The Psychopathic Personality Inventory-Revised: Evaluation of Its Psychometric Properties, Incremental Validity, and Moderating Effects of Gender in a Correctional Sample

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Ethics Statement

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Abstract

This study evaluated the psychometric properties of the Psychopathic Personality Inventory-Revised (PPI–R) in a mixed gender correctional sample. Results revealed support for the internal consistency of all of the PPI–R scales, for the predictive validity of the PPI–R total and the Self-Centered Impulsivity (SCI) factor scores vis-à-vis recidivism, and for the predictive validity of the total score with regard to *violent* offense(s). In addition, there was evidence of PPI–R score differences across gender. Nevertheless, there was no support for the predictive utility of the PPI–R factor or content scale scores with regard to the type of offense(s), for the incremental validity of the PPI–R relative to general measures of personality or a community risk/needs assessment instrument in terms of predicting future violence or crimes, or for the moderating effects of gender on the predictive utility of the PPI–R with regard to recidivism or type of offense(s). Finally, potential practical implications regarding the use of the PPI–R at correctional facilities that could aid in the treatment and management of offenders are discussed. Further research is needed to determine the generalizability of these findings, and to expand the empirical support for the psychometric properties of the PPI–R.

Keywords: Psychopathy; PPI–R; reliability; predictive validity; gender differences; moderating effects; incremental validity

I dedicate this work to my parents, sister, and aunt:
your loving support during the entire process was invaluable.
I also dedicated it to my partner, John:
without your encouragement, understanding, and
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List of Acronyms

AGG	Aggression subscale
ANT	Antisocial subscale
APD	Antisocial Personality Disorder
APQ	Activity Preference Questionnaire
AUC	Area under the curve
BAS	Behavior Activation System
BE	Blame Externalization scale
BIS	Behavior Inhibition System
BPD	Borderline Personality Disorder
C	Coldheartedness scale/factor
CAPP	Comprehensive Assessment of Psychopathic Personality
CAPP-IRS	Comprehensive Assessment of Psychopathic Personality–Institutional Rating Scale
CD	Conduct Disorder
CITC	Corrected item-to-total correlations
CN	Carefree Nonplanfulness scale
CORNET	Corrections Network
CPI	California Psychological Inventory
CRNA	Community Risk/Needs Assessment
ECR	Experiences of Close Relationships
FD	Fearless Dominance factor
FFM	Five-Factor Model
HCR–20	Historical, Clinical, and Risk scales–20
HPD	Histrionic Personality Disorder
5-HT	5-hydroxytryptamine (i.e., serotonin)
IA	Impulsive Antisociality factor
INC	Inconsistency scale
INF	Infrequency scale
IR40	Inconsistent Responding–40 scale
IRT	Item Response Theory
LPSP	Levenson Primary and Secondary Psychopathy scales
LSI–R	Level of Service Inventory–Revised

LSRP	Levenson Self-Report Psychopathy
MCMI–II	Millon Clinical Multiaxial Inventory–II
MCMI–III	Millon Clinical Multiaxial Inventory–III
MC–SDS	Marlowe-Crowne Social Desirability Scale
ME	Macheavelian Egocentricity scale
MIC	Mean inter-item correlations
MMPI–2	Minnesota Multiphasic Personaltiy Inventory–2
MPQ	Multidimensional Personality Questionnaire
NAS	Novaco Anger Scale
NEO–FFI	NEO–Five Factor Inventory
NEO–PI–R	NEO Personality Inventory–Revised
PAI	Personality Assessment Inventory
PCL	Psychopathy Checklist
PCL:SV	Psychopathy Checklist: Screening Version
PCL:YV	Psychopathy Checklist: Youth Version
PCL–R	Psychopathy Checklist–Revised
PDQ–R	Personality Diagnostic Questionnaire–Revised
PH	Proportional hazards
PICTS	Psychological Inventory of Criminal Thinking Styles
PPI	Psychopathic Personality Inventory
PPI:SF	Psychopathic Personality Inventory: Short Form
PPI–R	Psychopathic Personality Inventory–Revised
RN	Rebellious Nonconformity scale
ROC	Receiver operating characteristic analysis
SCI	Self-Centered Impulsivity factor
SIR	Statistical Information for Recidivism scale
SOI	Social Influence scale
SRP	Self-Report Psychopathy scale
SRP–II	Self-Report Psychopathy scale–II
SRP–III	Self-Report Psychopathy scale–III
STI	Stress Immunity scale
SUD	Substance use disorders
VRAG	Violence Risk Appraisal Guide

1. Introduction

The construct of psychopathy has been studied extensively over the past few decades, and not surprisingly it is of interest to various branches of the criminal justice system, as incarcerated individuals who score high on measures of psychopathy are more prone to engage in institutional infractions, as well as crime and violence, following release from custody (Edens, Poythress, Lilienfeld, & Patrick, 2008). The majority of these studies were conducted using a criminal sample and psychopathy was operationalized using the Psychopathy Checklist–Revised ([PCL–R; Hare, 1991, 2003]; Patrick, Edens, Poythress, Lilienfeld, & Benning, 2006). Nevertheless, over the past several years there has been an emergence of new measures of psychopathy, some of which are self-reports. The purpose of this study is: (1) to evaluate the internal consistency of the Psychopathic Personality Inventory-Revised (PPI–R; Lilienfeld & Widows, 2005), (2) to examine its predictive validity vis-à-vis recidivism, (3) to evaluate its incremental validity in terms of predicting recidivism relative to two general measures of personality: The Personality Assessment Inventory (PAI; Morey, 1991) and the NEO–Five Factor Inventory (NEO–FFI; Costa & McCrae, 1992b), as well as relative to the Community Risk/Needs Assessment (CRNA; Glackman, n.d.), and finally (4) to evaluate and compare the performance of the PPI–R across gender, as well as to examine the moderating effects of gender on the predictive utility of the PPI–R vis-à-vis crime and violence, and the type of post release offense(s). In the following pages, a discussion of the link between psychopathy and criminality or violence will be presented, followed by a review of prominent models of psychopathy. Further, existing measures of psychopathy will be reviewed (with a particular emphasis on the PPI–R as it is the focus of this study), followed by a discussion on the incremental validity of psychopathy, and an overview of psychopathy among women. Finally, the purpose, goals, and expected outcomes of the current study will be discussed in detail.

1.1. Psychopathy and Social Deviance or Crime

Various branches of the criminal justice system need to make decisions about people's freedom (i.e., who is safe to be released from custody, what level of management will be needed, etc.). This essentially requires relatively accurate prediction of violence (Douglas, Vincent, & Edens, 2006). Diagnosing psychopathy in making such predictions was shown to be promising in early research by Hart, Kropp, and Hare (1988), which in turn sparked research on the association between psychopathy and violence.

A review of the existing literature reveals a reliable relationship between psychopathy and instrumental use of violence, general, and violent recidivism. For instance, in a number of literature reviews and meta-analytic studies on this topic, psychopathy was consistently described as being not simply an important predictor of recidivism across inmate samples, but rather as one of the best predictors (e.g., Hart, 1998a, 1998b; Hart & Hare, 1997; Hemphill, Hare, & Wong, 1998; Hemphill, Templeman, Wong, & Hare, 1998). In addition, Douglas et al. (2006), who completed an overview of meta-analyses, reported that across studies there appears to be a relationship between psychopathy and future criminal behavior, which is greater in magnitude than that reported for other risk factors and recidivism.

More specifically, according to Hemphill, Hare, et al. (1998) who conducted a meta-analytic study on the relationship between the PCL–R scales and recidivism, psychopathic individuals were three times more likely to recidivate, or four times more likely to violently recidivate relative to those without psychopathic features. In addition, the authors reported that while both factors of the PCL–R contributed equally to violent recidivism, there was a stronger association between general recidivism and Factor 2, which reflects impulsive and antisocial behavioral traits. Along the same lines, in a meta-analysis evaluating the association between the Hare psychopathy measures and antisocial conduct, Leistico, Salekin, DeCoster, and Rogers (2008) reported that relative to Factor 1, which captures the interpersonal and affective deficits of psychopathy, there was a stronger relationship between Factor 2 and antisocial misconduct. The authors also reported better predictive ability for Factor 2 over longer follow-up periods. Nevertheless, in a meta-analytic study comparing the predictive utility of risk assessment tools, Yang, Wong, and Coid (2010) only found support for the predictive validity of Factor 2 of the PCL–R vis-à-vis violence at a moderate level, while the predictive accuracy of Factor 1 was only at a chance level among men.

Similar trends were found in a meta-analytic study of the predictive validity of the PCL–R vis-à-vis institutional adjustment and recidivism (Walters, 2003). Specifically, Factor 2 was moderately correlated with institutional adjustment and recidivism, while the associations between Factor 1 and those outcomes were less robust. Stronger associations for Factor 2 and institutional misconduct were also reported in a meta-analytic review by Guy, Edens, Anthony, and Douglas (2005). Nevertheless, Kennealy, Skeem, Walters, and Camp (2010) conducted a meta-analysis to determine whether core interpersonal and affective traits of psychopathy interacted with disinhibition and antisocial behavior in the prediction of violence. Their results did not provide support for an interaction between the Interpersonal-Affective and the Social-Deviance scales of the PCL–R, and revealed that the Social-Deviance scale is more uniquely predictive of violence.

