals with schizophrenia have a somewhat higher risk for expressions of violence (e.g., Douglas et al., 2009). It remains relatively unclear whether empathy impairments are present in individuals with psychosis who have expressed violence. The Toronto Empathy Questionnaire (TEQ) is a measure of the emotional components of empathy and has not been used to date with forensic patients, but has been found to be significantly correlated with—but not equivalent to—the RMET ($r = 0.35$) in non-clinical

populations (Spreng et al., 2009) and so was chosen for the current study to examine the empathy construct. A different measure of empathy, the Interpersonal Reactivity Index, was considered but not selected for the current study since this measure, although found to be useful in general populations, has demonstrated inconsistent evidence for validation within the forensic sample (Beven et al., 2004).

Interpersonal Perception

Widening the scope of social cognition from affective ToM and empathy, impairments in social/interpersonal perception, or the decoding and interpretation of social cues in others, are described in the forensic schizophrenia literature (e.g., Javed & Charles, 2018), but there remain significant gaps in empirical understandings. Specifically, the Interpersonal Perception Task-15 (IPT-15) has not been used in the forensic setting (Costanzo & Archer, 1989). This video-scenario tool shows potential utility as it demonstrates strong ecological validity in assessing one's ability to analyze a variety of social cues in real-world social interactions (Costanzo & Archer, 1989; Vaskinn et al., 2009). This measure has also been correlated with self-reported empathy in non-clinical samples (Spreng et al., 2009). Within the general schizophrenia literature, it has been identified that patients with schizophrenia are impaired on all aspects of the IPT-15 in comparison to healthy controls (Zhou et al., 2016), and that the IPT-15 is correlated with non-verbal sensitivity errors within this population (as assessed by the Half-Profile of Non-Verbal Sensitivity; Sergi et al., 2017). A meta-analysis identified accurate interpersonal sensitivity, defined as perceiving others accurately and engaging in appropriate interpersonal behaviour, as being related to adaptive psychosocial functioning (Hall et al., 2009). Such accurate judgments in the midst of social scenarios is considered to be potentially critical in the context of expressions of violence, as it is hypothesized that more aggressive individuals may be

biased towards misperceiving interactions as threatening and more generally to misjudge intentions. To date, however, the construct of interpersonal perception has not been well evaluated among NCRMD individuals and among those who have been recently aggressive while being treated for psychosis.

The Current Study

The overall objectives of the current study are to extend prior social cognitive research to a sample of NCRMD forensic psychiatric patients with psychosis who have committed violent index offences, and then examine more closely social cognitive functioning from the lens of on-unit recent aggressive behaviour. While affective ToM and empathy have been studied to some limited extent in the forensic context with regard to the violent nature of the index offence, the examination of these constructs—and interpersonal perception—with recently aggressive individuals is novel. This study also seeks to relate affective ToM and empathy to interpersonal perception accuracy, as the use of the IPT-15 is novel within the forensic psychiatric context. We take an innovative approach by examining more proximate (recent vs. historical) and dynamic (aggression severity on-unit vs. index offence) dimensions of aggression that hold greater real-world relevance and potential to improve clinical risk assessment.

Research Questions and Hypotheses

The present study will address the following questions:

1. Are there differences between forensic patients with violent index offences and healthy controls on measures of affective ToM, empathy, and interpersonal perception?

We hypothesize that forensic patients with violent index offences will score lower on measures of affective ToM, empathy, and interpersonal perception in comparison to healthy controls.

2. Do recently aggressive forensic patients perform differently than not-recently aggressive forensic patients on measures of affective ToM, empathy, and interpersonal perception?

   We hypothesize that recently aggressive forensic patients will score lower than not-recently aggressive forensic patients, and both will score lower than healthy controls on tasks measuring affective ToM empathy, and interpersonal perception.

3. Are ToM and empathy measures related to interpersonal perception in the forensic psychiatric setting?

   We hypothesize that forensic patients who score lower on measures of affective ToM and empathy will also score lower on the interpersonal perception measure.

Methods

This study was approved by the Hamilton Integrated Research Ethics Board (REB – 7741) and the York University Faculty of Graduate Studies Research Ethics Board.

Participants

The clinical population for this study was recruited from the inpatient and outpatient units at the Forensic Psychiatry Program, St. Joseph's Healthcare Hamilton-West Fifth. The healthy control group consisted of a community sample from the Greater Toronto and Hamilton areas, recruited through hospital postings, online Kijiji advertisements, and in-person. Study eligibility criteria required all participants to be a minimum of 18 years old, capable of understanding and signing informed consent, and able to read, write, and communicate in English. At the time of the study, all clinical participants held a DSM-5 diagnosis of a psychotic disorder, including schizophrenia, schizoaffective, or mood disorder with psychotic features. Exclusion criteria included current substance addiction based on multiple positive urine drug screens in the previous month or a diagnosis of an organic brain disorder or injury, dementia, an identified intellectual disorder, or any other neurological disorder. For the community sample, exclusion criteria also included a history of a psychotic disorder, major mental disorder, or a criminal record.

In total, 29 inpatients, 1 outpatient, and 21 community participants enrolled in the study. One forensic patient did not complete the study and asked for their data to be removed. We were unable to review medical charts until after study participation, requiring data from four forensic patient participants to be removed (two patients diagnosed with an intellectual disability, one patient diagnosed with an organic brain disorder, and another diagnosed with a neurological

disorder). The data from one community participant was excluded because they failed all validity checks (i.e., attention checks in the self-report measures). Therefore, data from a total of 25 patients—with 10 in the recently aggressive subsample and 15 not-recently aggressive—and 20 healthy controls were included in the analyses.

Procedures

To determine interest and review the study in detail, patients were approached on-unit by the author and a care team member, and community participants were contacted via telephone. For the inpatients, the study took place in a quiet room on the unit. For the outpatient and community participants in the Hamilton area, the study took place in an outpatient assessment room. For community participants in the Greater Toronto Area, the study took place at York University. A study session took between 45 to 60 minutes.

