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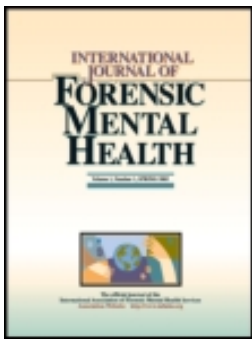
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# Identifying Aggression in Forensic Inpatients Using the MMPI-2-RF: An Examination of MMPI-2-RF Scale Scores and Estimated Psychopathy Indices

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Prior research has examined the relationship between personality characteristics and problematic behaviors, suggesting the utility of self-report personality measures in assessing risk of aggression. This study examined the relationship between select Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF) scales and estimated psychopathy indices derived from MMPI-2-RF scales, and institutional aggression among hospitalized pre-trial defendants. Scores on Thought Dysfunction (THD), Aberrant Experiences, Juvenile Conduct Problems, and Psychoticism-Revised (PSYC-r) were associated with mild-severe aggression. Similarly, THD and PSYC-r were associated with moderate-severe aggression. Regarding psychopathy, impulsive-antisociality, but not fearless-dominance, was associated with both aggressive outcomes. Overall, the relevant MMPI-2-RF scales demonstrated higher classification accuracy than the estimated psychopathy indices.

**Keywords:** MMPI-2-RF, institutional aggression, aggression, violence, psychopathy

Institutional aggression is a critical issue in inpatient forensic psychiatric and correctional facilities, as it places both staff and patients at risk of physical harm. Anticipating and experiencing aggression involves an emotional and financial burden on all involved parties, including patients, staff, and the institution itself (Douglas, Guy, & Hart, 2009; Nijman, Bowers, Oud, & Jansen, 2005; Nijman, Merckelbach, Evers, Palmstierna, & á Campo, 2002; Vitacco et al., 2009). The rate of inpatient aggression is estimated to be between 25% and 46% (Bader, Evans, & Welsh, 2014; Daf-fern, Howells, Ogloff, & Lee, 2005), with rates varying widely based on differing operational definitions of aggression between studies (Braithwaite, Charette, Crocker, & Reyes, 2010; Douglas et al., 2009; Guy, Edens, Anthony,

& Douglas, 2005; Vitacco et al., 2009). Accurate short-term prediction and management of aggressive behaviors in inpatient settings is necessary for maximizing the effectiveness of treatment interventions, improving monitoring procedures, and creating a more stable therapeutic environment for patients.

## Factors Associated with Inpatient Aggression

Several factors appear to differentiate patients who engage in aggression during their hospitalization from those who do not. Early research indicated that patients who committed acts of aggression were more frequently admitted involuntarily, were more frequently diagnosed with psychotic disorders, and were younger than patients who did not aggress (Nijman, Allertz, Merckelbach, á Campo, & Ravelli, 1997). Inpatient aggression has also been

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associated with impulsivity (Joyal, Gendron, & Côté, 2008), anger (Wang & Diamond, 1999), prior acts of aggression, institutional changes (e.g., in unit or treatment team), disruptive and intrusive behaviors, and problems in thinking (Braithwaite et al., 2010). Further, the literature consistently supports the relationship between psychopathy and externalizing behaviors, including aggression (e.g., Guy et al., 2005; Heilbrun et al., 1998; Reidy, Shelley-Tremblay, & Lilienfeld, 2011; Smith, Edens, & McDermott, 2013). Generally, likelihood of aggression may be impacted by level of staff experience, changes in hospital policy, composition of other patients, and multiple incidents of aggression on a unit over a short period of time (Starzomski & Wilson, 2014).

### Aggression Risk Assessment Methods

Violence risk assessment measures, such as the Historical Clinical Risk Management-20 Version 3 (HCR-20<sup>V3</sup>; Douglas, Hart, Webster, & Belfrage, 2013), Violence Risk Appraisal Guide (VRAG; Harris, Rice, & Quinsey, 1993; VRAG-R; Rice, Harris, & Lang, 2013), and the Short Term Assessment of Risk and Treatability (START; Webster et al., 2009) are useful in assessing risk of aggression in clinical, correctional, and forensic contexts. Completion of risk assessment measures typically requires comprehensive file reviews (e.g., review of correctional or psychiatric records) and potentially lengthy interviews with examinees. Unfortunately, the files needed for review are often incomplete or unavailable, particularly upon admission to psychiatric hospitals. Moreover, administering lengthy interviews may be problematic, depending on staff resources and patients' symptoms. Despite the obvious importance of violence risk assessment, psychologists and doctoral students note that they receive little, if any, formal training in violence risk assessment (American Psychological Association, 2002; Schwartz & Park, 1999), and what training is received is often described as inadequate (Gately & Stabb, 2005). This lack of training is particularly glaring in comparison to other types of psychological assessment that receive greater attention (Belter & Piotrowski, 2001).

### Self-Report Inventories and Aggression Risk

Self-report inventories of psychopathology and personality are more consistent with psychologists' typical training, are less reliant on the availability of records, take less time to complete and score, and resultantly are more cost effective than traditional risk assessments (Blais, Solodukhin, & Forth, 2014). Such measures may be administered as alternatives or supplements to risk assessment measures, as research suggests that they provide valuable prognostic information for the assessment of risk beyond what can be evaluated using traditional risk assessment measures (Gardner, Boccaccini, Biting, & Edens, 2015; Walters,

2007). For example, the Personality Assessment Inventory (PAI; Morey, 2007), Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher et al., 2001), and Minnesota Multiphasic Personality Inventory-2 Restructured Form (MMPI-2-RF; Ben-Porath & Tellegen, 2008) include items that are conceptually relevant to risk (Boccaccini et al., 2010; Gardner et al., 2015). Such measures allow clinicians to evaluate patients' thoughts, emotions, and behavioral tendencies, which may be otherwise unknown from interviews and records (Walters & Duncan, 2005), and often include indices which assess response bias. Therefore, information from self-report inventories of psychopathology and personality may be useful in identifying individuals who should be more thoroughly evaluated for violence risk, particularly if such measures are administered early in the patient's hospitalization. Several studies have examined the use of self-report measures in informing behavioral outcomes, such as post-release recidivism (Boccaccini et al., 2010; Walters & Duncan, 2005), institutional violence (Wang & Diamond, 1999), general disciplinary problems (Walters, Duncan, & Geyer, 2003), and institutional adjustment (Walters, 2007; Walters et al., 2003).