It is worth pointing out that there is often notable heterogeneity across studies included in meta-analyses, some of which is attributable to design variation (i.e., postdictive vs. predictive), as well as variation in the measurement of psychopathy (i.e., PCL measures vs. self-reports), or measurement of recidivism and testing outcomes (i.e., operational definitions of outcomes; see Douglas et al., 2006). Such heterogeneity may be among the contributing factors to detected differences in outcome.

Overall, these findings provide ample support for the relationship between psychopathy and crime or violence, and as Douglas et al. (2006) point out “the field may have reached an asymptote in terms of novel information to be gleaned from studies that simply address the question whether an association exists between psychopathy and recidivism” (pg. 548). Therefore a shift in focus toward exploring other research questions (e.g., predictive and incremental validity of psychopathy in various settings or samples, further exploration of newer conceptualizations of psychopathy in terms of prediction of crime and violence, etc.) may be needed in order to advance the literature on psychopathy and social deviance or crime (Douglas et al., 2006). Thus, the goal of the present study was to evaluate the incremental and predictive validity of a newer self-report measure of psychopathy (i.e., the PPI–R), and to compare its validity across male and female offenders. Exploring these particular research questions was deemed important as of the writing of this manuscript there has been no research focusing on these specific aspects of the psychometric properties of the PPI–R. In addition, given a majority of the research on psychopathy has focused on men (see Kreis & Cooke, 2011; John, 2009; Logan & Weizmann-Henelius, 2012; Stanford & Felthous, 2011; Wynn, Høiseth, & Pettersen, 2012), and in consideration of the very limited research on gender and the PPI–R with offender samples, evaluating the effects of gender was considered essential.

1.2. Conceptualizations of Psychopathy

Cleckley's description of psychopathy presented in his book "The Mask of Sanity" (1941, 1976) is among the most prominent conceptualizations and has been very influential in North America (Hare & Neumann, 2006). He described psychopathic individuals as exhibiting deep emotional deficits, and lacking the connection between emotional experience and cognitive emotional processing. He listed the following as typical psychopathic characteristics: Superficial charm, good intelligence, no delusions or irrationality, lack of nervousness or neuroticism, lack of remorse or shame, poor judgment, untruthfulness or insincerity (Cleckley, 1941, 1976). Further, pathological egocentricity and incapacity for love, poverty in major affective relations, lack of insight, unresponsiveness in interpersonal relationships, trivial sex life, and failure to follow any life plan are often exhibited by psychopathic individuals.

The definition of psychopathy has evolved over the years—it is now defined as a more extreme variant of Antisocial Personality Disorder (APD; American Psychiatric Association, 2000, p. 703), which focuses primarily on behavioral deficits and maladaptive lifestyle. Specifically, psychopathy is defined as a personality disorder characterized by affective, interpersonal, and behavior deficits. Those deficits are evident through unstable and impulsive behavior and lifestyle, a tendency to violate social norms, as well as egocentricity, grandiosity, callousness, lack of empathy, remorse or guilt, shallow affect, manipulativeness, irresponsibility and short-temper

(Hare, 2006). Psychopathy is considered to be stable across interpersonal and social domains, as well as across the life span.

Similar to its definition, the operationalization of psychopathy has evolved over the years. The traditional two-factor model was first introduced by Harpur, Hare, and Hakstian (1989), and was reflected in the *Psychopathy Checklist–Revised* (PCL–R; Hare, 1991 version). It contains two factors: Factor 1, incorporating a constellation of personality traits, considered to be the core of psychopathy (e.g., selfish, callous, and remorseless use of others), and Factor 2, including various behaviors indicative of social deviance, chronic instability, and anti-social lifestyle.

Cooke and Michie (2001) proposed an alternative three-factor model of the psychopathic symptomatology comprising the diagnostic criteria used in the PCL–R and other measures of psychopathy. This model consists of Arrogant and Deceitful Interpersonal Lifestyle (Factor 1), Deficient Affective Experiences (Factor 2), and Impulsive and Irresponsible Behavioral Style (Factor 3). Factor 1 captures manipulative, deceitful and superficial interpersonal lifestyle, Factor 2 is described as a combination of deficient affective experiences, and is characterized by a lack of emotional and affective depth, and Factor 3 is marked by impulsivity, boredom and parasitic lifestyle. Subsequent to the development of the three-factor model, Hare (2003) proposed a four-facet amendment of the original two-factor model of the PCL–R. In this new model, each of the original two factors was divided into two nested facets. Specifically, Factor 1 consists of the Interpersonal and Affective facets, and Factor 2 encompasses the Lifestyle and Antisocial facets. In this model psychopathy is operationalized as a covariation of the four facets, all of which are of equal importance (Hare & Neumann, 2006).

The three- and the four-factor operational models are quite similar as they encompass overlapping parts of the same construct. In fact, the main difference between them is reflected in the way they conceive the relationship between psychopathy and antisocial or socially deviant behavior (Douglas et al., 2006). Namely, whereas behavioral deviance is conceptualized as a mere consequence of psychopathy according to the three-factor model, it is actually understood to be an inherent characteristic of the disorder according to the four-factor model (Cooke & Michie, 2001;

Cooke, Michie, Hart, & Clark, 2004; Hare, 2003). Despite this disagreement between scholars, as discussed in the previous section, there is a large body of literature that has found support for a robust association between psychopathy and antisocial/socially deviant behavior (see Cooke & Michie, 2001; Cooke et al., 2004; Douglas et al., 2006; Hare & Neumann, 2006; Hare & Neumann, 2010; Skeem & Cooke, 2010a; Widiger, 2006), which carries practical implications for the fields of law enforcement, criminal justice, and clinical-forensic psychology.

The triarchic model is another model of psychopathy that was recently proposed by Patrick, Fowles, and Krueger (2009). Unlike the two-, three-, and four-factor operational models, which are based on examinations of the factor structure of various psychopathy measures, the triarchic model was developed based on a review of historical conceptualizations of psychopathy together with empirical findings about the most prominent assessment measures of psychopathy. It is an integrative model, according to which psychopathy includes three phenotypic constructs: *Disinhibition, boldness, and meanness.* It incorporates not only historical and contemporary conceptualizations of psychopathy, but also broader personality, psychopathology, and neurobiological concepts (Skeem, Polaschek, Patrick, & Lilienfeld, 2011).

In this model, *disinhibition* reflects proneness to externalizing behavior and problems of impulse control, which entail lack of planfulness and foresight, need for immediate gratification, impaired behavioral restraints, and deficient regulation of affect and urges. *Boldness* encompasses a combination of social dominance, emotional resilience, and venturesomeness. It entails the ability to remain calm and focused in dangerous situations, and to recover quickly from stressful events, as well as high self-assurance, social efficacy, and tolerance for unfamiliarity. It is worth noting that *boldness* is not synonymous with fearlessness. Instead, fearlessness is considered to be a genotypic disposition, which entails reduced sensitivity to cues of threat or punishment, while *boldness* could be perceived as a phenotypic expression of fearlessness. Finally, *meanness* reflects deficient empathy, lack of close attachments with others, rebelliousness, excitement seeking, exploitiveness, and satisfaction/empowerment through cruelty. It can be conceptualized as being between high dominance and low affiliation, and associated with low neuroticism (or high emotional stability).

Overall, the conceptualization of psychopathy and its association with crime and violence have been well established. In addition, there are a few well researched operational models of psychopathy, which will likely continue to be revised or fine tuned as new empirical evidence emerges. In order to take advantage of this knowledge, however, we must have measures that allow for accurate and reliable assessment of psychopathy. It is a common practice in law enforcement as well as in the field of clinical-forensic psychology to take into account past social deviance when attempting to estimate the risk for future social deviance. Nevertheless, Cooke et al. (2004) pointed out an inherent problem with this practice. Although an individual's potential and capability to engage in particular acts can very well be assessed based on their past behavior, whether or not he/she will engage in the same patterns of behavior in the future cannot be established with certainty. One way to avoid such tautology would be to employ measures that independently assess psychopathic personality features and socially deviant behavior. It is also important to avoid mono-operation bias in assessing psychopathy (i.e., relying on a single measure), as well as doing so in a limited number of settings, as that may lead to serious construct underrepresentation (Cooke, Michie, & Hart, 2006). This of course does not imply that the field is limited due to a lack of available psychopathy measures and therefore there is a need to focus on the development of new measures. Quite the contrary -- there are a number of measures available, and as a way of shedding light on the current state of the practice of assessing psychopathy, an overview of measures typically utilized in the field of clinical-forensic psychology is presented next. Of note, creating an exhaustive catalogue of the existing measures of psychopathy is beyond the scope of this dissertation. Therefore, only measures which have been researched extensively and have been shown to have well-established or promising psychometric properties, and are therefore typically used in practice, were selected for review.