All participants were provided a detailed informed consent form to read and sign; during this time, participants had the opportunity to ask any clarification questions. After obtaining informed consent, participants completed a series of questionnaires capturing demographics (see Appendix A), aggressive personality traits (PAI), and empathy (TEQ; see Appendix B). For each measure, validity checks were added, requiring participants to select a specific response, to ensure they were not randomly responding. Socially desirable responding was also assessed utilizing the PAI positive impression management (PIM) scale. Following the self-report questionnaires, participants completed two behavioural tasks: the IPT-15 assessing interpersonal perception and the RMET assessing affective ToM. All participants received a 10-dollar Tim Horton's gift card for their time, with complimentary parking provided for outpatients and controls.

For the clinical group, following completion of the testing session, medical charts were reviewed to determine the presence and severity of aggressive behaviour in the previous 3 months using the Aggressive Incidents Scale (AIS; see Appendix C). Also retrieved were formal primary and secondary diagnoses rendered by a staff psychiatrist, mental status exams to identify overt symptoms of psychosis at the time of study participation, urine drug screens, and official index offences.

Materials

Aggressive Incidents Scale (AIS; Chaimowitz & Mamak, 2011)

The AIS is a single 9-point scale—ranging from "Rude, Argumentative" (1) to "Critical Incident – Possible Life and Death" (9)—used to monitor and document the severity of aggressive behaviour (see Appendix C). The AIS is completed daily by nursing staff for all patients and is documented in clinical charts. Aggressive behaviour is defined as any score greater than 0 on this scale.

Selected Scales from the Personality Assessment Inventory (PAI; Morey, 1991)

For the purposes of validity and characterizing the samples, items from selected scales of the PAI were administered. Specifically, the PAI aggression scale (AGG) was administered in order to characterize levels of aggression and aggressive potential in the samples; the PAI-AGG is an 18-item self-report measure with 3 subscales assessing aggressive attitudes (AGG-A), physical (AGG-P) and verbal aggression (AGG-V). These subscales focus on the global degree of anger and hostility (AGG-A), as well as the forms through which anger is expressed (AGG-P & V). In addition, the PAI positive impression management (PIM) scale was administered and contains 9 items to detect socially desirable responding, which is commonly assessed in studies

using forensic samples. Participants respond to items on a 4-point Likert scale ranging from "Not at all true (0)" to "Very true (3)." For the purposes of reporting, consistent with the research literature, obtained raw scores were converted to PAI *t*-scores using the conversation tables provided by Morey (1991). Morey (1991) also describes the original validation studies for the AGG and PIM scales, which are considered to be well-established over decades of empirical and clinical use. Of relevance to the current study, forensic patients with histories of violence have been shown to score higher on the PAI-AGG scale compared with patients without histories of violence and in particular, show elevations on the AGG-P subscale (Douglas et al, 2001).

Reading the Mind in the Eyes Task-Revised (RMET; Baron-Cohen et al., 2001)

The RMET was used to assess affective ToM. The participant is presented with photographic stimuli of facial expressions, cropped to show specifically the eye region. Participants are instructed to choose one of four emotions that best describe what the person in the picture is thinking or feeling. There are 36 items, and the total correct score represents the participant's ability to read emotional states. Participants were given a list of emotion definitions, and explicitly told to use the list when they are unsure what a word means, to mitigate the influence of verbal comprehension. A review of the RMET's psychometric properties suggests moderate reliability with a Cronbach's alpha of 0.61 for internal consistency, and test-retest reliability of 0.83 (Vellante et al., 2013). The RMET tends to be correlated with empathy measures in the range of r = 0.23-0.56 (Vellante et al., 2013). Internal consistency within the current study is unavailable at this time.

Toronto Empathy Questionnaire (TEQ; Spreng et al., 2009)

The TEQ is a 16-item self-report measure assessing empathy as a primarily emotional, rather than cognitive, process (see Appendix B). Participants respond to various empathic statements on a 5-point Likert scale ranging from "Never (0)" to "Always (4)." Psychometric properties of the TEQ include good internal consistency (Cronbach's alpha = 0.85-0.87), as well as test-retest reliability (r = 0.81) in non-clinical populations (Spreng et al., 2009). It shows strong convergent validity with the Interpersonal Reactivity Index, a well-validated self-report measure of empathy (Spreng et al., 2009). It has also been found to be correlated significantly with the IPT-15 (r = 0.23) and RMET (r = 0.35) in non-clinical populations (Spreng et al., 2009). Within our study, internal consistency for the TEQ as assessed by Cronbach's alpha was 0.71, which is considered to be adequate.

Interpersonal Perception Task-15 (IPT-15; Costanzo & Archer, 1989)

The IPT-15 involves 15 brief video clips, with segments ranging from 30 seconds to 1-minute in duration, depicting social interaction scenarios between individuals. These interactions are categorized by the test developers into five subscale domains: kinship, intimacy, competition, status, and deception. The participant must rely on a variety of verbal and non-verbal cues in the situation to correctly answer a given multiple-choice question, with two to three answer options per question. A sum of the correct multiple-choice responses is used to determine domain-specific scores and total score. Potential scores range between 0 and 3 for each of the five IPT-15 domains, and 0 and 15 for the total score, which is based on the total correct responses to all of the 15 items. Higher scores are considered to reflect a greater ability to interpret interpersonal interactions. Participants were also asked to provide an estimate score (out of 15) of the accuracy

of their performance; a perceived correct difference score was calculated by subtracting the actual total from their estimate (positive scores indicate over-estimated beliefs of social perceptual accuracy). Costanzo & Archer (1989) report the test-retest reliability coefficient to be 0.73 but low internal consistency (KR20 = 0.38). This task has strong ecological validity as it uses a diverse set of non-actors in real-world settings, as well as incorporating a variety of social cues (Vaskinn et al., 2009). The instrument's lack of high internal consistency is considered to be likely due to the variety of verbal, emotional, relationship, and social cues (Riggio & Darioly, 2016). Indeed, in the current research, we found the internal consistency for the IPT-15 to be low (KR20 = 0.34), but similar to previous research.