In particular, the MMPI-2 and MMPI-2-RF appear to assist in differentiating individuals who engage in criminal activities and exhibit behavioral problems from those who do not. Megargee, Mercer, and Carbonell (1999) identified the following scales as being the most prominent MMPI-2 scales in the profiles of individuals convicted of felony offenses: F (Infrequency), Scale 4 (Psychopathic Deviate; Pd), Scale 6 (Paranoia; Pa), Scale 8 (Schizophrenia; Sc), and Scale 9 (Hypomania; Ma), while the MacAndrew Alcoholism Scale-Revised (MAC-R) was particularly associated with criminality. Citing MacAndrew (1981), Megargee and colleagues suggested that non-mentally ill offenders with elevated scores on the MAC-R, Pd, Ma, and ASP (Antisocial Practices) scales of the MMPI-2 may be at increased risk for antisocial behavior, due to associated characterological problems such as difficulties with impulse control. Several additional scales of the MMPI-2-RF are conceptually related to poorly controlled behavior, such as BXD (Behavioral/Externalizing Dysfunction) and DISC-r (Disconstraint-Revised), while others reflect a tendency to engage in rule breaking and irresponsible behavior in childhood and adulthood, such as JCP (Juvenile Conduct Problems) and RC4 (Antisocial Behavior; asb). ANP (Anger Proneness), AGG (Aggression) and AGGR-r (Aggressiveness-Revised) have been well-validated as scales which assess proclivity toward aggressive behaviors in various settings (Greene, 2011; Ben-Porath & Tellegen, 2008), although some researchers have noted low internal reliability in recommending that researchers not use AGG in assessing a person's inclination to violence (Butcher & Williams, 2012). Regardless, recent research identified RC4, JCP, AGG, and ANP among the strongest predictors of institutional violence in a forensic hospital setting,

controlling for hospitalization time, age, and gender (Tarescavage, Burchett, & Glassmire, 2015). Additionally, researchers have evaluated the ability of the MMPI-2-RF to capture various aspects of psychopathy (Sellbom et al., 2012; Phillips, Sellbom, Ben-Porath, & Patrick 2013), which are well-established predictors of violence.

### Psychopathy and Aggression

The presence versus absence of psychopathy consistently differentiates aggressive and nonaggressive individuals, including those with severe mental illness (e.g., Heilbrun et al., 1998; Guy et al., 2005; Pederson, Kunz, Rasmussen, & Elsass, 2010; Tengström, Grann, Långström, & Kullgren, 2000), and also informs the motivations behind aggressive behaviors. For example, Bo and colleagues (2013) identified psychopathy as being strongly related to aggression in various settings, including forensic psychiatric and inpatient settings. Camp and colleagues (2013) noted that traits which characterize psychopathy may also be elevated in non-psychopathic individuals who are at risk for violent behaviors. Vitacco and colleagues (2009) determined that psychopathy was a strong predictor of instrumental aggression (i.e., the tendency to use aggression for personal gain) in forensic patients, whereas anger was predictive of reactive aggression (i.e., becoming aggressive in response to environmental stressors). Although there is a well-researched association between psychopathy and instrumental aggression (see Blais et al., 2014), Laurell, Belfrage, and Hellström (2010) indicated that individuals who produce high scores on measures of psychopathy may also exhibit reactive aggression.

Thus, in addition to broadband measures of risk, psychopathology, and personality, specific measures of psychopathy are often effective in assessing violence risk. Such measures typically assess characteristics including disinhibition, negative or diminished affect, a tendency toward externalizing behaviors, and criminogenic attitudes (Camp et al., 2013; Guy et al., 2005; Pedersen et al., 2010). Consistent with offender samples (Blais et al., 2014; Hare, 2003), an estimated 10% to 15% of forensic psychiatric patients exhibit elevated levels of psychopathic traits (Hare, Hart, & Harpur, 2001; Hart & Hare, 1989). However, different norms for forensic psychiatric and offender populations indicate that there are fewer high scorers on measures of psychopathy (e.g., PCL-R) in forensic psychiatric samples. In their meta-analysis of psychopathy as a predictor of institutional misconduct among adults, Guy and colleagues (2005) noted that failure to consider psychopathy in violence risk assessment indicates “possible evidence of professional negligence” (p. 1061). However, it may not be feasible to incorporate measures of psychopathy into already lengthy risk assessments.

Psychopathy is often conceptualized using a two factor model, in which Factor 1 describes the personality

components of psychopathy, such as fearlessness and dominance, and Factor 2 describes the behavioral aspects of psychopathy, such as impulsivity and social deviance. Some evidence suggests that elevated scores on specific subscales of psychopathy measures (e.g., scales which assess specific factors or facets of psychopathy), in addition to total scores on such measures, differentiate those who aggress from those who do not. The Psychopathic Personality Inventory (PPI; Lilienfeld & Widows, 2005) is a self-report measure which correlates highly with the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), the gold-standard measure of psychopathy (Blais et al., 2014), and yields scale scores for Factor 1 and Factor 2 of psychopathy in addition to a total score. Camp and colleagues (2013) found that the PPI, and primarily its Impulsive-Antisociality subscale (and Fearless-Dominance subscale, to a lesser degree), was related to violence in a combined sample of correctional inmates and individuals in a residential substance abuse treatment facility. Smith and colleagues (2013) similarly identified an association between scores on Psychopathic Personality Inventory-Revised (PPI-R; Lilienfeld & Widows, 2005) scales (i.e., Fearless-Dominance and Self-Centered Impulsivity) and inpatient aggression occurring during the course of forensic psychiatric hospitalizations.

### Psychopathy and the MMPI-2-RF

Sellbom and colleagues (2012) recently identified a number of MMPI-2-RF Restructured Clinical and Specific Problems scales that are conceptually related to psychopathic traits, such as fearlessness and interpersonal dysfunction. These included RCd (Demoralization), RC1 (Somatic Complaints), RC2 (Low Positive Emotions), RC3 (Cynicism), RC4 (Antisocial Behavior), RC6 (Ideas of Persecution), RC7 (Dysfunctional Negative Emotions), RC8 (Aberrant Experiences), RC9 (Hypomanic Activation), BRF (Behavior Restricting Fears), MSF (Multiple Specific Fears), IPP (Interpersonal Passivity), SAV (Social Avoidance), SHY (Shyness), and DSF (Disaffiliativeness). Using multiple regression, separate linear combinations of these scales were derived to predict the PPI Psychopathy Total, Fearless-Dominance, and Impulsive-Antisociality factor scores in a mixed sample of college students and male prison inmates. Results indicated that the MMPI-2-RF scales assessing grandiosity, low reactivity to stress, fearlessness, and proactive aggression (i.e., RC7, RC8, RC9, MSF, IPP, SAV, SHY, DSF) predicted Fearless-Dominance, as measured by the PPI. Meanwhile, MMPI-2-RF scales assessing disinhibition/, impulsivity, nonconformity, social disengagement and disaffiliativeness, interpersonal mistrust, sensation seeking, activation, and reactive aggression (i.e., RC1, RC2, RC4, RC5, RC9, DSF) corresponded with Impulsive-Antisociality. Phillips and colleagues (2013) expanded on this study by adding a sample of female prison inmates. They found that Fearless-Dominance was related

to boldness, high social efficacy, reduced affective responsiveness, narcissism, and sensation seeking (i.e., RCd, RC1, RC2, RC7, MSF, IPP, SAV, SHY), while Impulsive-Antisociality was related to social deviancy, disinhibition, callousness, guiltlessness, and general disregard for others (i.e., RCd, RC1, RC3, RC4, RC6, RC7, RC8, RC9, BRF, and DSF). The addition of female inmates substantially changed the results, with only five predictors of Fearless-Dominance and four predictors of Impulsive-Antisociality replicating. Indeed, some research suggests that psychopathy manifests differently in males and females (e.g., Cale & Lilienfeld, 2002).