1.3. Frequently Used Measures of Psychopathy

1.3.1. Interview-Based Measures/Observer-Ratings of Psychopathy

Psychopathy Checklist–Revised

The most commonly used measure of psychopathy is the Psychopathy Checklist–Revised (PCL–R; Hare, 1991, 2003). PCL–R assessments are based on detailed semi-structured interviews, completed by specifically trained raters, as well as file and collateral information. The PCL–R adopts the four-factor operational model of psychopathy. It consists of 20 items, each scored on a 3-point scale (0 = *No*, 1 = *Maybe*, and 2 = *Yes*), and yields a score between 0 and 40. Based on recommendations in the original PCL–R manual (1991), investigators would at times use cut scores to conduct extreme-group analyses. Specifically, a score of 30 and above has been used to classify participants as psychopathic, and a score of 20 or lower as non-psychopathic. Given that these cut score guidelines have been useful for research purposes, depending on the context (i.e., diagnosis, forensic assessment, treatment recommendations, etc,) they could have utility in some clinical and forensic settings as well.

The PCL–R has two derivatives, the Screening Version (PCL:SV; Hart, Cox, & Hare, 1995) and the Youth Version (PCL:YV; Forth, Kosson, & Hare, 2003), which are psychometrically, empirically, and conceptually similar to the PCL–R (Forth et al., 2003; Hare & Neumann, 2006). However, they are outside of the scope of this dissertation and will not be reviewed in detail. In terms of the psychometric properties of the PCL–R, original validation data included in the 2nd edition of its manual (Hare, 2003) reveals high internal consistency, and interrater reliability. Nevertheless, a recent study raised concerns about the PCL–R Factor 1 score, which was found to have exceedingly poor interrater reliability (Edens, Boccaccini, & Johnson, 2010). Descriptive and validity data for different offender groups, as well as forensic psychiatric patients, is also available in the manual, and are considered to be adequate. It is worth pointing out that the two factors were moderately correlated, which could be interpreted as support for their convergent validity, but could also raise questions about their discriminant validity.

Even though the PCL–R was designed strictly for the assessment of the clinical construct of psychopathy, its utility for assessing risk for recidivism and other applied purposes has been evaluated extensively. While some studies show support for its utility in assessing recidivism risk (see Dolan & Doyle, 2000; Hare & Neumann, 2006; Olver, Neumann, Wong, & Hare, 2012), others have raised concerns or have shown that the PCL–R is outperformed by other measures in that regard (Gendreau, Goggin, & Smith, 2002; Guy, Douglas, & Hendry, 2010; Skeem & Cooke, 2010b; Yang et al., 2010). Similarly, the predictive validity of the PCL–R vis-à-vis crime and antisocial behavior has been examined in male and female samples, with support shown by some scholars (e.g., Campbell, French, & Gendreau, 2009; Dolan & Völlm, 2009; Walters, 2003; Yang et al., 2010), while others have raised questions in that respect (McKeown, 2010; Nicholls & Petrila, 2005; Strand & Belfrage, 2005).

When the PCL–R is disaggregated into its two factors, the prevailing literature indicates that Factor 2 (encompassing the Antisocial and Lifestyle facets) is a stronger predictor of recidivism and violence than Factor 1 (encompassing the Interpersonal and Affective facets; see Gonsalves, Scalora, & Huss, 2009; Kennealy et al., 2010; Olver et al., 2012; Walters, 2003). Further, with regard to its incremental validity a recent study (Walters, Wilson, & Glover, 2011) revealed that when the Antisocial and Lifestyle facets were combined into a single factor, it displayed incremental validity relative to the Interpersonal and Affective facets. In addition, the Antisocial summed composite score predicted recidivism significantly better than the summed composite score of the other three facets (i.e., Interpersonal, Affective, or Lifestyle). These findings were in line with two previous studies on general and violent recidivism (see Walters & Heilbrun, 2010; Walters, Knight, Grann, & Dahle, 2008). Nevertheless, in another study, the composite of the Interpersonal, Affective, and Lifestyle facets failed to predict general and violent recidivism once age and criminal history were taken into account (Walters, 2011). All in all, while extensive support for the psychometric properties of the PCL–R exists, some contradicting findings have been recently reported. In addition, even though the PCL–R was not originally developed as a risk assessment instrument, it has been extensively used in that capacity. Yet, there appears to be a lack of agreement in the field in terms of its utility to assess risk for recidivism, which has raised questions and concerns in that regard.

Comprehensive Assessment of Psychopathic Personality–Institutional Rating Scale (CAPP–IRS)

The CAPP–IRS is a newer measure of psychopathy, designed by Cooke, Hart, and Logan (2005), which focuses primarily on the symptoms and underlying personality traits of the psychopathy construct rather than maladaptive patterns of behavior. It consists of a family of measures, including the Staff Rating Scale and the Life-Time version. The measures depict six domains of psychopathic symptomatology: Attachment, Behavioral, Cognitive, Dominance, Emotional, and Self. They contain 33-items, and severity of symptoms is scored on a 7-point scale, ranging from 0 = *Not present* to 6 = *Very severe*.

The primary difference between the two versions is the method of administration. The Life-Time version is to be administered by trained professionals, and ratings are based on an interview. The Staff Rating Scale, on the other hand, is intended for use by paraprofessionals at secured facilities (i.e., correctional staff members), and therefore imposes fewer demands for training prior to its use. Ratings of psychopathic symptoms are based on observations over a six-month time frame during which the participant has been residing at the facility. Due to the fact that it covers six domains of psychopathy, the CAPP is optimized for use in a variety of settings—at secured treatment facilities as well as in the community—instead of being limited for use in a single setting. In addition, the CAPP is designed to assess not only lifetime severity of symptoms, but also changes in severity over discrete periods of time, and as such can be useful when the temporal stability of symptom severity is of interest.

Considering the recent development of this measure, currently there are only a couple of published studies on the CAPP–IRS. Nevertheless, in combination with data from unpublished studies, there is preliminary support for what appear to be promising psychometric properties of the CAPP–IRS. Specifically, there is preliminary support for its high internal consistency, and good to excellent interrater reliability (see Corrado, Watkinson, Hart, & Cohen, 2006; Corrado, Watkinson, Hart, Lussier, & Cohen, 2007; McCormick, Corrado, Hart, & Cohen, 2008). Preliminary support for the content and construct validity of the instrument has also been reported (see Cooke, Hart, Logan, & Kreis, 2009; Cooke, Logan, Kreis & Hoff, 2009; Kreis, & Cooke, 2011; Nikolova, 2009). Specifically, Kreis & Cooke (2011) found that the interpersonal domains of the CAPP (i.e., Attachment, Dominance, and Self) were most salient of psychopathy, while the Cognitive domain was the least salient. Further, there was support for the association between violence and some of the items on the CAPP–IRS (i.e., “suspicious” and “lack of emotional depth”), as well as preliminary support for the discriminant and convergent validity of the CAPP–IRS. Namely, higher severity ratings of CAPP–IRS symptoms were given to patients with a diagnosis of a Cluster B personality disorder (see Corrado et al., 2006; Corrado et al., 2007; McCormick et al., 2008; Strub, Kreis, & Hart, 2008; Watkinson, Corrado, Lussier, Hart, & Cohen, 2007). Finally, a recent study with forensic psychiatric patients in Denmark revealed support for the predictive accuracy of the CAPP in terms of violent recidivism, as well as for its concurrent validity with the PCL:SV in that regard (Pedersen, Kunz, Rasmussen, & Elsass, 2010).

1.3.2. Self-Report Measures of Psychopathy

Even though the PCL–R and the CAPP–IRS can be quite useful in clinical and research settings, there are practical limitations associated with their utility. The PCL–R and the Life-time version of the CAPP–IRS are quite time and labor intensive, and require a well-trained rater. The use of the Staff Rating version of the CAPP–IRS, which is less labor intensive, may be obstructed by other challenges such as limited time and resources for staff at correctional or treatment facilities who would need to complete the ratings. These issues limit the usefulness of those measures in applied settings, where a time-/resource-efficient assessment tool for psychopathy could be quite beneficial. As a result there is an increased interest in alternative measures of psychopathy, such as self-reports, which would void the need for lengthy interviews and review of collateral information and would not impose additional demands on staff.

The idea of assessing psychopathy by using self-reports has been criticized by many. Lilienfeld and Fowler (2006) provide an excellent overview of the problems and pitfalls of self-report measures of psychopathy (see also Ray et al., 2012). First, considering that psychopathic individuals might lie quite frequently, it would be reasonable to suspect that they may not provide truthful information, thus yielding skewed or invalid results on self-report measures. Therefore, sole reliance on self-report measures for the assessment of psychopathy might be problematic, unless the veracity of the information provided by the respondent is verified by collaboration with external sources of information. Further, psychopathic individuals also often lack insight into their functioning, and may be simply unaware of the extent and scope of their psychological problems (i.e., not realizing the impact of their actions on others). Therefore, external observers might be better at providing an accurate account of the functioning of a psychopathic individual. Furthermore, given their inability to experience certain emotional states, for instance guilt or empathy, psychopathic individuals may not be able to report the lack of such emotions. Alternatively, if they report experiencing emotions, their self-report may be confounded due to their lack of understanding of their true emotions (e.g., reporting feeling remorseful when in fact they regret being incarcerated). Another major criticism of self-report measures of psychopathy pertains to the fact that many of those instruments are saturated with items assessing negative emotionality, yet, negative emotionality should be fairly independent of psychopathy. As a result, the discriminant validity of such instruments is lower, making it difficult to distinguish psychopathy from other conditions that are marked by antisocial behavior.