Data Analysis

SPSS version 23.0 (IBM Corp, Armonk, NY, USA) was used to conduct all analyses. Group means were inputted when data for a single measure was missing for a participant (n = 1, PAI), or invalid due to a failed validity check (n = 2, TEQ). Data were normal based on visual inspection of histograms, Q-Q plots and boxplots, with some unequal variances between groups.

Index offences for forensic patients were classified as violent (i.e., offences against the person) or non-violent (i.e., drug offences or offences against property). To test hypothesis #1, that forensic patients with violent index offences will score lower on the RMET, TEQ, and IPT-15 in comparison to healthy controls, independent samples t-tests were conducted where appropriate, with Welch t-tests used when variances were found to be unequal, based on significant Levene's test. Due to unequal sample sizes, effect sizes were calculated using Hedge's g. An effect size of 0.2 or greater is considered a small effect, medium effect is 0.5 or greater, and a large effect falls at 0.8 or above.

The clinical group was divided into recently aggressive forensic patients and not-recently aggressive forensic patients based on AIS scores. Forensic patients were included in the recently aggressive group if they received any score above 0 on the AIS in the three months prior to study participation. To test hypothesis #2, that recently aggressive forensic patients will score lower than not-recently aggressive forensic patients, and both will score lower than healthy controls on the RMET, TEQ, and IPT-15, *t*-tests and effect sizes were used following the same procedures as outlined for hypothesis #1.

To test hypothesis #3, that forensic patients who score lower on the RMET and TEQ will also score lower on the IPT-15, Pearson correlations (*r*) were used to assess the relation between these measures. For all tests, alpha was set at 0.05. Being underpowered due to a small sample size, effect sizes (Hedge's *g*) will be emphasized in the interpretation of results, rather than relying solely on statistically significant *p*-values.

Results

Socio-Demographic & Clinical Characteristics

A summary of socio-demographic and clinical characteristics is located in Table 1. All 25 individuals in the forensic sample committed a violent index offence, and 10 displayed recent aggressive behaviour. All 25 had some form of a psychotic disorder, with the majority having a primary diagnosis of schizophrenia (n = 17). There was also a large proportion of these patients (n = 20) who had a comorbid diagnosis of a substance use disorder, with half (n = 10) currently classified as substance use in remission as patients in a controlled environment, which is consistent with the literature on violence risk factors (Witt et al., 2013). Additionally, five patients held a secondary diagnosis of antisocial personality disorder.

Table 1

Socio-Demographic & Clinical Characteristics of Participants

Variable		Forensic (n = 25)	Controls (n = 20)
Age M*(SD)*		35.24*(11.18)*	35.0*(14.61)*
Sex			
	Male	20 (80%)	14 (70%)
	Female	5 (20%)	6 (30%)
Relationship Status			
	Single	22 (88%)	6 (30%)
	Boyfriend/Girlfriend	2 (8%)	7 (35%)
	Married/Common Law	1 (4%)	6 (30%)
	Widowed	0 (0%)	1 (5%)
Level of Education			
	Some High School	7 (28%)	0 (0%)
	High School Diploma	4 (16%)	0 (0%)
	Some college	6 (24%)	6 (30%)
	College diploma	3 (12%)	5 (25%)
	Some University	5 (20%)	2 (10%)

	University Degree	0 (0%)	7 (35%)
Violent Index Offence			
	Yes	25 (100%)	-
Recent Aggressive Incident			
	Yes	10 (40%)	-
Primary Diagnosis-Psychotic Disorder			
	Schizophrenia	17 (68%)	-
	Schizoaffective	5 (20%)	-
	Mood Disorder with Psychotic Features	3 (12%)	-
Substance Use Disorder			
	Yes-total	20 (80%)	-
	in remission in controlled environment	10 (40%)	-
Antisocial Personality Disorder			
	Yes	5 (20%)	-

Test-taking attitude was measured using the PAI-PIM scale, which showed no significant difference between forensic patients and healthy controls, though the mean level of positive impression management for the forensic group was found to be just above the cut-off score (t = 54) for positive impression, based on PAI clinical interpretative guidelines. To assess socially desirable responding, scores on the PIM scale of the PAI were correlated with self-report measures (i.e., TEQ and PAI) for the forensic and healthy control groups. Within the forensic sample, there were significant negative correlations between the PIM scale (M = 54.33, SD = 11.90) and the aggression scale (M = 50.25, SD= 10.58), r = -0.773, p = 0.000; as well as the aggressive attitudes subscale (M = 49.08, 10.20), r = -0.706, p = 0.000; the verbal aggression subscale (M = 45.96, SD = 8.11), r = -0.517, p = 0.000; and the physical aggression subscale (M = 56.58, SD = 12.67), r = -0.760, p = 0.000. Within the control sample, the only significant correlation to PIM (M = 49.45, SD = 10.51) was the aggressive attitudes subscale of the PAI aggression scale (M = 49.10, SD = 10.85), r = -0.523, p = 0.018.

Findings indicated significantly higher levels of reported physical aggression in the forensic group compared with healthy controls, at levels consistent with PAI-AGG-P scores found in a validation study of forensic patients with histories of violence (Douglas et al, 2011) and as such validates the selection criteria of a history of past violence. The validation study (Douglas et al, 2001) found that the AGG-P measure was the only significant aggression subscale predictor of violence, which is consistent with the current findings, though there was also a trend for somewhat lower levels of self-reported verbal aggression in the forensic sample (medium effect). See Table 2 for a summary of these results.