Rock, Sellbom, Ben-Porath, and Salekin (2013) demonstrated that such estimated psychopathy indices on the MMPI-2-RF were useful in predicting recidivism and treatment completion for convicted male batterers. However, no published studies to date have investigated the association between MMPI-2-RF profiles, including the psychopathy prediction equations derived from MMPI-2-RF scores, and institutional aggression. The current study assessed whether and to what extent the MMPI-2-RF is associated with aggression in a sample of male pre-trial defendants hospitalized for restoration of competency to stand trial. We hypothesized that the MMPI-2-RF scales associated with poor impulse control, irritability, low frustration tolerance, and instrumentally aggressive behavioral tendencies (i.e., THD, BXD, RC4, RC8, RC9, JCP, AGG, ANP, PSYC-r, DISC-r, and AGGR-r) would differentiate patients who aggressed during the course of inpatient hospitalization from those who did not. Additionally, we evaluated whether estimated psychopathy index scores, produced using the regression formula from Sellbom and colleagues (2012) and described below in the Method section, would be more effective in differentiating between aggressive and non-aggressive patients than the aforementioned MMPI-2-RF scales, and also more effective than combinations of the relevant MMPI-2-RF scales.

## METHOD

### Participants

Archival data from 219 male pre-trial defendants admitted to a state forensic psychiatric hospital between February 2011 and June 2014, and who completed the MMPI-2-RF, were included in this study. Patients who provided inconsistent (i.e., VRIN-r  $\geq$  80T; TRIN-r  $\geq$  80T;  $n = 64$ ), or otherwise invalid (i.e., Fp-r  $\geq$  100T;  $n = 57$ ) MMPI-2-RF profiles according to the MMPI-2-RF manual were excluded from further analysis ( $n = 91$ ), resulting in a final sample of 128 patients. These exclusion criteria were implemented to maximize consistency with prior studies that examined estimated psychopathy indices derived from MMPI-2-RF scales (Rock et al., 2013; Sellbom et al.,

2012). The high rate of inconsistent profiles in this sample appears related to cognitive functioning and response style (Gu et al., in review; Reddy et al., 2013). Excluded patients did not differ demographically from the final sample, with the exception that excluded patients completed one less year of education ( $M = 10.8$ ,  $SD = 2.6$ ) than included patients ( $M = 11.6$ ,  $SD = 2.3$ ),  $t(334) = 2.93$ ,  $p = .004$ ; less than one-quarter ( $n = 73$ ; 22.8%) of included patients reported having completed high school or earned a GED. A subset of excluded patients ( $n = 48$ ) were coded for aggressive incidents (process described below); for excluded patients, the base rate of Mild-Severe Aggression was 50.0%, and the base rate of Moderate-Severe Aggression was 43.8%. Excluded patients were as likely to commit acts of aggression as included patients, with regard to both Mild-Severe Aggression ( $\chi^2 = 1.25$ ,  $p = .26$ ), and Moderate-Severe Aggression ( $\chi^2 = .08$ ,  $p = .78$ ).

The majority of the final sample ( $n = 78$ ; 60.9%) identified as Black/African-American; 17 (13.3%) identified as Hispanic, 29 (22.7%) identified as Caucasian, three (2.3%) identified as Asian, and one (0.8%) identified as "Other." The patients averaged 37.5 years of age ( $SD = 11.3$ ; range = 20–63 years) at the time of testing. More than half ( $n = 80$ ; 63.5%) were diagnosed with a psychotic disorder upon admission to the hospital, and 40 (31.7%) were diagnosed with a mood disorder. Of the remaining patients, four (3.2%) were diagnosed with a substance use disorder without a comorbid Axis I disorder (using DSM-IV nosology), and two (1.6%) were diagnosed with an adjustment disorder. Two-thirds of patients ( $n = 85$ ; 66.4%) were diagnosed with a comorbid substance use disorder. All individuals were hospitalized for restoration of competency to stand trial, with a median length of hospitalization of 13 weeks. Patients reported an average of 4.2 ( $SD = 6.0$ ; range = 0–35) civil psychiatric hospitalizations prior to the current hospitalization. All patients were charged with at least one felony, and 74 (66.1%) were charged with a violent offense; charge information was missing for 16 cases. The majority of patients ( $n = 94$ ; 73.4%) had one or more prior convictions. However, only 39 patients (31.2%) had been previously incarcerated for more than 12 months, suggesting that patients' prior convictions were generally for misdemeanor offenses.

### Measures

#### *Wide Range Achievement Test*

The Wide Range Achievement Test (WRAT4; Wilkinson & Robertson, 2006) Word Reading subtest was administered to determine each patient's approximate reading level. The patient's estimated reading level (i.e., grade equivalent) was used to determine the appropriate administration format of the MMPI-2-RF.

### *Minnesota Multiphasic Personality Inventory-2 Restructured Form*

The MMPI-2-RF (Ben-Porath & Tellegen, 2008) is a 338-item self-report measure with all items taken from its predecessor, the MMPI-2. The MMPI-2-RF is a broadband measure of psychopathology and personality, composed of 42 substantive scales (9 Validity Scales, 3 Higher Order Scales, 9 Restructured Clinical Scales, 23 Specific Problems Scales, 2 Interest Scales, and 5 Personality Psychopathology Five Scales). Twenty-two of the non-validity scales were included in the current analyses. Patients demonstrating at least a sixth grade reading level on the WRAT4 Word Reading subtest were administered the paper form of the MMPI-2-RF. Patients who did not demonstrate at least a sixth grade reading level were administered the audio-CD version of the MMPI-2-RF, as were patients the evaluators determined would benefit from the accommodation.

### *START Outcomes Scale*

The START Outcomes Scale (SOS; Nicholls et al., 2007) is an outcome measure that is used to classify 12 forms of problematic behaviors. In the current study, domains of interest included Verbal Aggression (e.g., verbal threats), Physical Aggression Against Others (e.g., punching), Aggression Against Property (e.g., throwing objects), Sexual Aggression (e.g., exposure), and Stalking (e.g., repeatedly contacting specific individuals). Each behavior was rated on a scale from 1 (least severe) to 4 (most severe). Vague instances of aggression noted in the hospital records without sufficient detail for raters to determine the appropriate severity rating (e.g., "physical altercation with peer"), were identified but not rated for severity. Verbal threats of aggression to third parties or individuals not at the hospital (e.g., via telephone) were not coded as verbal aggression; verbal threats by this description in the context of an emotional outburst were coded generically as level 2 for "temper outburst." Table 1 provides brief descriptions of the behaviors that are captured by each category of the SOS, and indicates which behaviors are included in each of the two dichotomous outcome variables used in the present study. Comprehensive hospital records were reviewed and coded by a minimum of two independent raters, who collaboratively reached consensus on final ratings of aggressive behaviors.