Lilienfeld and Fowler (2006) also provide an overview of the advantages of self-report measures of psychopathy. First, self-reports may be particularly useful in providing information on subjective emotional states and traits. Specifically, emotional states and traits are best known by the person experiencing them; all others must rely on information directly provided to them by the respondent, or on behavioral inferences of the emotional states or traits of the respondent based on observations and interactions with them, which are ultimately prone to subjective bias. Thus, the quality of the information captured via self-reports, assuming it is accurate, might be superior to that based on interview-based measures. Further, even though psychopathic individuals are likely unreliable in reporting the lack of emotions such as guilt, empathy, and fear (as they may be simply unaware of this deficit), they may experience anger and alienation more frequently than those who do not show psychopathic features, and may be capable of providing reliable accounts of such emotions.

Self-reports are also quite economical (Lilienfeld & Fowler, 2006). They are often brief and relatively easy to complete, and do not require any specialized training in order to be administered. Further, when response style indicators are incorporated in the self-report measures, they can assess response styles systematically, which is not the case for interview based measures. Assessing response styles is quite relevant when working with highly psychopathic individuals given engaging in pathological lying and being conning and manipulative are among the core characteristics of the disorder (Lilienfeld & Fowler, 2006). In fact, a recent meta-analytic review of the literature on the associations between self-reported psychopathy and distorted response styles revealed support for the validity of self-report psychopathy measures, thus tapering concerns regarding positive response bias associated with self-report measures (Ray et al., 2012). Finally, interrater reliability has no relevance for self-reports as they are completed by respondents and require no judgment calls by interviewers or observers (Lilienfeld & Fowler, 2006). This is particularly relevant here, as the assessment of psychopathy includes the evaluation of various affective and emotional states. This in turn requires significant clinical inference on the part of the interviewers, which is often quite challenging and likely to negatively affect inter-rater reliability. As Lilienfeld and Fowler (2006) point out "because validity is limited by the square root of reliability (Meehl, 1986), the subjectivity inherent to interview-based measures will, *ceteris paribus,* constrain their validity" (pg. 108). Lastly, it is important to highlight that the information obtained by self-report measures, if provided accurately, might overlap substantially, or even fully correspond to information obtained through an interview, given the domains of functioning assessed by both types of measures (i.e., the self-report measure and the interview) are adequately represented in both (see Jones & Miller, 2012, and Miller, Jones & Lynam, 2011, regarding the convergence between self and informant reports of psychopathy).

Psychopathy has been conceptualized through the prism of structural models of personality, and in particular the Five Factor Model (FFM), and has therefore been assessed with general measures of personality, such as the NEO Personality Inventory–Revised (NEO–PI–R; Costa & McCrae, 1992a, 1992b) and NEO–Five Factor Inventory ([NEO–FFI; Costa & McCrae, 1992b]; Lynam & Derefinko, 2006). As a point of reference, the FFM was developed by studying the English language in order to identify domains of personality functioning that were most prevalent in general descriptions of personality traits (Lynam & Derefinko, 2006). It yielded five broad domains: (1) Extraversion (E), reflecting an individual's proneness to positive emotions, (2) Agreeableness (A), assessing one's interpersonal relationships, (3) Conscientiousness (C), reflecting the ability to plan, organize, and complete tasks, (4) Neuroticism (N), concerned with emotional adjustment and stability, and (5) Openness to Experience (O), assessing an individual's preference to new experiences. Studies that have examined psychopathy in this fashion have revealed that the core features of the disorder map onto one or more dimensions of the FFM, and particularly on the A and C domains. Specifically, findings have revealed that low Agreeableness (or high interpersonal Antagonism) and low Conscientiousness/Constraint are the most robust descriptors of psychopathy. The findings with regard to Neuroticism and Extraversion have been less consistent, where psychopathic individuals have been described as being high in some aspects of these domains (i.e., angry, hostile, and impulsive [on N]; and excitement seeking [on E]), while being low on others (i.e., self-consciousness [on N]; and warmth and positive emotions [on E]; Lynam & Derefinko, 2006). These latter findings ultimately reflect the differential relationships between the domains of personality and the factors of psychopathy (i.e., interpersonal/affect vs. behavioral).

Nevertheless, some of the other self-report measures used for the assessment of psychopathy (e.g., the Psychopathic Deviate scale of the Minnesota Multiphasic Personality Inventory–2 [MMPI–2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989], and the Socialization scale of the California Psychological Inventory [CPI; Gough & Bradley, 1996]) have been found to exhibit low or modest intercorrelation, indicating they are likely not measuring the same construct (Lilienfeld & Fowler, 2006). Another issue with the self-report assessment of psychopathy pertains to the fact that due to method covariance (i.e., sole reliance on self-reports), the correlations between psychopathy questionnaires may be inflated. Finally, many of the measures most commonly used to assess psychopathy (i.e., Psychopathic Deviate scale of the MMPI–2, Socialization scale of the CPI, Antisocial scale of the Millon Clinical Multiaxial Inventory–II [MCMI–II; Millon, 1987], and Antisocial scale of the Personality Assessment Inventory [PAI; Morey, 1991]) appear to measure non-specific behavioral deviance, rather than core interpersonal or affective features of psychopathy, as they relate preferentially to Factor 2 of the PCL–R (Lilienfeld & Fowler, 2006). In light of these limitations, the use of general measures of personality for the assessment of psychopathy, even though efficient in terms of time and resources, does not appear to be optimal.

In response to these shortcomings, new self-report measures designed specifically for the assessment of psychopathy, rather than general personality, were developed. A brief overview of those measures is presented next.

Levenson Primary and Secondary Psychopathy Scales (LPSP)

The LPSP (also referred to as Levenson Self-Report Psychopathy [LSRP] scale) was developed by Levenson, Kiehl, and Fitzpatrick (1995) to capture psychopathic features in non-institutional samples. It contains 26-items scored on a 4-point Likert scale. The Primary and Secondary scales were designed to resemble Factor 1 and Factor 2 of the PCL–R respectively. Exploratory factor analyses conducted by the authors revealed a two-factor structure of the instrument, which has been confirmed via confirmatory factor analysis as well (Brinkley, Schmitt, Smith, & Newman, 2001; Lynam, Whiteside, & Jones, 1999). Nevertheless, a more recent study of male correctional inmates, as well as male and female college students (Sellbom, 2011), which also implemented confirmatory factor analysis, revealed that the best fitting model for the measure was the three-factor model, which was initially proposed by Brinkley, Diamond, Magaletta, & Heigel (2008).

The LPSP has promising psychometric properties evidenced by adequate internal consistencies for both scales. Similar to the two factors of the PCL–R, the two scales were moderately correlated, which is desired in terms of convergent validity, but could also raise questions about discriminant validity. Specifically, according to Karpman (1948) the concepts of primary and secondary psychopathy, which are essentially reflected in the Primary and Secondary scales respectively, are etiologically distinct. In addition, Sellbom (2011) showed support for the convergent and discriminant validity of the LPSP total and factor scores, with the exception of the Antisocial factor, which appeared to be too saturated with emotional distress. Further, positive correlations between the LPSP and self-report measures of sensation seeking, antisocial behavior, and passive avoidance errors have been reported (Levenson et al., 1995; Lynam et al., 1999). Nevertheless, the construct validity of the LPSP is questionable—the measure appears to be highly related to antisocial behavior rather than affective and interpersonal features of psychopathy (Lilienfeld & Hess, 2001; Lilienfeld, Skeem, & Poythress, 2004; Poythress et al., 2010; Wilson, Frick & Clements, 1999). It was also found to have low correlations with fearlessness and low empathy (Sellbom, 2011), and thus may not fully represent psychopathy. These findings highlight the need for future research and perhaps the need for potential revisions to the LPSP.

Self-Report Psychopathy Scale (SRP)

The SRP is a 29-item scale developed by Hare and colleagues to resemble the factor structure of the PCL (see Hare, 1985). The original version of the measure correlated only modesty with the PCL, and did not provide sufficient content coverage for some of the core personality characteristics of psychopathy (i.e., callousness, dishonesty, superficial charm). As a result, Hare, Harpur, and Hemphill (1989) developed a 60-item updated version of the instrument, the SRP–II. Items are scored on a 5-point Likert scale, ranging from 1 = *Disagree Strongly* to 5 = *Agree Strongly*. The SRP–II contains two factors resembling the factor structure of the PCL–R – the first factor captures personality and affective aspects of psychopathy, while the second one focuses on impulsivity and antisocial lifestyle. Nevertheless, confirmatory factor analysis revealed that the best fitting model for the measure was the original four-factor model proposed by the authors (Lester, Salekin, & Sellbom, 2013). Yet, others have reported that the factor structure of the SRP-II does not parallel that of the PCL-R based on exploratory factor analyses in non-forensic samples (Williams & Paulhus, 2004). Taken together, these findings highlight the need for further exploration. Further, a 31-item abridged version of the instrument has been used in research settings (e.g., Paulhus & Williams, 2002; Salekin, Trobst, & Krioukova, 2001), though questions have been raised as to whether it adequately captures the structure of the PCL–R (see Lester et al., 2013).