Table 2

Clinical Characteristics of Participants: Personality Assessment Inventory

Scale	Forensic		Controls		*t*-statistic	*p*-value	Effect (*g*)
	M	SD	M	SD			
Agg-Total	50.25	10.58	49.85	11.26	0.12	0.903	0.04
Agg-A	49.08	10.20	49.10	10.85	1.00	0.996	0.00
Agg-V	45.96	8.11	51.10	11.64	-1.74	0.088	0.52
Agg-P	56.58	12.67	49.25	10.27	2.10	**0.042**	0.63
PIM	54.33	11.90	49.45	10.51	1.44	0.157	0.43

Notes.
Bold text denotes significant effect at $p < .05$.
PAI: Personality Assessment Inventory. AGG: PAI Aggression Scale. A: Attitude. V: Verbal. P: Physical. PIM: PAI Positive Impression Management Scale

Hypothesis 1: Social Cognition in Violently Offending Forensic Patients

To compare social cognitive functioning between forensic psychiatric patients with violent index offences ($n = 25$) and healthy controls ($n = 20$) in terms of the RMET, TEQ, and IPT-15, independent samples and Welch *t*-tests were run between all study measure total scores and scales (see Table 3 for a summary of results). In line with our hypothesis, forensic patients

with violent index offences demonstrated significant interpersonal misperceptions compared with healthy controls on the IPT-15 video task based on a lower total score and kinship subscale score, with large effects. Although non-significant, the difference between scores on the deception subscale was trending with a medium effect in the direction of our hypothesis, with forensic patients making less accurate judgments than healthy controls. Further, while on the one hand, forensic patients with violent index offences demonstrated more errors in interpersonal perception, they significantly over-estimated their accuracy of performance in comparison to healthy controls, with a medium effect. Contrary to our hypothesis, other tests of social cognitive constructs (including the RMET ToM measure and TEQ empathy measure) were found to be non-significant, with small effects.

Table 3

Comparison of Forensic Patients with Violent Index Offences (n = 25) vs. Healthy Controls (n = 20)

Measure	Scale	Forensic		Controls		*t*-statistic	*p*-value	Effect (*g*)
		M	SD	M	SD			
RMET								
	Total	23.76	4.11	25.10	3.02	-1.22	0.230	0.37
TEQ								
	Total	42.88	6.75	45.37	5.19	-1.36	0.181	0.41
IPT-15								
	Total	8.32	1.70	10.10	2.10	-3.14	**0.003**	0.94
	Perceived Correct	1.67	2.71	-0.35	3.28	2.27	**0.028**	0.68
	Kinship	1.60	0.91	2.30	0.80	-2.70	**0.010**	0.81
	Intimacy	1.40	0.65	1.70	0.87	-1.33	0.190	0.40
	Competition	2.16	0.62	2.25	0.55	-0.51	0.610	0.15
	Status	2.20	0.65	2.45	0.69	-1.26	0.216	0.38
	Deception	0.96	0.79	1.40	0.94	-1.71	0.095	0.51

Notes.
Bold text denotes significant effect at $p < .05$.
RMET: Reading the Mind in the Eyes Task-Revised. TEQ: Toronto Empathy Questionnaire. IPT-15: Interpersonal Perception Task-15.

Hypothesis 2: Social Cognition in Forensic Patients with Recent Aggression

Independent samples and Welch *t*-tests were conducted to compare the recently aggressive patients, not-recently aggressive patients, and healthy controls on study measures (see Table 4 for a summary of these results). In line with our hypothesis that both recently aggressive and not-recently aggressive patients would perform worse than healthy controls, both groups were impaired on global performance on the IPT-15 task (large effect). While both groups were impaired in terms of their overall performance, trending towards significance with a medium effect, they overestimated their performance in comparison to healthy controls. Additionally, not-recently aggressive patients significantly misperceived the kinship subscale (large effect), with the recently aggressive patients' misperception on this subscale trending towards significance (medium effect).

There were no significant differences in comparing the forensic patients based on recent aggression. However, considering the small sample sizes, particularly with the clinical sub-groups, we also examined differences based on effect sizes, which revealed interesting patterns. With regard to the IPT-15 interpersonal perception measure, a medium effect was observed in which the recently aggressive forensic patients demonstrated misperceptions on the competition subscale in comparison to both the not-recently aggressive group and healthy controls, in line with our hypothesis. On the other hand, the not-recently aggressive group demonstrated misjudgments on the status subscale in comparison to the recently aggressive group and healthy controls, a finding which was unexpected.

Consistent with our hypothesis of worse performance for not-recently aggressive patients in comparison to healthy controls, these patients showed impairments on the RMET, TEQ, and

deception subscale of the IPT-15 with medium effects. All other tests were non-significant, with small effect sizes. As such, it was unexpected that the recently aggressive patient group failed to show reduced empathy and reduced affective ToM levels in comparison to the not-recently aggressive patients and healthy controls.

Table 4

Comparison of Not-Recently Aggressive Forensic Patients (n = 15) vs. Recently Aggressive Forensic Patients (n = 10) vs. Healthy Controls (n = 20)

Measure	Scale	Group 1	Group 2	Group 1		Group 2		*t*-statistic	*p*-value	Effect (*g*)
				M	SD	M	SD			
RMET										
	Total									
		Not-Agg	Agg	23.00	4.61	24.90	3.07	-1.14	0.266	0.47
			Control	23.00	4.61	25.10	3.02	-1.63	0.113	0.56
		Agg	Control	24.90	3.07	25.10	3.02	-0.17	0.866	0.07
TEQ										
	Total									
		Not-Agg	Agg	42.00	7.12	44.10	6.30	-0.76	0.458	0.31
			Control	42.00	7.12	45.37	5.19	-1.62	0.115	0.55
		Agg	Control	44.10	6.30	45.37	5.19	-0.59	0.561	0.23
IPT-15										
	Total									
		Not-Agg	Agg	8.27	1.75	8.40	1.71	-0.19	0.852	0.07
			Control	8.27	1.75	10.10	2.10	-2.74	**0.010**	0.93
		Agg	Control	8.40	1.71	10.10	2.10	-2.21	**0.035**	0.86
	Perceived Correct									
		Not-Agg	Agg	1.54	3.17	1.89	1.97	-0.31	0.757	0.13
			Control	1.54	3.17	-0.35	3.28	1.71	0.097	0.58
		Agg	Control	1.89	1.97	-0.35	3.28	1.98	0.058	0.77
	Kinship									
		Not-Agg	Agg	1.53	0.92	1.70	0.95	-0.44	0.664	0.18
			Control	1.53	0.92	2.30	0.80	-2.64	**0.013**	0.90
		Agg	Control	1.70	0.95	2.30	0.80	-1.82	0.080	0.71
	Intimacy									
		Not-Agg	Agg	1.40	0.74	1.40	0.52	0.00	1.000	0.00