### *Procedure*

Within a few weeks of admission to the hospital, patients were administered a standard battery of psychological measures, including the WRAT4 and MMPI-2-RF, to assist in treatment planning. The median length of hospitalization was 17 days (range = 6–71) at the time of testing. Hospital records, including progress notes, official hospital incident reports, psychological testing reports, and reports of clinical

interviews, were reviewed by psychology graduate students to identify any acts of aggression exhibited by each patient during the course of hospitalization, as well as relevant demographic information. Any aggressive incidents that occurred between each patient's dates of admission and discharge from the hospital were classified by severity using the SOS; instances of aggression noted in the chart as having occurred prior to admission were not coded for this study. Using the SOS ratings, two composite outcome variables were generated to reflect the presence or absence of aggressive behaviors during hospitalization. In both cases, five classes of behaviors were considered: verbal aggression, physical aggression against others, aggression against property, sexual aggression, and stalking. The proportions of patients who committed at least one act of aggression in each domain, and at particular severity levels, between time of admission to and discharge from the hospital, are presented in Table 1.

The first definition of aggression (i.e., Mild-Severe Aggression) was derived from the START manual (Webster et al., 2009), in which aggression is defined broadly as any threatened, attempted, or actual harm to oneself or others, with the exception that aggression against one's self was not included in the current study. Rather, an act was considered aggressive if it involved physical aggression against others, aggression against property, sexual aggression, or stalking, and was categorized on the SOS as 1–4 in level of severity; or if it involved verbal aggression and was categorized as 2–4 in level of severity. This last condition was established to exclude minor, commonly occurring and non-threatening acts of verbal aggression (e.g., cursing). In addition to the aforementioned behaviors, instances of aggression which were documented as having occurred, but for which the level of severity could not be determined based on hospital records, were also included in this broad definition of aggression.

The second definition of aggression (Moderate-Severe Aggression) was derived from the HCR-20<sup>V3</sup> manual (Douglas et al., 2013), which utilizes a narrower definition of aggression (i.e., interpersonal violence) inclusive of threatened, attempted, or actual bodily harm to another person. Following this definition, aggressive behaviors included those that were categorized using the SOS as 3–4 in level of severity for verbal aggression, 1–4 in severity for physical aggression against others, 3–4 in severity for aggression against property (i.e., aggressive behavior that caused a threat to people), 2–4 in severity for sexual aggression, and 3–4 in severity for stalking. With the exception of physical aggression, in which any instance of aggression was included, instances of aggression for which the severity could not be determined were excluded from this second definition.

Both criterion variables (i.e., Mild-Severe Aggression and Moderate-Severe Aggression) were coded dichotomously, such that a patient either exhibited at least one

TABLE 1  
Aggressive Behaviors Categorized Using the START Outcomes Scale

	Presence		Description	Frequency	
	<i>N</i>	%		<i>N</i>	%
VA	78	60.9	<sup>a</sup> Level Unknown	18	14.1
			1. Shouts angrily, curses mildly, or makes personal insults.	59	46.1
			<sup>a</sup> 2. Curses viciously, is severely insulting, has temper outbursts.	44	34.4
			<sup>b</sup> 3. Impulsively threatens violence towards others.	27	21.1
			<sup>b</sup> 4. Makes clear threats of violence toward others repeatedly or deliberately (e.g., to gain money or sex).	10	7.8
PAAO	54	42.2	<sup>b</sup> Level Unknown	14	10.9
			<sup>b</sup> 1. Makes threatening gestures, swings at people, grabs at clothing, throws objects dangerously.	37	28.9
			<sup>b</sup> 2. Strikes, pushes, scratches, pulls hair (without injury).	11	8.6
			<sup>b</sup> 3. Kicks, punches, bites. Action results in mild-moderate physical injury (e.g., bruises, sprains, welts).	27	21.1
			<sup>b</sup> 4. Attacks others, uses weapons, resulting in severe physical injury (e.g., fracture, loss of teeth or consciousness, lacerations, internal injury).	3	2.3
AAP	28	21.9	<sup>a</sup> Level Unknown	3	2.3
			<sup>a</sup> 1. Slams door angrily, throws objects down, pushes furniture.	15	11.7
			<sup>a</sup> 2. Kicks furniture, throws objects, defaces property.	12	9.4
			<sup>b</sup> 3. Breaks objects, rips clothing, smashes windows, urinates/defecates on floor.	8	6.3
			<sup>b</sup> 4. Sets fires, ransacks room, uses weapons.	0	0
SA	21	16.4	<sup>a</sup> Level Unknown	2	1.6
			<sup>a</sup> 1. Makes sexually inappropriate or suggestive invitations, gestures or statements.	14	10.9
			<sup>b</sup> 2. Makes sexually threatening statements, exposes genitals to others, masturbates in public or is voyeuristic.	10	7.8
			<sup>b</sup> 3. Sexually touches or fondles others non-consensually.	4	3.1
			<sup>b</sup> 4. Commits coercive or violent sexual assaults (with/without penetration; oral, genital, or anal), uses weapons.	1	0.8
STALK	13	10.2	<sup>a</sup> Level Unknown	2	1.6
			<sup>a</sup> 1. Non-contact (e.g., talking about, loitering near, or following causes discomfort; disregard for personal space or privacy).	6	4.7
			<sup>a</sup> 2. Contact (e.g., phoning, sending notes, talking to victim in person).	5	3.9
			<sup>b</sup> 3. Aggressive/threatening contact (e.g., threats to damage property, threats to self, threats to harm the target, verbal abuse).	3	2.3
			<sup>b</sup> 4. Violent contact (e.g., physical aggression, destruction to property). Any stalking behavior that results in legal charges or restrictions or in violation of supervision.	0	0

Note. VA = Verbal Aggression; PAAO = Physical Aggression Against Others; AAP = Aggression Against Property; SA = Sexual Aggression; Stalk = Stalking. Mild-Severe Aggression base rate = 59.4%; Moderate-Severe Aggression base rate = 46.1%.

<sup>a</sup>This level is included only in the Mild-Severe Aggression definition of aggression.

<sup>b</sup>This level is included in both the Mild-Severe Aggression and Moderate-Severe Aggression definitions of aggression.

From "START Outcomes Scale," by T. L. Nicholls, N. Gagnon, A. G. Crocker, J. Brink, S. Desmarais, and C. Webster, 2007, Vancouver, BC Mental Health & Addiction Services. Copyright 2007 by T. L. Nicholls. Adapted with permission.

behavior that fell into any of the aforementioned severity levels, or did not exhibit any aggressive behaviors at these levels during the course of his hospitalization. Therefore, patients were categorized as being either aggressive, or not aggressive, according to both definitions of aggression. Interrater reliability analysis based on a subsample of patients ( $n = 101$ ) indicated almost perfect agreement between raters with regard to Mild-Severe Aggression (Kappa = .87;  $p < .001$ ), and Moderate-Severe Aggression (Kappa = .90;  $p < .001$ ).