The internal consistency and construct validity of the SRP–II have been evaluated with various samples and appear to be promising (see Lester et al., 2013; Derefinko & Lynam, 2006; Williams & Paulhus, 2004). There is support for the convergent validity of the SRP–II with respect to self-report measures of narcissism, social deviance, as well as reversed conscientiousness, agreeableness, anxiety, and empathy (see Lester et al., 2013; Lilienfeld & Fowler, 2006; Zágon & Jackson, 1994). Further, the total score of the SRP–II correlated positively with other self-report measures used to assess psychopathy (e.g., MMPI–2 Antisocial Practices content scale, the Antisocial scale of the PAI, PPI,and the Five Factor Psychopathy Index [FFP, Miller, Lynam, Widiger, & Leukefeld, 2001]; see Derefinko & Lynam, 2006; Lilienfeld & Fowler, 2006; Salekin et al., 2001), as well as with conceptually relevant correlates such as maladaptive attachment, riskier driving attitudes and behavior, and engaging in antisocial conduct (Lester et al., 2013). However, the discriminant validity of the SRP–II with respect to generalized criminality requires further clarification (see Lilienfeld & Fowler, 2006).

Finally, the SRP–II was further revised to its most recent version, the SPR–III (Paulhus, Neumann, & Hare, in press). As part of the revision process exploratory and confirmatory factor analyses were employed in two different samples to ensure that the factor structure of an earlier version of the SPR-III adequately captured the four factors of psychopathy identified in the PCL–R (Williams, Paulhus, & Hare, 2007). Results revealed four distinct but intercorrelated factors, similar to those of the PCL–R (see also Mahmut, Menictas, Stevenson, & Homewood, 2011; Neal & Sellbom, 2012). Further, evaluation of the psychometric properties of the SRP–III revealed appropriate construct validity with related personality or psychopathy measures (Neal & Sellbom, 2012;). Good convergent and discriminant validity for the instrument have also been reported in a community sample (Mahmut et al., 2011). In addition, an acceptable level of internal consistency has been obtained in a college sample, where the measure has also evidenced promising criterion-related, convergent, and discriminant validity with regard to predicting scores on conceptually relevant external criteria (e.g., drug use, thrill seeking, aggression, irresponsibility, impulsiveness, fraud and theft, callous affect, as well as lack of dependability, honesty, empathy, emotional distress, negative emotionality, social avoidance, and shyness) (Neal & Sellbom, 2012).

1.3.3. Psychopathic Personality Inventory (PPI)

The PPI is the most widely validated self-report measure of psychopathy. It was originally developed by Lilienfeld (1990) and was subsequently refined by Lilienfeld and Andrews (1996). It was intended to capture psychopathic traits in non-criminal samples. This was deemed important for a better understanding of subclinical psychopathy, as prior psychopathy research had generally been conducted with incarcerated populations (Lilienfeld & Andrews, 1996). It is worth noting that in using undergraduates to develop and initiate the validation of the PPI, Lilienfeld and Andrews assumed that the personality traits underlying psychopathy were dimensional (rather than taxonic). They also presumed that those traits, as well as the behaviors typically accompanying them (i.e., illegal acts), would exhibit sufficient variance to render validation efforts meaningful in their samples. Finally, it is worth pointing out that Lilienfeld and Andrew's choice to construct a self-report measure (as opposed to an interview-based instrument) was driven by the desire to develop a measure suitable for large-scale studies outside of prison settings.

Lilienfeld and Andrews (1996) took a theory-driven approach to the development of the PPI, and instead of relying on overt acts of behavioral deviance, focused on personality-based psychopathy-relevant constructs identified in the clinical literature. The goal of this approach was to distinguish psychopathy from general criminality and other disorders that were capturing behavioral-based issues such as antisocial personality disorder. As a result, it was presumed that the PPI has the capacity to identify individuals who have the core personality features of psychopathy, but who have not engaged in repeated illegal or social transgressions, such as those with antisocial personality disorder. In developing the PPI items, Lilienfeld and Andrews utilized an exploratory approach to test construction as a means at arriving at a pool of items to assess the constructs of interest, and also as a way of clarifying those constructs. All items were written with the intention to minimize social undesirability, and were phrased to appear relatively normative. In addition, because the PPI is explicitly multifactorial, it was presumed that it may be useful in determining the specific psychopathic traits that are optimal in predicting different external validating criteria (Lilienfeld & Andrews, 1996).

The PPI contains 187 items, scored on a 4-point Likert scale (i.e., 1 = *False* to 4 = *True*). It yields a total score representing global psychopathy, as well as eight lower-order facet scores—Social Potency, Fearlessness, Stress Immunity, Machiavellian Egocentricity, Impulsive Noncomformity, Blame Externalization, Carefree Nonplanfulness, and Coldheartedness. Three validity scales were also incorporated in the PPI and were intended to detect response styles known to be common among psychopathic individuals (i.e., positive impression management, malingering, and careless or random responding).

Studies on the factor structure of the PPI have revealed two factors: Factor I (i.e., Fearless Dominance [FD]) included Social Potency, Fearlessness, and Stress Immunity, while Machiavellian Egocentricity, Impulsive Noncomformity, Blame Externalization, and Carefree Nonplanfulness loaded on Factor II (i.e., Impulsive Antisociality [IA], which was subsequently labeled Self-Centered Impulsivity [SCI]; see Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). Of note, Coldheartedness did not load to either factor. Factor I and II of the PPI appear to be orthogonal, which is different than the PCL–R, where the two factors are moderately correlated (Lilienfeld & Fowler, 2006; Marcus, Fulton, & Edens, 2012). This suggests that the PPI does not assess psychopathy as a unitary construct.

Discrepant findings about the factor structure of the PPI have been reported in an incarcerated male sample. Specifically, Neumann, Malterer and Newman (2008) were unable to replicate the two-factor solution of Benning et al., 2003, using exploratory and confirmatory factor analyses. Instead they found evidence for a three-factor solution, where Impulsive Noncomformity, Blame Externalization, Machiavellian Egocentricity, and Fearlessness loaded on one factor, Carefree Nonplanfulness and Stress Immunity loaded on a second factor, and Coldheartedness and Carefree Nonplanfulness loaded together on a third factor.

The psychometric properties of the PPI have been examined in a few non-criminal samples and there is support for its high internal consistency, test-retest reliability, as well as convergent validity with other measures of psychopathy and antisocial behavior, or theoretically related concepts such as empathy, sensation seeking or driving anger (see Blonigen, Carlson, Krueger, & Patrick, 2003; Lilienfeld, 1990; Lilienfeld & Andrews, 1996; Woltil, 2011;). Further, there is evidence that the PPI can be useful in assessing APD as much as psychopathy, which raises questions about its discriminant validity from general measures of social deviancy (see Lilienfeld & Fowler, 2006). Despite that, there is support for the discriminant validity of the PPI from measures of depression, negative emotionality, and schizotypy (Benning et al., 2003; Lilienfeld & Andrews, 1996).

Further, results from a hierarchical multiple regression used to examine the incremental validity of the PPI, revealed that the instrument captures meaningful variance, which is not shared with other measures of psychopathy or antisocial behavior (e.g., MMPI–2 and Personality Diagnostic Questionnaire–Revised [PDQ–R; Hyler & Rieder, 1987)]; see Lilienfeld & Andrews, 1996). In addition, relative to the LPSP, the PPI has evidenced convergent and discriminant validity with regard to aggression and anxiety in a non-clinical and non-forensic sample (i.e., student sample) (Falkenbach, Poythress, Falki, & Manchak, 2007).

Even though the PPI was developed for use with non-criminal populations, its psychometric properties have been examined with correctional samples. Results reveal negative association with measures of empathy and positive correlations with measures of aggression (Sandoval, Hancock, Poythress, Edens, & Lilienfeld, 2000). Further, meaningful associations between the PPI and some of the scales of the PAI, which are theoretically consistent with the conceptualization of psychopathy, have also been reported. Namely, the PPI correlated positively with the Antisocial, Aggression, Dominance, and Borderline scales of the PAI (Edens, Poythress, & Watkins, 2001). Positive correlations between the PPI and physical or nonaggressive disciplinary infractions were also reported in the same study. Furthermore, results from a study on the criterion-related validity and the relationship of the PPI with the Behavior Activation System (BAS), Behavior Inhibition System (BIS), and the Five-Factor Model (FFM) of personality revealed that Factor I (i.e., FD) was related to low BIS, high BAS, expert prototype psychopathy scores, and primary psychopathy (Ross, Benning, Patrick, Thompson, & Thurston, 2009). Factor II (i.e., IA or SCI) was associated with high BAS and other psychopathy measures. Further, high Extraversion and Openness, and low Agreeableness and Neuroticism predicted Factor I, while high Neuroticism and low Agreeableness and Conscientiousness predicted Factor II. The authors pointed out that even though low Agreeableness was related to both factors, it was considered to be a function of the manifestation of psychopathy, given the two factors relate differentially with other FFM traits (see Ross et al., 2009).