		Control	1.40	0.74	1.70	0.87	-1.08	0.288	0.37
	Agg	Control	1.40	0.52	1.70	0.87	-1.01	0.323	0.39
Competition									
	Not-Agg	Agg	2.33	0.62	1.90	0.57	1.77	0.089	0.72
		Control	2.33	0.62	2.25	0.55	0.42	0.676	0.14
	Agg	Control	1.90	0.57	2.25	0.55	-1.63	0.115	0.63
Status									
	Not-Agg	Agg	2.07	0.46	2.40	0.84	-1.14	0.274	0.52
		Control	2.07	0.46	2.45	0.69	-1.98	0.056	0.63
	Agg	Control	2.40	0.84	2.45	0.69	-0.17	0.863	0.07
Deception									
	Not-Agg	Agg	0.93	0.88	1.00	0.67	-0.20	0.841	0.09
		Control	0.93	0.88	1.40	0.94	-1.49	0.146	0.51
	Agg	Control	1.00	0.67	1.40	0.94	-1.34	0.241	0.46

Notes.

Bold text denotes significant effect at $p < .05$.

Agg: recently aggressive patients. Not-Agg: not-recently aggressive patients. RMET: Reading the Mind in the Eyes Task-Revised. TEQ: Toronto Empathy Questionnaire. IPT-15: Interpersonal Perception Task-15

Hypothesis 3: Social Cognition Within the Forensic Group

Pearson correlations were conducted to examine social cognitive associations within the forensic psychiatric group. TEQ and RMET scores were not correlated with each other (p = 0.830). The TEQ was not correlated with the IPT-15 (p = 0.565), nor was the RMET correlated with the IPT-15 (p = 0.110). See Table 5 for a summary of these results.

Table 5

Correlations between Affective ToM, Empathy, and Interpersonal Perception within Forensic Group

Measure	1	2	3
1. RMET	--		
2. TEQ	-0.049	--	
3. IPT-15 Total	0.328	-0.121	--

Notes.

RMET: Reading the Mind in the Eyes Task-Revised. TEQ: Toronto Empathy Questionnaire. IPT: Interpersonal Perception Task-15

Discussion

This study sought to extend prior research implicating the possible role of social cognitive impairments within violent (based on index offence) forensic patients diagnosed with psychosis (e.g., Addy et al. 2007, Douglas et al., 2009; Schiffer et al., 2017). It aimed to extend this literature on social cognition by a) examining interpersonal perception within the widely utilized framework of violence based on index offence and b) to examine possible impairments from a more proximal lens of recent aggression. We hypothesized that forensic patients with violent index offences and recently aggressive forensic patients would be outperformed on the social cognitive measures by healthy controls, and in terms of recent aggression, be outperformed by not-recently aggressive patients. This is grounded in a social cognitive understanding of the importance of accurate perception and interpersonal sensitivity in adaptive psychosocial functioning (e.g., Hall et al., 2009) which mitigates expressions of violence.

This research is the first study to identify impaired levels of interpersonal perception among forensic patients who committed acts of violence that were serious enough to lead to court-ordered hospitalization and treatment. The IPT-15 measure may provide a unique contribution in the understanding of violence and aggression among forensic patients diagnosed with psychosis because the measure examines the extent to which individuals misjudge a host of verbal and non-verbal interpersonal and social cues. Examining interpersonal perception (IPT-15) with violence linked to index offence, and further with recent aggression, highlights a pattern of differences. This study extends some findings of impairments in a general schizophrenia sample (Zhou et al., 2016) to the field of forensic psychiatry. The current findings are an original contribution to the forensic literature, as well as our understanding of the relation between interpersonal perception and psychosis more generally within North America.

Hypothesis #1: Social Cognition in Violently Offending Forensic Patients

In line with our initial hypothesis, forensic patients with violent index offences showed impairments in interpersonal perception in comparison to healthy controls, as assessed by the IPT-15 social scenario video task. Overall, the number of errors reflected by the low total scores is indicative of impaired judgments in interpreting a host of verbal and non-verbal cues within social situations (Costanzo & Archer, 1989). Further, there are suggestions of key areas of misjudgements related to errors on the kinship and deception subscales. Forensic patients with violent index offences express faulty judgments with regards to recognizing and understanding attachment relationships (Costanzo & Archer, 1989). This finding is particularly poignant and deeply relevant because it has been identified that family members and partners are the most common victims of crimes perpetrated by those deemed NCRMD in Canada, comprising over 30% of victims (Crocker et al., 2015). Another area of poor performance—the deception subscale—reflects a lessened ability to detect honesty and deceit (Costanzo & Archer, 1989). The deception subscale is particularly relevant to the expression of violence, as a forensic patient may be aggressive towards someone they misperceive as lying.

Further, a key finding relates to a failed ability to recognize their poor interpersonal judgments. While forensic patients with violent index offences showed clear inaccuracies in their interpersonal perceptions, by significantly overestimating their performance on the IPT-15 they also lacked awareness of the extent of their errors. It has been suggested elsewhere that a lack of insight is related to poorer social functioning among individuals with schizophrenia (e.g., Dickerson et al., 1997). Thus, the overestimation of abilities we see in this study is potentially a function of said lack of insight, with lack of insight long considered to be part of the phenomenology of schizophrenia and psychosis (e.g., Cuesta & Peralta, 1994). Interestingly, it

has been suggested more generally that individuals who lack skill in a domain are the same ones to hold more favourable views of their performance (Kruger & Dunning, 1999). It seems that impaired performance is also linked to an impaired metacognitive ability to realize one's own limitations (Kruger & Dunning, 1999). Perhaps it is this 'double whammy' which is the important consideration leading to acts of violence; that is, individuals who have impaired social perception, yet at the same time, overestimate their social judgment capacity. That 'double whammy' is dangerous in terms of aggressive behaviour; a forensic patient may be more confident in a false perception and thus more likely to act in a possibly hostile manner.