## Statistical Analyses

Correlational analyses were performed to evaluate length of hospitalization as a possible covariate in subsequent analyses. Contrary to expectation, length of hospitalization was unrelated to both Mild-Severe Aggression ( $r_{pb} = .08$ ,  $p = .41$ ) and Moderate-Severe Aggression ( $r_{pb} = .16$ ,  $p = .09$ ). In other words, the likelihood of a patient committing acts of aggression did not significantly increase as the length of hospitalization increased. Therefore, length of



hospitalization was not entered as a covariate in subsequent analyses.

A priori, scores on the following MMPI-2-RF scales were hypothesized to differentiate aggressive and non-aggressive patients due to their association with poor impulse control, irritability, low frustration tolerance, or instrumentally aggressive behavioral tendencies: Thought Dysfunction (THD), BXD, RC4, RC8, RC9, JCP, Aggression (AGG), Anger Proneness (ANP), Psychoticism-Revised (PSYC-r), DISC-r, and Aggressiveness-Revised (AGGR-r). Two sets of independent samples *t*-tests were performed to identify which of the pre-selected MMPI-2-RF scales significantly differed between patients who engaged in aggression (defined as Mild-Severe Aggression and Moderate-Severe Aggression) and those who did not aggress. Correlational analyses between the significant MMPI-2-RF scales were then conducted to determine whether there was an issue of multicollinearity; in particular, scales which assess difficulties in thinking were expected to be highly correlated. Logistic regression analyses were conducted with the variables identified as significantly related to aggression, based on the *t*-test analyses, entered as independent variables. Relative Risk Ratios were computed for each of the significant MMPI-2-RF scales, to explore potential alternate cutoff scores for identifying aggressive patients.

Subsequently, the three psychopathy indices Sellbom and colleagues (2012) generated to estimate the Psychopathy Total, Fearless-Dominance, and Impulsive-Antisociality scores of the PPI were computed using MMPI-2-RF scores. Uniform *T*-scores for each of the MMPI-2-RF scales (RCd, RC1, RC2, RC3, RC4, RC6, RC7, RC8, RC9, BRF, MSF, IPP, SAV, SHY, and DSF) were converted to *z* scores, then multiplied by the relevant beta weight; these

products were then summed. Sellbom and colleagues' scores were used instead of those derived by Phillips and colleagues (2013) because the present sample only included male pre-trial patients. Correlations between the three PPI predictor scores were computed to evaluate for multicollinearity; Estimated Psychopathy Total (Py-Total) was expected to be dropped from further analyses due to a high correlation with Estimated Fearless-Dominance (Py-FD) and Estimated Impulsive-Antisociality (Py-IA). Finally, logistic regression analyses were performed to determine which predictor scores were associated with aggressive behaviors. This was performed using Mild-Severe Aggression as the dependent variable, and again using Moderate-Severe Aggression as the dependent variable.

## RESULTS

In our sample, 59.4% of patients committed aggressive behaviors as defined broadly (Mild-Severe Aggression), and close to half (46.1%) committed aggressive behaviors using a stricter definition (Moderate-Severe Aggression). Excluding verbal aggression entirely, the base rate for Mild-Severe Aggression remained high at 56.3%, and 43.8% for Moderate-Severe Aggression, indicating that very few patients were classified as aggressive based solely on verbal behaviors.

### MMPI-2-RF Scales

Two sets of independent samples *t*-tests were performed to identify which MMPI-2-RF scales significantly differentiated aggressive and non-aggressive patients (see Table 2). Patients who exhibited Mild-Severe Aggression produced

TABLE 2  
MMPI-2-RF Scale Scores and Aggressive Behaviors

Scale	Mild-Severe Aggression					Moderate-Severe Aggression				
	M <sub>Non</sub> (n = 52)	M <sub>Agg</sub> (n = 76)	<i>t</i>	<i>p</i>	Cohen's <i>d</i>	M <sub>Non</sub> (n = 69)	M <sub>Agg</sub> (n = 59)	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
THD	54.21	61.71	2.88	.005**	.53	56.10	61.66	2.14	.04*	.38
BXD	53.90	56.83	1.42	.16	.26	54.48	57.00	1.24	.22	.22
RC4	56.27	59.33	1.39	.17	.25	57.14	59.19	.94	.35	.17
RC8	51.12	56.12	2.29	.02*	.42	52.58	55.85	1.50	.14	.27
RC9	45.73	49.07	1.57	.12	.29	46.25	49.44	1.52	.13	.27
ANP	46.68	48.80	1.65	.10	.28	47.35	48.45	.80	.43	.14
JCP	55.63	60.30	2.07	.04*	.37	57.23	59.78	1.13	.26	.20
AGG	47.56	50.46	1.44	.15	.26	48.45	50.25	.90	.37	.16
AGGR-r	54.35	56.37	1.14	.26	.21	54.81	56.41	.91	.37	.16
PSYC-r	51.92	59.87	3.15	.002**	.58	53.80	59.97	2.44	.02*	.43
DISC-r	54.88	56.13	.63	.53	.11	54.97	56.39	.72	.47	.13

Note. THD = Thought Dysfunction; BXD = Behavioral/Externalizing Dysfunction; RC4 = Antisocial Behavior; RC8 = Aberrant Experiences; RC9 = Hypomanic Activation; ANP = Anger Proneness; JCP = Juvenile Conduct Problems; AGG = Aggression; AGGR-r = Aggressiveness-Revised; PSYC-r = Psychoticism-Revised; DISC-r = Disconstraint-Revised; M<sub>Non</sub> = mean *T*-score for non-aggressive patients; M<sub>Agg</sub> = mean *T*-score for aggressive patients.

\**p* < .05. \*\**p* < .01.

TABLE 3  
Correlations Between MMPI-2-RF Scales, Estimated Psychopathy Indices, and Outcome Variables

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. THD	—														
2. BXD	.41**	—													
3. RC4	.36**	.88**	—												
4. RC8	.88**	.44**	.43**	—											
5. RC9	.52**	.79**	.59**	.55**	—										
6. ANP	.60**	.50**	.41**	.61**	.60**	—									
7. JCP	.27**	.79**	.84**	.32**	.49**	.32**	—								
8. AGG	.50**	.80**	.71**	.52**	.77**	.48**	.56**	—							
9. AGGR-r	.39**	.54**	.33**	.36**	.74**	.43**	.29**	.65**	—						
10. PSYC-r	.96**	.43**	.38**	.87**	.54**	.60**	.32**	.51**	.39**	—					
11. DISC-r	.27**	.90**	.78**	.33**	.70**	.36**	.74**	.66**	.56**	.31**	—				
12. Py-Total	.33**	.82**	.75**	.37**	.79**	.34**	.62**	.75**	.65**	.35**	.83**	—			
13. Py-FD	-.24**	.12	-.07	-.21*	.30**	-.18*	-.05	0.08	.48**	-.24**	.33**	.49**	—		
14. Py-IA	.54**	.88**	.90**	.60**	.77**	.59**	.74**	.81**	.49**	.58**	.77**	.87**	.01	—	
15. Mild-Severe	.25**	.13	.12	.20*	.14	.15	.18*	.13	.10	.27**	.06	.11	-.11	.20*	—
16. Moderate-Severe	.19*	.11	.08	.13	.13	.07	.10	.08	.08	.21*	.06	.15	.01	.18*	.77**

Note. THD = Thought Dysfunction; BXD = Behavioral/Externalizing Dysfunction; RC4 = Antisocial Behavior; RC8 = Aberrant Experiences; RC9 = Hypomanic Activation; ANP = Anger Proneness; JCP = Juvenile Conduct Problems; AGG = Aggression; AGGR-r = Aggressiveness-Revised; PSYC-r = Psychoticism-Revised; DISC-r = Disconstraint-Revised; Py-Total = Estimated Psychopathy Total; Py-FD = Estimated Fearless-Dominance; Py-IA = Estimated Impulsive-Antisociality; Mild-Severe = Mild-Severe Aggression; Moderate-Severe = Moderate-Severe Aggression.