Further, the association between the PPI and the PCL–R was examined in a sample of 50 male offenders, yielding moderately high correlations between the measures (Poythress, Edens, & Lilienfeld, 1998). Most importantly the correlations were higher with PCL–R Factor 1 (r =.54) than with Factor 2 (r = .40), which may suggest that the PPI is the first self-repot measure to correlate substantially with the core characteristics of psychopathy, at least as measured by the PCL–R (Lilienfeld & Fowler, 2006). Of note, those findings were not replicated in a study conducted by Lilienfeld and Skeem (2004), where the associations with Factor 2 of the PCL–R were stronger than those of Factor 1. Similar results were reported by Malterer, Lilienfeld, Neumann, and

Newman (2010), which raises questions regarding the convergent validity of the PPI factors with the PCL–R/SV. In addition, the concurrent validity of the PPI relative to the PCL:SV and its associations with past violence were examined in a sample of insanity acquittees (Kruh et al., 2005). Results revealed significant correlations between the PPI total, and several subscale scores (i.e., Social Potency, Machiavellian Egocentricity, and Impulse Noncomformity), and the total and factor scores of the PCL:SV, yielding support for the concurrent validity of the PPI in this sample. In the same study, the postdictive utility of the PPI was comparable to that of the PCL:SV with regard to past violence.

Furthermore, Poythress et al. (2010) compared the PPI and the LPSP in a large offender sample relative to the PCL–R. They found not only better convergent and discriminant validity of the PPI, but results also revealed that the PPI had more consistent incremental validity in predicting PCL–R scores relative to the LPSP, and its patterns of associations with measures of external criterion variables were more similar to the patterns observed for the PCL–R. The concurrent and discriminant validity of the PPI were also examined in a male sample of maximum security federal inmates (Rosner, 2004). Specifically, the PPI's relationship to corresponding scales on the PAI and the MCMI–III was evaluated, and there was support for the convergent validity of the PPI as a measure of psychopathic personality features. Nevertheless, results were inconsistent with regard to its discriminant validity from measures of schizophrenia-spectrum disorder and mania.

The psychometric properties of the PPI have also been examined in female samples. For instance, the PPI was negatively associated with the CPI Socialization scale, and positively with the PAI Antisocial scale in a female correctional sample (Chapman, Gremore, & Farmer, 2003). These findings provide support for the convergent validity of the PPI, but raise questions about its discriminant validity as the Antisocial scale of the PAI measures primarily antisocial behavior. The findings are similar to those obtained from an undergraduate female sample (Hamburger, Lilienfeld, & Hogben, 1996), which raises questions about the criterion validity of the instrument. However, Berardino, Meloy, Sherman, and Jacobs (2005) found support for the concurrent and discriminant validity of the PPI in a sample of incarcerated women, and concluded that the PPI assesses the antisocial as well as the interpersonal-affect facets of psychopathy.

Further, Marcus et al. (2012) conducted a meta-analytic review of studies examining the theoretically important correlates of the two PPI factors. The authors found that each factor predicted distinct correlates, which were sometimes opposite from one another. Particularly, while SCI was highly correlated with PCL–R (Factor 2) and LPSP, FD was modestly correlated (at best) with PCL–R (Factor 1), and the Primary Psychopathy Scale of the LPSP. In addition, while the SCI was associated with measures of antisocial personality, the FD was not. Instead, FD was correlated with positive traits and emotions, negatively related with neuroticism, and unrelated with constraint. Finally, results revealed that the FD factor was not highly correlated with most other measures of psychopathy, which raised questions regarding the role of FD in the conceptualization of psychopathy. Specifically, they found that FD was not particularly maladaptive, and those who score high on FD are unlikely to appear especially pathological. These findings were interpreted as a limitation of the PPI and it's two factor model by Neumann, Uzieblo, Crombez, and Hare (2013). Similar findings were reported in another meta-analytic study (Miller & Lynam, 2012). Specifically, the authors reported strong convergent associations between the SCI factor and other psychopathy measures (i.e., PCL/PCL–R, LSRP, and SRP), as well as expected correlations between SCI factor scores and theoretically important correlates (e.g., interpersonal antagonism, empathy, impulsivity, APD). Conversely, they expressed skepticism that high scores on the FD factor alone could be used to identify individuals as psychopathic. Taken together these findings raise the question of whether PPI-assessed psychopathy is a unitary construct or whether it is comprised of "relatively independent lower-order facets", which has been previously suggested as a possibility by Lilienfeld and Widows (2005; see Marcus et al., 2012).

Notably, Marcus et al.'s (2012) meta-analysis has been criticized for excluding studies that have quantified the PPI factors by including personality variables (e.g., subscales of the Multidimensional Personality Questionnaire [MPQ; Tellegen, 1982]), and other psychopathy measures (Patrick, Venables, & Drislane, 2012). The meta-analysis has also been criticized for categorizing personality-criterion variables around broad personality dimensions (i.e., Positive Emotionality, Negative Emotionality, and Constraint), as such an approach may attenuate or obscure significant associations between the PPI factors and relevant correlates (Patrick et al., 2012). Further, in response to Marcus et al.'s meta-analysis, Blonigen (2013) emphasized the theoretical and conceptual relevance of the FD factor to psychopathy, which did not appear to be highlighted by Marcus et al. Finally, Benning (2013) offered a conceptual explanation for the heterogeneity of effect sizes reported in the meta-analysis, and along with Lilienfeld (2013) suggested that the results from the meta-analytic study reflect the nature of psychopathy, and are not indicative of psychometric limitations of the PPI or methodological issues of the study.

Similarly, Miller and Lynam's (2012) findings have been described as "problematic on several grounds" by Lilienfeld et al., 2012. Specifically, the authors argue that Miller and Lynam failed to address the importance of boldness in psychopathy, which has been recognized in the literature. Additionally, they criticize Miller and Lynam's meta-analysis for not including psychologically adaptive correlates within the nomological network of psychopathy, as well as for "erroneously" assuming that Cleckley's "mask" of healthy adjustment should be associated with marked pathological functioning (pg. 355), and for omitting a large body of literature on the associations of the FD factor and theoretically relevant correlates and measures of psychopathy.

Finally, the predictive validity of the PPI has been examined in correctional samples, and results provide support for the predictive utility of the instrument. Specifically, the PPI total and factor scores were predictive of the number of infractions, and Factor I was more strongly associated with nonaggressive misconduct, while Factor II was more strongly correlated with aggressive misconduct (Edens et al., 2008). Support for the predictive utility of the PPI with regard to the veracity of drug reports was also evident in a sample of adult males seeking admission to an inpatient drug treatment facility (Abrams, 2005). Overall, its good psychometric properties suggest that the utility of the PPI in criminal justice settings is promising.

Psychopathic Personality Inventory: Short Form

An abbreviated version of the PPI, the Psychopathic Personality Inventory: Short Form (PPI:SF) was created by Lilienfeld (1990), and contains 56 items derived from the original PPI, scored on the same 4-point Likert scale (as cited in Lilienfeld & Hess, 2001). The items selected for the PPI:SF were the seven highest loading items within each subscale. Although there is limited published research on the PPI:SF to date, its brevity and efficiency in research settings appeared to be the primary benefits associated with its use (Kastner, Sellbom, & Lilienfeld, 2012). However, Smith, McCarthy and Anderson (2000, as cited in Smith, Edens, & Vaughn, 2011), warned against a potential construct underrepresentation and possibly an atypical factor structure due to the way the measure was constructed. In fact, Wilson et al. (1999) found that Impulsive Nonconformity and Coldheartedness loaded on Factor I, while Factor II was comprised of the original subscales with the exception of Impulsive Nonconformity. Further, the psychometric properties of the PPI:SF were evaluated against the full length PPI in a college and a prison sample, and results revealed comparable discriminant validity for both instruments (Kastner et al., 2012). Nevertheless, the construct validity and internal consistency of the PPI:SF were found to be lower than that of the PPI, and the PPI:SF also evidenced weaker correlations with conceptually relevant criteria (e.g., egocentricity, aggressiveness, and aggression). Concerns about the internal consistency of several of the PPI:SF subscales (e.g., Carefree Nonplanfulness, Impulsive Nonconformity, and Social Potency) were also raised by Smith et al. (2011), who evaluated the measure in three samples: Undergraduate, foster care, and juvenile justice. Yet, the expected associations of the PPI:SF scales and external correlates (e.g., egocentricity, hypochondriasis, deceptive practices, extraversion, depressive symptoms, hostility, etc.) were found to be generally consistent with prior studies evaluating the PPI. The authors concluded that their findings provide some evidence that the subscales combined to create Factor I and Factor II of the PPI:SF are tapping distinct constructs (Smith et al., 2011).