Unlike previous research, this study does not present violent forensic patients as impaired on affective ToM and empathy measures (e.g., Addy et al. 2007, Schiffer et al., 2017). While self-reported empathy (TEQ) and a narrow-focussed task of emotion recognition (RMET) did not highlight impairments within the forensic sample, we have identified the utility of a more complex measure (IPT-15) in this regard.

Hypothesis #2: Social Cognition in Forensic Patients with Recent Aggression

When grouped by recent aggression, similar to findings of forensic patients with violent index offences, both recently aggressive and not-recently aggressive patients show impairments on global interpersonal perception in comparison to healthy controls, as well as overestimation of their performance. Thus, we suggest that global impairments and overestimating their abilities may be more closely related to violent offending behaviour, rather than continued aggression on-unit. However, that being said, we do see a pattern of specificity in the defining differences between recently aggressive and not-recently aggressive patients.

While differences were not statistically significant, we do see medium effect sizes where not-recently aggressive patients were less accurate in their perceptions of judged status in comparison to recently aggressive patients and healthy controls. Recently aggressive patients, performing similarly to healthy controls on status, may be particularly attuned to recognizing power dynamics and perhaps show heightened wariness about understanding interactions with those in positions of authority (Costanzo & Archer, 1989).

Further, recently aggressive forensic patients displayed inaccuracies in their judgment of videos depicting interpersonal competition, in comparison to both not-recently aggressive patients and healthy controls. These errant judgements reflect difficulties in detecting agitation and restlessness in those who are upset (Costanzo & Archer, 1989). A key conclusion to be drawn from this finding is that an impairment in this area suggests an inability to detect negative emotional/behavioural cues in others, which might otherwise help to ward off aggressive outbursts as a situation is provoked and escalated. This is consistent with findings that suggest pestering is a behavioural risk factor for the transition of patients with schizophrenia from general to forensic units (Freyberger et al., 2008).

In comparison to healthy controls, the not-recently aggressive patients did show the expected pattern of impairments on empathy and affective ToM measures. Interestingly, it was the recently aggressive patients who failed to show these anticipated impairments, for reasons that are unclear.

Hypothesis #3: Social Cognition Within the Forensic Group

Contrary to our hypothesis, and unlike the original validation study in a non-clinical sample suggesting a relation between the TEQ and RMET—and a relation between outcomes on

these measures and performance on the IPT-15—this was not replicated within the forensic population (Spreng et al., 2009). Considering the stable performance of the forensic sample on the TEQ and RMET relative to the healthy controls, this is not surprising. We suggest these non-findings provide support for the utility of more sensitive measures, like the IPT-15, in detecting more nuanced impairments.

Clinical Implications

The social cognitive task which elucidated a number of impairments within the forensic sample was the IPT-15 video scenario measure. We suggest that increasing the accuracy of interpersonal perceptions and fostering interpersonal skills may help mitigate aggression. The utility of the interpersonal misperception findings is evident when breaking down the pattern of impairments. Forensic patients with violent index offences present with global impairments in interpersonal perception, impaired perception of their abilities, as well as specific impairments in detecting deceit and understanding attachment. These areas may be useful targets for intervention when considering risk of recidivism (re-offending). In terms of recent aggression on inpatient units, we see specific impairments among recently aggressive patients in recognizing when others are upset or frustrated, but relatively better performance for understanding proper interactions with those in power. Improving the ability of patients to detect others' agitation, restlessness, and general distress may prove useful in reducing on-unit aggressive incidents. In reducing pestering behaviour by increasing an understanding of appropriate interactions with others who are displaying negative emotional states, situations may be de-escalated rather than provoked and agitated, which often leads to verbal or physical altercations (e.g., Freyberger et al., 2008). Additionally, we recognize previous research implicating the role of substance use in the relation between schizophrenia and violence, where it has been suggested that this

combination is important to expressions of violence and aggression (Fazel et al., 2009a; Fazel et al., 2009b; Freyberger et al., 2008). Although the clinical participants were not acutely intoxicated at time of study, the fact that 80% of the clinical sample had a diagnosed comorbid substance use disorder (50% of these in remission in a controlled environment) does seem to mirror the phenomenon, and warrants an important avenue for intervention and treatment, something which is recognized and already implemented on these units.

Within the frame of interpersonal skill development, current group interventions available to our patient participants include dialectical behaviour therapy (DBT) skills groups, with a focus on interpersonal effectiveness (Linehan, 2015), and The Circles Program, which teaches boundaries and seeks to improve relationship skills (Walker-Hirsch et al., 1981). The efficacy of DBT within forensic populations is limited. A quasi-experimental study comparing DBT to treatment-as-usual on forensic inpatient units found benefits in terms of decreased hostile mood, paranoia, psychotic behaviours, and maladaptive interpersonal coping styles in the treatment group, as well as decreased staff burnout (McCann et al., 2000). A pilot study of DBT effectiveness also suggested increases in global functioning and decreases in risk factors for forensic patients with intellectual disabilities (Sakdalan et al., 2010). The efficacy of these interventions in reducing aggressive behaviour is unclear, and we posit a need for interventions with a more nuanced social cognitive focus. There are a number of psychosocial interventions that have been developed in order to improve social cognitive impairments, including cognitive remediation therapies like social cognitive training (Darmedru et al., 2017). These interventions have been found useful in decreasing violence among forensic patients with schizophrenia (Darmedru et al., 2017). Validating the need for targeted interventions such as these, the current study highlights a link between specific social cognitive impairments and aggression.