\* $p < .05$ ; \*\* $p < .01$ .

significantly higher scores on four MMPI-2-RF scales than patients who were not aggressive: THD, RC8, JCP, and PSYC-r. The effect sizes for these variables were in the small to medium range. Correlational analyses, presented in Table 3, revealed that these four scales were highly associated. In particular, THD was highly correlated with both RC8 ( $r = .88, p < .001$ ), and PSYC-r ( $r = .96, p < .001$ ), and RC8 and PSYC-r were similarly correlated ( $r = .87, p < .001$ ). Of these three scales which assess difficulties in thinking, PSYC-r was the most highly correlated with Mild-Severe Aggression ( $r = .27, p = .002$ ). To reduce multicollinearity, only PSYC-r, the best single predictor of Mild-Severe Aggression, was entered into the regression analysis along with JCP. As displayed in Table 4, the logistic regression revealed that the combination of JCP and PSYC-r was significantly associated with Mild-Severe Aggression. The two scales accurately classified 65.6% of patients, compared with 59.4% for chance prediction. However, only PSYC-r scale scores contributed significantly to this model.

Similarly, the second independent samples *t*-test revealed that THD and PSYC-r significantly differentiated those patients who engaged in Moderate-Severe Aggression and patients who did not (Table 2); again, effect sizes were in the small to medium range. Specifically, patients who engaged in aggressive behaviors while hospitalized produced higher scores on THD and PSYC-r than patients who were not aggressive. A logistic regression was not performed, due to the aforementioned issue with multicollinearity. As THD and PSYC-r were highly correlated in the present sample, the individual

contribution of each scale to the regression model would not be interpretable.

As indicated in Table 2, the mean *T*-scores for the significant scales with regard to Mild-Severe Aggression (i.e., THD, RC8, JCP, and PSYC-r) were 6.3 points higher on average for aggressive patients than for non-aggressive patients. Similarly, the mean *T*-scores for the significant scales with regard to Moderate-Severe Aggression (i.e.,

TABLE 4  
Results of Logistic Regression Analyses

Scale	Mild-Severe Aggression						
	$\chi^2$	$R^2$	$p$	B	Wald	SE	Exp (B)
JCP	—	—	.25	.02	1.34	.02	1.02
PSYC-r	—	—	.01*	.04	6.37	.02	1.04
Model	11.41	.12	.003**	—	—	—	—
Py-FD	—	—	.20	-.46	1.61	.36	.63
Py-IA	—	—	.02*	.64	5.15	.28	1.89
Model	6.99	.07	.03*	—	—	—	—
Scale	Moderate-Severe Aggression						
	$\chi^2$	$R^2$	$p$	B	Wald	SE	Exp (B)
Py-FD	—	—	.94	.03	.01	.33	.96
Py-IA	—	—	.05*	.53	4.02	.26	.05
Model	4.19	.04	.12	—	—	—	—

Note. THD = Thought Dysfunction; RC8 = Aberrant Experiences; JCP = Juvenile Conduct Problems; Py-FD = Estimated Fearless-Dominance; Py-IA = Estimated Impulsive-Antisociality;  $R^2$  = Nagelkerke *R* Square; *df* = 1; Mild-Severe Aggression base rate = 59.4%; Moderate-Severe Aggression base rate = 46.1%.

\* $p < .05$ . \*\* $p < .01$ .

THD and PSYC-r) were 5.9 points higher on average for aggressive patients than for non-aggressive patients. Prior research indicated that differences in *T*-scores of 5 points or greater is not likely the result of a sampling artifact, and that “a difference of 5 *T*-score points appears to be the optimal level of code-type definition” (Graham, Timbrook, Ben-Porath, & Butcher, 1991, p. 208). Therefore, these differences of approximately one half standard deviation are considered meaningful. However, the mean *T*-scores on these scales for aggressive patients, by both definitions, fell below the manual-recommended clinical cutoff of 65T. To identify effective alternate *T*-score cutoffs for clinical purposes, we calculated relative risk ratios; the results are presented in Table 5. For Mild-Severe Aggression, the following cutoff scores were identified as most effective in classifying patients: THD = 55T, RC8 = 50T, JCP = 50T, and PSYC-r = 50T. For Moderate-Severe Aggression, THD = 55T and PSYC-r = 50T were again the most effective.

TABLE 5  
Relative Risk Ratios for Significant MMPI-2-RF Scales at  
Alternate Cutoffs

Scale	M	SD	Cutoff (≥)	Criterion	RRR	95% CI
THD	58.7	14.9	65T	Mild-Severe	1.25	[.94, 1.67]
	58.7	14.9		Moderate-Severe	1.26	[.86, 1.86]
	58.7	14.9	60T	Mild-Severe	1.32	[1.00, 1.77]
	58.7	14.9		Moderate-Severe	1.44	[.99, 2.10]
	58.7	14.9	55T	Mild-Severe	1.58	[1.13, 2.21]
	58.7	14.9		Moderate-Severe	1.96	[1.25, 3.09]
	58.7	14.9	50T	Mild-Severe	1.54	[1.01, 2.35]
	58.7	14.9		Moderate-Severe	1.70	[.98, 2.96]
RC8	54.1	12.3	65T	Mild-Severe	1.29	[.95, 1.74]
	54.1	12.3		Moderate-Severe	1.23	[.80, 1.90]
	54.1	12.3	60T	Mild-Severe	1.28	[.96, 1.70]
	54.1	12.3		Moderate-Severe	1.27	[.86, 1.88]
	54.1	12.3	55T	Mild-Severe	1.11	[.83, 1.48]
	54.1	12.3		Moderate-Severe	1.24	[.86, 1.80]
	54.1	12.3	50T	Mild-Severe	1.47	[1.04, 2.09]
	54.1	12.3		Moderate-Severe	1.80	[1.12, 2.91]
JCP	58.4	12.7	65T	Mild-Severe	1.08	[.80, 1.45]
	58.4	12.7		Moderate-Severe	0.97	[.64, 1.45]
	58.4	12.7	60T	Mild-Severe	1.18	[.90, 1.57]
	58.4	12.7		Moderate-Severe	1.20	[.83, 1.75]
	58.4	12.7	55T	Mild-Severe	1.38	[.98, 1.93]
	58.4	12.7		Moderate-Severe	1.28	[.84, 1.95]
	58.4	12.7	50T	Mild-Severe	1.90	[1.10, 3.27]
	58.4	12.7		Moderate-Severe	1.63	[.89, 2.99]
PSYC-r	54.6	14.5	65T	Mild-Severe	1.44	[1.11, 1.88]
	54.6	14.5		Moderate-Severe	1.61	[1.12, 2.29]
	54.6	14.5	60T	Mild-Severe	1.46	[1.12, 1.91]
	54.6	14.5		Moderate-Severe	1.56	[1.09, 2.23]
	54.6	14.5	55T	Mild-Severe	1.45	[1.05, 1.99]
	54.6	14.5		Moderate-Severe	1.59	[1.04, 2.41]
	54.6	14.5	50T	Mild-Severe	1.57	[1.09, 2.27]
	54.6	14.5		Moderate-Severe	1.68	[1.05, 2.71]