Psychopathic Personality Inventory–Revised (PPI–R)

The PPI was recently revised (Lilienfeld & Widows, 2005) in order to lower its reading level and remove items with questionable psychometric properties, or items that were culturally specific. It now contains 154 items and its structure is essentially identical to that of the PPI. It produces a total score, as well as eight content scores (i.e., Machiavellian Egocentricity, Social Influence, Coldheartedness, Carefree Nonplanfulness, Fearlessness, Blame Externalization, Rebellious Nonconformity, and Stress Immunity), and three factor scores (i.e., Self-Centered Impulsivity, Fearless Dominance, and Coldheartedness, the latter of which is the same as the content score). This version of the instrument contains four validity scales: Virtuous Responding (VR), Deviant Responding (DR), and two Inconsistent Responding (IR) scales (i.e., a 15-item or a 40-item scale). Items are scored on a 4-point Likert scale (i.e., *False*, *Mostly False*, *Mostly True*, or *True*). Notably, support for the need and utility of the VR and DR validity scales of the PPI-R has been shown in a recent study, where the scales evidenced utility in differentiating between dissimulators and genuine test-takers, and mean elevations and the psychometric validity of the scale scores appeared to be grossly affected by response bias (Anderson, Sellbom, Wygant, & Edens, 2012).

Two normative samples were used to validate the PPI–R: Community/college (N = 985) and offender sample (N = 154). Results provide support for the reliability of the measure—internal consistency (i.e., alpha coefficients) for the total and content scores ranging from .78 and .92 in the community/college normative sample, and .71 and .84 in the offender normative sample; the mean alpha coefficients for the three factor scores were .87 for the community sample, and .82 for the offender sample. Test-retest reliability based on average of 19.9 days (ranging from 12 to 45) was .93 for the total score, .89 for the content scales, and .90 for the factor scores. Support for the internal consistency has also been demonstrated outside of the normative samples, with alpha coefficients being comparable or higher (e.g., Anestis, Caron & Carbonell, 2011; Jones & Miller, 2012; Russell, 2004; Seibert, Miller, Few, Zeichner, & Lynam, 2011). Further, there is support for the discriminant and convergent validity of the instrument. Namely, the total, content and factor scores of the PPI–R were found to be correlated to the LPSP, the SRP–II, the PAI, the NEO–FFI, and the Activity Preference Questionnaire (APQ; Lykken, Tellegen, & Katzenmeyer, 1973), the Experiences of Close Relationships (ECR; Brennan, Clark, & Shaver, 1998), and the Multidimensional Personality Questionnaire (MPQ; Patrick, Curtin, & Tellegen, 2002) (see DeMauro & Leung, 2005; Lilienfeld & Widows, 2005; Russell, 2004; Uzieblo, Verschuere, Van den Bussche, & Crombez, 2010; Witt, Donnellan, Blonigen, Krueger, & Conger, 2009).

Finally, the construct validity of the PPI–R was examined in a sample of forensic psychiatric patients, and results revealed that the SCI factor predicted anger, hostility, impulsivity, drug abuse, overall psychiatric symptoms, and violence risk (Edens & McDermott, 2010). The FD factor predicted anger, depression, low anxiety and alcohol abuse or dependence. Further, the association between impulsivity and the PPI–R was examined, and results revealed positive correlations for the total score and the SCI factor (Ray, Poythress, Weir, & Rickelm, 2009). Fearless Dominance, in contrast, appeared to be strongly associated with sensation seeking, weakly associated with lack of premeditation, and negatively with lack of perseverance. Given the PPI–R is a relatively new measure, there were no published studies on its predictive validity with regard to recidivism as of the writing of this manuscript.

1.4. Incremental Validity of Psychopathy

While many studies have evaluated the relationship between psychopathy and crime or violence, the incremental validity of psychopathy over and above other important risk factors such as demographic variables, criminal history, substance abuse or mental disorders, remains under-investigated. Some important findings have emerged, however, based on the available research. For instance, in their review of existing meta-analyses on psychopathy and criminal recidivism, Douglas et al. (2006) reported that there is support for the predictive incremental utility of psychopathy as measured by the PCL–R vis-à-vis crime and violence, and that appears to be the case even after controlling for factors such as substance abuse, criminal history, and demographics. Along the same lines, Hemphill, Hare, et al. (1998) and Hemphill, Templeman, et al. (1998) reported that the PCL–R made significant contributions toward predicting recidivism not only beyond demographic characteristics and criminal history, but also beyond personality disorder diagnoses. Similar results were also reported in a more recent meta-analysis conducted with male and female juvenile offenders, where psychopathy was found to be significantly associated with general and violent recidivism even after covariates of psychopathy were controlled for (Edens, Campbell, & Weir, 2007; Olver, Stockdale, & Wormith, 2009). That was also the case in a meta-analysis conducted with adults (Campbell et al., 2009).

The incremental validity of a number of psychopathy measures has also been examined. For instance, Jones and Miller (2012) examined the incremental validity of self and informant reports of psychopathic traits assessed with three psychopathy measures (i.e., PPI–R, LSRP, and Five-Factor Model psychopathy) to determine their utility in predicting externalizing behaviors (EBs) such as substance abuse, antisocial behavior, gambling, and intimate partner violence. The authors concluded that both self-and informant-reported psychopathy scores were related to EBs, and provided some degree of incremental validity. Specifically, they found that self-reported psychopathy scores were somewhat more useful than informant reports of psychopathy as they generally provided more unique information regarding EBs, and in particular substance abuse and gambling, while informant-reported psychopathy proved useful in predicting intimate partner violence.

Nevertheless, in a study comparing the predictive incremental validity of the PCL:SV and a self-report measure assessing criminal thinking styles—the Psychological Inventory of Criminal Thinking Styles (PICTS; Walters, 1995)—Walters (2009) found support for the incremental validity of the PICTS, but not for the PCL:SV. Further, Walters (2006) conducted a meta-analysis comparing the incremental predictive validity of risk appraisal instruments and self-report measures of various aspects of personality. He included risk appraisal instruments such as the PCL/PCL–R, the Violence Risk Appraisal Guide (VRAG; Harris, Rice, & Quinsey, 1993), the Revised Level of Service Inventory (LSI–R; Andrews & Bonta, 1995), the Historical, Clinical, and Risk scales (HCR–20; Webster, Eaves, Douglas, & Wintrup, 1995), amongst others. The NEO Personality Inventory–Revised (NEO–PI–R; Costa & McCrae, 1992a, 1992b), the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1967), the Novaco Anger Scale (NAS; Novaco, 1994), and the PAI, were among the self-report measures evaluated in his study. Even though he found that risk appraisal measures have some advantage over self-reports in terms of predicting criminal justice outcomes, the two types of instruments performed comparably when institutional adjustment was used as the criterion (i.e., there was also support for the incremental predictive validity of both types of instruments). Of note, Walters (2006) pointed out that in studies contrasting the predictive utility of risk appraisal instruments with that of self-report measures reflecting criminal offending and antisocial behavior, there was no clinically or statistically significant difference in mean effect sizes.

Taken together these findings highlight the need for further research on this topic. Given the robust association between psychopathy and social deviance or criminality, it is reasonable to assume that measures of psychopathy should be preferred over general measures of personality when faced with the task of estimating risk for future offending. Nevertheless, there is not enough empirical evidence to support that assumption.

1.5. Psychopathy and Gender

1.5.1. Why Study Psychopathy among Females?

Psychopathy shares similarities and commonalities with a number of personality and behavioral disorders, for which gender differences have been reported (i.e., antisocial, histrionic, borderline, and narcissistic; Goldstein et al., 1996; Hartung & Widiger, 1998; Sprague, Javdani, Sadeh, Newman, & Verona, 2012; Verona & Carbonell, 2000). To avoid pathologizing stereotypical gender traits, many of the personality inventories that are used to assess those disorders take gender into account during scoring and interpretation by utilizing gender specific norms. This suggests that personality pathology varies across gender, and there is no reason to assume that the gender differences as reported in personality disorders such as antisocial, histrionic, borderline, and narcissistic, would not be observed in psychopathy as well (Forouzan & Cooke, 2005; Nicholls, Odgers, & Cooke, 2007).

Further, given psychopathy is a central factor to comprehensive risk assessment for violence, it is reasonable to assume that when risk for violence among females is of concern, assessing psychopathy would be relevant (Hare, 1991; Hart, 1998a, 1998b; Webster, 1999; Wynn et al., 2012). In reality, there are a number of facts in support of this argument. For instance, there is an increase in the number of adolescent girls (Odgers, Reppucci, & Moretti, 2005) and women (Weizmann-Henelius, Viemerö, & Eronen, 2004) who become involved in the legal system (as cited in Nicholls & Petrila, 2005; see also Crime in America.net, 2010; The Sentencing Project, 2007). Also, women comprise a large percentage of patients in civil (40%) and forensic (10%) hospitals (see Nicholls & Petrila, 2005), where higher rates of recidivism and institutional infractions were found among women with psychopathic traits (measured with the PCL–R) than among women without those traits (Hare, Clark, Grann, & Thornton, 2000). Similar trends have been reported for female offender samples (see Jackson & Richards, 2007). Finally, while rates of perpetrating intimate partner violence appear to be comparable across gender, females have been found to be the most frequent perpetrators of child physical abuse (Dutton, 2006; Brand & Fox, 2008). In all of these settings psychopathy is a potentially important risk factor for violence perpetrated by females, and it is therefore important to be studied (see Nicholls et al., 2007; Nicholls & Petrila, 2005).