This study lends support for the idea that violent individuals with psychosis may not be processing social situations in an appropriate way. It appears that forensic patients struggle in reading both verbal and non-verbal cues within social situations, lacking interpersonal sensitivity. This provides implications for police, as individuals with mental illness are three times more likely to interact with police, and these interactions often lead to apprehensions for transport to hospital (Hartford et al., 2005). The current study provides empirical support for aspects of the "Guidelines for Working with the Mental Health System," developed by the Canadian Association of Chiefs of Police, which continue to be implemented within police forces across Canada (Coleman & Cotton, 2010). Notably, our study lends support for the need for specially trained officers in a) effective communication with those with mental illness, b) de-escalation techniques, c) mental health stigma, and d) risk assessment (Coleman & Cotton, 2010). In addition to specially trained officers, there is a need for joint mobile crisis teams comprised of police and mental health workers like COAST (Crisis Outreach and Support Team), a partnership between St. Joseph's Healthcare Hamilton, Hamilton Police Services, and Halton Regional Police Services (Coleman & Cotton, 2010). This is not only important for increasing public perception of safety, but also to increase patient and officer safety within these interactions.

While we did not present any prospective data and cannot report whether these social cognitive measures predict aggressive behaviour, it does appear that they are useful in differentiating those who have displayed historical and recent aggressive behaviour. While cognitive measures and a detailed psychosocial history are currently included in clinical risk assessments on these forensic units, it might prove useful to incorporate more social cognitive measures. This study highlights the utility of the IPT-15, a measure of interpersonal perception,

in differentiating recently aggressive and not-recently aggressive forensic patients. The IPT-15 is a more holistic measure of verbal and non-verbal cues, in comparison to the RMET for example, and might show greater utility in assessment (Costanzo & Archer, 1989). The PAI was also useful in detecting differences in levels of aggression between the forensic sample and healthy controls, providing some evidence for its continued use in clinical risk assessment on these units. Findings of socially desirable responding (high PIM scores) being associated with lower self-reported aggression in forensic samples has been found previously in the literature and seems to be part of the phenomenon of impaired social cognition findings (Newberry & Shuker, 2012; Walters et al., 2003). Despite an elevated PIM, the forensic group still showed a higher degree of physical aggression traits than controls, providing evidence that the PAI is useful in samples attempting to present themselves more favourably.

Strengths & Limitations

A major strength of this study is the original contribution conceptualizing violence based on recent aggression in the investigation of impairments among forensic patients on social cognitive measures. Utilizing an index offence that was potentially years prior, and may have been a 'one-off' event, might not be the most accurate method of defining aggression within this population. Utilizing a more proximal measure of aggression may highlight patients that continue to be aggressive in-hospital, potentially identifying patients who display more chronic aggression. Additionally, rather than a reductionistic approach, we utilized a more holistic measure of social cognition (IPT-15), which increases the ecological validity of the study and the ability to translate these findings to real-world settings (Vaskinn et al., 2009). Another strength of the study was the high level of patient engagement, with only one patient failing a validity

check on one of the self-report measures. Most patient participants reported that they were eager and excited to participate, as it provided a break in routine.

Overall, a difficulty in recruitment within this population led to small samples which we suggest impacted our statistical power to detect effects. We addressed this by emphasizing effect sizes in the interpretation of our results, rather than relying solely on statistically significant *p*-values, as even a medium effect of 0.5 is considered meaningful in clinical settings. Another limitation is reflected by the relationship status of participants, with more single patients than healthy controls, which we suggest is consistent with the phenomenon of impaired social cognition findings. A further demographic limitation includes the lower level of education among the forensic sample in comparison to healthy controls. Barriers to completing secondary education and pursuing post-secondary education within the clinical group (e.g., challenges due to psychosis and substance use, social and economic disadvantages etc.) were likely a factor. In anticipation of this, we sought measures that were believed to be less related to general intellectual functioning. For example, many studies find no relation between the RMET and general intellectual functioning, with a meta-analysis suggesting a small positive relation (r = 0.24; e.g., Baker et al, 2014; Baron-Cohen et al., 1997; Baron-Cohen et al., 2001; Tager-Flusberg & Sullivan, 2000). We also made attempts at actively recruiting healthy controls with lower levels of education and were successful in recruiting those with some college education or college diplomas.

Another limitation of this study was a bias in participant recruitment, specifically with the forensic sample. Due to the nature of the study being presented as reflecting social skills and social situations, patients who find themselves struggling in those areas may have been disinclined to participate. It was also suggested by nursing staff that those patients who were

more acutely psychotic may have been wary of interacting with a stranger (the author) for the time required to complete the experiment. In fact, a number of patients cited the time requirement as a reason for their disinterest. The clinical sample was likely not acutely psychotic as none of the patient participants were being held on 30-day assessments; this was verified by clinical nurse reports where only three patients were charted as having overt psychotic symptoms at the time of the study. Unfortunately, formal and more comprehensive evaluation of psychotic symptomology was not available for this study (e.g., The Positive and Negative Syndromes Scale). Thus, it is possible we did not capture patients with more severe psychopathology and social cognitive impairments.

Although there were ten patients who exhibited recent aggressive behaviour, these incidents were low severity according to AIS scores. Most of these individuals were exhibiting rude or argumentative behaviour, rather than outright physical aggression toward others. Thus, there was not a gross difference between the recently aggressive and not-recently aggressive groups in terms of aggression.