Note. RRR = Relative Risk Ratio; Mild-Severe Aggression base rate = 59.4%; Moderate-Severe Aggression base rate = 46.1%.

As expected and displayed in Table 3, Py-Total was significantly related to both Py-FD ( $r = .49, p < .001$ ) and Py-IA ( $r = .87, p < .001$ ) scores; however, Py-FD and Py-IA were not correlated ( $r = .01, p = .88$ ). Therefore, the Py-Total variable was excluded from further analyses. A logistic regression was performed to determine whether either of the resulting two psychopathy constructs were associated with Mild-Severe Aggression. The results indicated that the two variables in combination accurately classified 66.1% of patients, compared with 59.4% for chance prediction. However, only Py-IA was significantly related to the outcome. The logistic regression was repeated, using Moderate-Severe Aggression as the outcome variable. As indicated in Table 4, the model was not significantly associated with Moderate-Severe Aggression; the indices in combination accurately classified only 56.3% of patients, compared with 53.9% for chance prediction.

## DISCUSSION

The current study evaluated the ability of the MMPI-2-RF to identify male pre-trial defendants who committed acts of aggression while at a forensic psychiatric hospital. This endeavor was supported by the literature, which suggests that self-report inventories, such as the MMPI-2-RF, provide insight into the emotional, behavioral, and cognitive processes of examinees in a manner that traditional risk assessment measures cannot. Boccaccini and colleagues (2010) suggested that “self-report personality measures may someday enhance prediction beyond the simple historical variables on measures like the STATIC-99 [Hanson & Thornton, 1999],” a measure of risk of sexual recidivism (p. 146). Such findings call for an examination of broadband personality measures, inclusive of scales related to psychopathic traits, as they may be applied to risk assessment. The current study identified specific MMPI-2-RF scales, as well as estimated psychopathy indices, which may be considered in the assessment and management of risk in forensic psychiatric settings.

We predicted that MMPI-2-RF scales related to impulsive and aggressive behaviors, irritability, and low frustration tolerance (i.e., THD, BXD, RC4, RC8, RC9, JCP, AGG, ANP, PSYC-r, DISC-r, and AGGR-r) would differentiate patients who exhibited aggressive behaviors while hospitalized from those who did not. Four of these 11 scales (i.e., THD, RC8, JCP, and PSYC-r) were found to be individually associated with aggressive behaviors when a broad definition of aggression was utilized, and two of these scales (i.e., THD and PSYC-r) were individually associated with aggression when a more narrow definition of aggression was utilized. Aggressive patients scored approximately five points or more higher than non-aggressive patients on these scales. Further, JCP, and PSYC-r were associated with Mild-Severe Aggression in combination, although

only the PSYC-r scale significantly contributed to the regression model. Alternate cut-off scores ranging from 50T-55T were identified for each significant scale.

Thus, the scales that were predictive of aggressive behaviors during the patients' hospitalizations were those associated with unusual and/or disordered thinking (i.e., positive and disorganized symptoms of psychosis; THD, RC8, and PSYC-r). These findings are consistent with those reported in Douglas and colleagues' (2009) meta-analysis examining the relationship between psychosis and violence. Douglas and colleagues (2009) found that psychosis was associated with a 49%–68% increased likelihood of aggression. Among several reasons for their findings, the authors theorized that patients who experience disorganized thinking and related symptoms may not be able to appropriately manage interpersonal conflicts. Further, psychosis may contribute to violence if an individual experiences symptoms such as delusions or hallucinations that are themselves supportive of aggression (Douglas et al., 2009). The researchers indicated that a limitation of research examining the relationship between psychiatric diagnosis and aggression has been discrepancies in clinical diagnosis and record keeping (i.e., unreliable psychodiagnostic assessment). Nearly three-quarters (63.5%) of the patients in the current study were formally diagnosed with a psychotic disorder, and the MMPI-2-RF was able to further differentiate patients, identifying disordered thinking as related to aggression risk. Results from the MMPI-2-RF suggest that, as proposed by Douglas and colleagues, symptom-level differences are associated with differential risk.

The JCP scale was also found to identify patients who engaged in aggression. In other words, patients who self-reported conduct problems and antisocial tendencies during adolescence were more likely than their peers to commit acts of aggression while in the hospital. This finding is consistent with an immense literature (e.g., Huesmann, Dubow, & Boxer, 2009; Moffitt, 1993), and the rationale behind traditional historically-based risk assessment measures. Specifically, this finding resonates with longitudinal studies that identified an association between aggressive behaviors during childhood and physical aggression in adulthood, and which indicated that there may be some continuity in aggressive behaviors as individuals age, potentially due to pervasive deficits in socialization (Kokko et al., 2009).

Contrary to our hypothesis, MMPI-2-RF scales which assess for chronic antisocial tendencies, behavioral dysfunction, disconstraint, aggression/aggressiveness, and anger were not predictive of aggressive behaviors. In conjunction with the finding that scales which assess problems in thinking and perception were related to aggressive outcomes, lack of significance may indicate that those patients in our sample with more accurate reality-testing are less likely to aggress in this setting, regardless of their impulses or behavioral tendencies. This may be attributed to a number of factors, including motivation by the privilege level

system at the facility, the interpersonal dynamics of the patients and staff, and patient involvement in groups which address anger management and conflict resolution. Future research may examine the degree to which contextual factors such as these affect behavioral outcomes for patients with particular MMPI-2-RF profiles.