Future Directions

Looking towards future studies, it would be interesting to incorporate comparison samples of non-forensic psychiatric patients with psychosis, as well as a sample of correctional offenders. This would allow for greater specificity in understanding which impairments are related more to history of violence or psychosis. Additionally, continuing to conceptualize violence in terms of recent aggression, it would be useful to include higher-level measures of social cognition that might be more sensitive to identifying impairments. For example, these include the cognitive component of ToM (e.g., social faux pas, ambiguous intentions), reflecting

the ability to infer another's thoughts, intentions, and beliefs, which is related to other cognitive abilities and intelligence (e.g., recognizing that others may have false beliefs), in distinction to the affective component utilized in the current study (Murphy, 2006; Tager-Flusberg & Sullivan, 2000). Additionally, addressing morality within social contexts may also highlight social cognitive processes (e.g., Nazarov et al., 2016). These would require including some measure of intelligence, as intellectual functioning varies widely within forensic settings. Although the TEQ was not correlated with PIM, it would still be useful to utilize behavioural measures of empathy that do not require self-reporting, like a picture viewing paradigm (Westbury & Neumann, 2008). These may actually prove more sensitive to differences than self-report measures. Finally, and most importantly, identifying impairments in social cognition on the basis of a broad video-based measure reflecting real-world scenarios suggests virtual reality (VR) measures are a natural extension of this work. Utilizing these VR measures may allow for a less reductionistic approach with higher external validity in assessing social cognition and as well as possible future developments in VR-based interventions.

Conclusion

Aggression, particularly inpatient aggression, has a profound impact at an individual and staff level but also contributes to increased healthcare costs. The underlying etiology of aggression still remains poorly understood across the research literature, and even more so among individuals with psychosis. Working with an understudied and stigmatized population at-risk for aggression provides a unique opportunity to gain insight into the origins of aggressive behaviour in the context of severe mental illness and increase our knowledge base of human aggression more broadly.

Within a social cognitive frame, the findings of this study suggest violent forensic patients are globally impaired, but at the same time overestimate their abilities, in their judgments of interpersonal interactions. More specifically, a pattern of impairments emerges in which forensic patients with violent index offences show impairments in recognizing attachment and deception, with recently aggressive forensic patients impaired in recognizing negative non-verbal cues. Importantly, this video-based measure of real-world interpersonal scenarios identifies impairments in the ability to detect verbal and non-verbal cues that might help ward off aggressive outbursts as a situation is provoked and escalated.

Clinically, this study has strong implications for assessment and treatment. This study provides evidence for the need of implementing already available treatments that target social cognition directly, a social cognitive approach in risk assessment, and the need for specially trained police officers and crisis teams including police and mental health workers. Importantly, we identify VR as a natural extension of this work and look towards the potential utility of VR measures within social cognitive assessment and intervention.

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Appendix A

Demographic Questions

Age: _____

Gender:
a) Male
b) Female
c) Something else

Marital Status:
a) Single
b) Boyfriend/Girlfriend
c) Married/Common Law
d) Divorced
e) Widowed

Education Level:
a) Some elementary
b) Elementary diploma
c) Some high school
d) High school diploma
e) Some college
f) College diploma
g) Some university
h) University degree

Appendix B

Toronto Empathy Questionnaire
(Spreng et al., 2009)

Directions: Below is a list of statements. Please read each statement carefully and rate how frequently you feel or act in the manner described. Circle your answer on the response form. There are no right or wrong answers or trick questions. Please answer each question as honestly as you can.

Never= 0; Rarely = 1; Sometimes = 2; Often = 3; Always = 4.

1. When someone else is feeling excited, I tend to get excited too
2. Other people's misfortunes do not disturb me a great deal R
3. It upsets me to see someone being treated disrespectfully
4. I remain unaffected when someone close to me is happy R
5. I enjoy making other people feel better
6. I have tender, concerned feelings for people less fortunate than me
7. When a friend starts to talk about his/her problems, I try to steer the conversation towards something else R
8. I can tell when others are sad even when they do not say anything
9. I find that I am "in tune" with other people's moods
10. I do not feel sympathy for people who cause their own serious illnesses R
11. I become irritated when someone cries R
12. I am not really interested in how other people feel R
13. I get a strong urge to help when I see someone who is upset
14. When I see someone being treated unfairly, I do not feel very much pity for them R
15. I find it silly for people to cry out of happiness R
16. When I see someone being taken advantage of, I feel kind of protective towards them

Note. R: reverse scored

Appendix C

Aggressive Incidents Scale
(Chaimowitz & Mamak, 2011)

LEVEL	INCIDENT	DESCRIPTION
9	Violent Assault with Serious Injury: Possible Life and Death Possible Police Call	Serious violent assault or intrusive and/or violent sexual assault requiring medical attention. Police could be summoned.
8	Violent Assault - No clear Antecedents	Impulsive interpersonal assault in which no apparent precursors are identifiable or clearly violent sexual contact, may be over or under clothing. Features of nonsexual aggression (as described below) may be present.
7	Violent Assault - Antecedents Identifiable	Aggression involves physical contact with another person, e.g. kicking, punching, spitting, scratching; or, violent sexual contact-may be over or under clothing. Features of nonsexual aggression (as described below) may be present.
6	Push / Shove	Clearly aggressive push or shove, e.g. push has significant force and the target falls to the ground or, uninvited embrace or touch of any kind, use of force may be present to subdue or restrain, contact directed to sexual features (e.g. groping buttocks, breasts, groin).
5	Destruction of Property	Aggression is directed at property; personal or hospital property is damaged. e.g. broken chair, table thrown; or, hands off sexual behaviour, including exposing body parts.
4	Inappropriate Physical Contact	No direct threat is uttered but physical contact inappropriate (ie, brushes someone aside communicating “get away from me”); or, uninvited embrace or touch of any kind, even if not intended as aggressive (brushing against body, hug or kiss)-include attempted physical contact.
3	Intimidating, Threatening, Personal Space Violated	Patient’s body language and words are threatening in nature, e.g. patient is in your personal space and taken aggressive/confrontational stance; or, patient is engaging in verbal intimidation; or is taunting another (ie. bullying); or, leering, following, sexual gestures, showing sexual images or writings.
2	Intimidating, Raised Voice	Patient is verbally intimidating, possibly yelling and possibly using profanities; or, individual is participating in or is an active bystander of someone being bullied or verbally taunted/intimidated; or verbally aggressive content may be sexualized.
1	Rude, Argumentative	Patient is being rude, argumentative, and possibly challenging staff authority; or, making sexual comments.
N: No Intervention - P: Physical Intervention - V: Verbal Intervention - PC: Police Called		