Regarding psychopathy, Camp and colleagues (2013) identified the PPI as a self-report measure which may be applied as a measure of violence risk. Based on the work by Sellbom and colleagues (2012) and Phillips and colleagues (2013), we hypothesized that estimated psychopathy index scores (i.e., Estimated Fearless-Dominance and Estimated Impulsive-Antisociality), created using MMPI-2-RF scale scores, would be associated with aggressive behaviors. Analyses revealed that Py-FD and Py-IA in combination were significantly predictive of Mild-Severe Aggression, but not Moderate-Severe Aggression. Regardless of how aggressive behaviors were defined, Py-IA, and not Py-FD, was associated with aggressive outcomes. These findings are consistent with the findings of Camp and colleagues, who identified that the Impulsive-Antisociality subscale of the PPI, in addition to the Psychopathy Total score, was highly predictive of violence in a combined sample of correctional inmates and individuals in a residential substance abuse treatment facility. Camp and colleagues noted that impulsive antisociality is directly associated with lifetime patterns of violence that involve goal directedness, material gain-seeking, and a lack of anger-response (i.e., instrumental aggression). However, in light of research that suggests relationships between the two factors and specific types of aggression (i.e., instrumental and reactive aggression; Bo et al., 2013), future research should investigate whether estimated psychopathy scores, using the MMPI-2-RF, can differentiate between instrumental and reactive aggression.

The present study used two definitions of aggression, which were consistent with established risk assessment measures (i.e., HCR-20<sup>V3</sup> and START), to aid in attempts to replicate our findings in other settings, as well as to enable comparisons with prior studies. Our analyses were not limited by low base rates of aggressive behaviors, as some prior research involving patients at inpatient facilities (Rogers & Shuman, 2005). The high base rates of aggression in the current study may be an artifact of the staff's decision to document incidents more frequently than is typical; a large proportion of aggressive incidents that occur in inpatient facilities are often not documented (Bader et al., 2014). The present base rates may be further explained by our method of data collection, which involved a comprehensive review of hospital records, as opposed to reliance on only formal incident reports or other standalone sources of information. Finally, prior research demonstrated that patients found incompetent to stand trial commit the greatest proportion of aggression among forensic inpatients (Bader et al., 2014); as

our sample was composed entirely of such individuals, it follows that we obtained a high base rate.

In short, an examination of specific MMPI-2-RF scales and estimated impulsive-antisociality index scores may be clinically useful in identifying patients who would benefit from further assessment, and ultimately those patients at risk for violence. Once such patients are identified, precautions may be taken to minimize their risk to others; further analysis of the patients' MMPI-2-RF profiles may provide additional information regarding how to best manage that individual's risk.

## Limitations and Future Directions

### *Predictors*

In the present study, only estimated PPI scores were used, as opposed to actual PPI or PPI-R scores. The estimated PPI scores were created using beta weights that were not normed for the present sample, and which may differ in various ways from a male correctional/college student combined sample. This may have contributed to decreased classification accuracy of these constructs in the present study. However, our findings indicate that estimated psychopathy scores, while not ideal, may still be of use in situations where measures of psychopathy cannot be administered (e.g., due to constraints in resources). Future clinical research might include the use of a psychopathy measure (e.g., PPI or PPI-R), in addition to the MMPI-2 or MMPI-2-RF, in order to identify beta weights which optimize estimated psychopathy index scores for their specific sample. Once sample-specific beta weights are established, researchers may more accurately test whether estimated psychopathy index scores are predictive of aggressive behaviors in the population from which the sample is selected, without the addition of another measure to assess psychopathy.

Additionally, the current study examined the potential of the MMPI-2-RF for assessing risk of inpatient aggression, without consideration of formal risk assessment measures. Although self-report measures such as the MMPI-2-RF capture person characteristics, contextual factors which contribute to the commission or abstinence of aggressive behaviors are not adequately captured by such measures. In the present study, the relevant MMPI-2-RF scales in combination yielded 66.3% sensitivity for Mild-Severe Aggression, and 62.9% for Moderate-Severe Aggression, compared with 53.7% for the estimated psychopathy indices; all three of these rates may be increased if one also accounts for contextual factors. Therefore, future research should compare the accuracy of the MMPI-2-RF and established risk assessment measures (e.g., HCR-20<sup>V3</sup>, and START) in assessing risk directly, considering each as a standalone assessment tool, and also examining their utility in combination. As both the HCR-20<sup>V3</sup> and START include items relevant to current psychiatric symptoms and situational factors, and the MMPI-2-RF provides detailed insight

into the patient's personality and symptomatology, combining self-report personality measures with formal risk assessment measures may lead to increasingly accurate comprehensive risk assessments, and help to inform risk management.

### *Outcomes*

Contrary to our expectations, length of hospitalization and the presence/absence of aggressive behaviors was unrelated. This suggests that patients who pose a behavior problem may be identified at any point during their hospitalization. This was an unexpected finding, given that behavioral instability at a forensic psychiatric facility has the potential to result in continued delay of trial proceedings and prolonged retention at the hospital, and the number of opportunities a patient has to aggress increases along with the amount of time that the patient spends hospitalized. Alternatively, patients may be more likely to aggress within forensic settings at the start of their hospitalization (Grassi et al., 2001), due to relative difficulty and stress associated with institutional adjustment. Descriptive information which would allow for the coding of instrumental or reactive aggression was also not consistently available in the present study. Future research should seek to gain a more nuanced understanding of aggression, including specific triggers among other motivations for aggression. Researchers may wish to investigate the utility of MMPI-2-RF scales, as well as estimated psychopathy indices, in predicting aggression with more qualitative detail.

The outcomes of the current study may have been impacted by the hospital's recording procedures, in combination with our use of the SOS as the outcome measure. Lack of detail in hospital records resulted in a small number of aggressive incidents, which apparently occurred, to be excluded from select analyses (i.e., those analyses involving Moderate-Severe Aggression). Low-level acts of aggression in particular may not be documented in detail by staff members, whereas more severe aggressive behaviors (e.g., physical fights which result in injuries requiring medical attention, or physical altercations between a patient and staff) are likely to be detected and sufficiently documented in formal incident reports. In practice, it is likely most pressing to effectively predict more "serious" behaviors; identifying additional low-level aggressive behaviors would not necessarily improve the clinical usefulness of prediction. However, low-level behaviors may have an overall destabilizing effect on the environment.

Additionally, our study captures aggression as a dichotomous construct, which may restrict the utility of any measure due to the complex nature of aggression. Future research may examine the utility of MMPI-2-RF profiles in predicting aggression as a more continuous outcome, such as to identify whether particular profiles are associated with persistently problematic patients.

## CONCLUSION

Effective prediction of institutional aggression in inpatient forensic psychiatric settings is likely to reduce risk of harm to staff and patients. Self-report inventories, including the MMPI-2-RF, provide risk relevant information that can be considered in assessing risk. Previous research has suggested that specific scales of the MMPI-2 and MMPI-2-RF differentiate those who exhibit poorly controlled behavior, criminality, and antisocial behaviors from those who do not. Similarly, psychopathic traits have been established as predictors of aggression in various settings. The findings of the current study support the literature's associations between personality traits, conceptualized both as typical traits of personality and as traits of psychopathy, and aggressive behaviors. Classification accuracy was found to be highest when using MMPI-2-RF scale scores as the predictor variables, regardless of the definition of aggression (i.e., Mild-Severe Aggression or Moderate-Severe Aggression). Findings suggest that with careful interpretation, MMPI-2-RF scale scores can inform assessment of aggressive behaviors. Such information may be particularly effective if considered within the context of data from established risk assessment tools, allowing for a comprehensive assessment of the patient.

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