There have been numerous studies on psychopathy in women in recent years. Nevertheless, research on the topic has relied on the male conceptualization of psychopathy, and has utilized instruments that have been developed and validated in male samples (see Kreis & Cooke, 2011; Nicholls, Ogloff, Brink, & Spidel, 2005). This practice has raised concerns (see Forouzan & Cooke, 2005, Kreis & Cooke, 2011, Nicholls & Petrila, 2005), as it implies that the current male conceptualization of psychopathy and the available instruments are applicable across gender, yet, there is still no agreement as to whether this is true.

1.5.2. Differences in Symptoms and Symptom Severity

Going back to Cleckley's (1976) conceptualization of psychopathy, highly psychopathic females exhibit personality traits similar to those of their male counterparts (e.g., truancy, pathological lying), yet, there is a difference in the degree and manifestation of these features. According to Kreis and Cooke (2011), who proposed a prototypical model of psychopathy among women, the female psychopath is likely to be more manipulative, emotionally unstable, and may have a more unstable self-concept than a psychopathic man. At the same time, she may appear more empathic, anxious, less aggressive and disruptive, less self-centered, domineering, and self-aggrandizing than her male counterparts. These characteristics paint an image that is quite different than that of men who exhibit psychopathy, as they are typically described as being more self-aggrandizing, domineering, disruptive, aggressive, unempathic, having a strong sense invulnerability, and experiencing less anxiety.

Forouzan and Cooke (2005) pointed out that gender differences in psychopathy are also notable with regard to the degree of symptom severity, as well as the meaning of particular behavioral indicators of the disorder. Specifically, the authors indicated that interpersonal characteristics such as glibness, superficial charm, and grandiose self-worth among women are only apparent in extreme cases. In addition, the authors noted that indicators of psychopathy, such as promiscuous sexual behavior, might have different meaning for males versus females. Specifically, for females it might be underpinned by a desire to exploit, and therefore, could be used as a manipulation tactic to obtain financial, social, or narcissistic gain, and may be reflective of a parasitic or impersonal lifestyle. Conversely, for men it may be underpinned by sensation seeking or may reflect mating effort. Social norms may also affect how psychopathic traits are interpreted across gender. For instance, while financial dependency may be socially acceptable for females, it is looked down upon for males, and it is considered to be parasitic (Forouzan & Cooke, 2005; Logan & Weizmann-Henelius, 2012). In addition, females with psychopathic traits may rely on different tactics than psychopathic males to achieve the same goals. For instance, given their lesser upper body strength, physical aggression is less likely to yield the same results for women as for men, and therefore women may resort to manipulation, flirtation, or coercion to reach their goals (Nicholls & Petrila, 2005). As a result of these differences, psychopathy among women may not be captured by assessment instruments designed for men.

Even though the etiology of psychopathy is not fully understood, research thus far supports the notion that a number of factors (e.g., physiological, social, cultural, environmental, etc.) come into play in the shaping of gender differences in general, and psychopathy in particular (for a discussion, see Kreis, 2009; Nicholls et al., 2007; Verona & Vitale, 2006). For instance, hormonal and neurochemical differences such as levels of androgens and dysregulated serotonin (5-hydroxytryptamine [5-HT]) have been linked with differential prevalence on antisocial behavior and aggression across gender (Verona & Vitale, 2006). Specifically, abnormally high levels of androgens in girls seem to be linked to male-specific behavior during childhood (i.e., girls tend to be *tomboys*), which may be overridden by socialization and other developmental influences over time. In addition, male hormones have been linked to aggression and other types of antisocial behavior in both men and women, even though findings have not been entirely consistent (see Kreis, 2009; Nicholls et al., 2007; Verona & Vitale, 2006). Also, while lower levels of 5-HT have been associated with aggression and impulsivity in men (i.e., externalizing psychopathology), they have been linked with mood disorders such as anxiety and depression in women (i.e., internalizing psychopathology; Verona & Vitale, 2006).

Further, developmental socialization has also been highlighted as a reason for gender differences in the manifestation of psychopathy. For instance, assuming strong and dominant roles, as well as having high self-regard and mastery, is typically accepted and expected of men rather than women (Nicholls et al., 2007; Perri & Lichtenwald, 2010). In a similar fashion, culture may influence the degree of gender differences in the expression of personality traits in general, as well as psychopathy (Kreis, 2009; Nicholls et al., 2007). Specifically, cultural factors may play a role through modeling the manifestation of pathologies and by influencing the frequency of occurrence of psychopathology. They may also be influential in terms of shaping specific ways of coping with problems, which typically differ across gender. In addition, cultural norms may dictate whether specific conditions or behaviors are seen as pathological, and may shape people's beliefs and reactions to different disorders (Kreis, 2009).

In addition, adverse backgrounds (i.e., being socially and economically marginalized, and growing up in dysfunctional family environments), as well as childhood abuse and trauma, have also been linked differentially with antisocial deviance and incarceration across gender, which in turn are linked with psychopathy (see Bottos, 2007; Verona & Vitale, 2006). Specifically, higher rates of abuse, and especially sexual abuse, have been recorded for incarcerated women. In addition, experiences of severe social and familial dysfunction, including childhood neglect and abuse, appear to be more strongly associated with antisocial deviance and incarceration, substance abuse and dependence, and perpetration of intimate partner violence in women than in men. This suggests that early abuse experiences are linked to higher levels of externalizing maladjustment in women relative to men (see Verona & Vitale, 2006).

As proposed by Kreis (2009) and Kreis and Cooke (2011), the differences in the symptoms of psychopathy across gender also make sense theoretically from an evolutionary psychological theory perspective (Campbell, 2002 as cited in Kreis, 2009), which postulates that males and females differ with regard to domains relevant to reproductive success. Namely, these domains include aggression, dominance, emotionality, interpersonal skills, and risk-taking. According to Triver (1972) those differences are due to the different reproductive strategies used by men versus women, which are closely linked to the differential parental investment needed across gender to ensure reproductive success (as cited in Pratto, Sidanius, & Levin, 2006). Specifically, as men can father many children with a minimal biological investment, they should prefer short-term mating relations with multiple fertile partners. In addition, considering men are unlikely to be interested in investing in children who are not theirs, they tend to be more jealous than women, find ways to protect women's sexuality from other men, and at times may expropriate other men's resources for their own families. In contrast, as women invest more of their time and resources to ensure survival of their offspring, they should prefer a long-term mating strategy with a partner who is stable and could provide resources. As a result, women tend to be more selective of their mates and the mating conditions than men (Kreis, 2009; Pratto et al., 2006). In light of this, gender differences in psychopathic characteristics as described at the beginning of this section appear fitting within the framework of evolutionary psychological theory given the roles of males and females in the reproductive process (for a discussion, see Kreis, 2009).

Similarly, some aspects of the differential manifestation of psychopathy across gender could be understood from social dominance theory (Sidanius & Pratto, 1999) perspective, which postulates that "men have disproportionate social, political, and military power compared to women" (Pratto et al., 2006, pg. 273). Specifically, the disparity in power between men and women might be due (at least in part) to the differential benefit resulting from the reproductive strategies utilized by men as outlined above. This in fact is conceptualized as one of the primary reasons that men universally tend to exhibit higher levels of aggression and social dominance orientation (i.e., reflecting an individual's preference for hierarchy) in comparison to women (Pratto et al., 2006), which is of particular relevance to psychopathy.

Further, according to relational theory (Miller, 1976, as cited in Convington, 2007) men and women differ in their developmental goals in terms of reaching maturity. Specifically, men's goal is to become self-sufficient and autonomous and they achieve that through individuating and separating themselves from their caregivers until maturity is reached. Women on the other hand are primarily motivated by a sense of connections with others, which gives them a sense of self and self-worth. Thus, the guiding principle for growth in women is a sense of connection rather than separation (Convington, 2007), which presents as another possible explanation as to why there might be gender differences in the manifestation of psychopathy.

1.5.3. Differences in Behavioral Manifestation, Clinical Presentation, and Comorbidity

Despite some mixed findings, it has been hypothesized that the behavioral manifestation of psychopathy varies across gender, where a more antisocial pattern has been noted among males, and more of a histrionic pattern among females (compare and contrast Cloninger, 1978; Lilienfeld, Van Valkenburg, Larntz, & Akiskal, 1986; Marsee, Silverthorn & Frick, 2005; and Czar, Dahlen, Bullock, & Nicholson, 2011; Schmeelk, Sylvers, & Lilienfeld, 2008). Specifically, males tend to be more likely to express psychopathy through physical aggression or by engaging in conning behavior (Bobadilla, Wampler, & Taylor, 2012; Forouzan & Cooke, 2005; Logan & Weizmann-Henelius, 2012; Strand & Belfrage, 2005; Verona & Vitale, 2006). In contrast, psychopathy among females is more likely (though not exclusively) to be manifested via relational aggression (i.e., behaviors intended to harm others' relationships such as back-stabbing, gossiping, rumor spreading, lying, and deceitfulness), as females have been found to be significantly more relationally aggressive than males starting in childhood (see Bobadilla et al., 2012; Crick & Grotpeter, 1995; Logan, 2009; Logan & Weizmann-Henelius, 2012; Marsee et al., 2005). It is important to highlight that results have been somewhat different in high risk samples, where females have been found to be both relationally and physically aggressive, while males appeared to be more physically than relationally aggressive (Penney & Moretti, 2007; Stickle, Marini, & Thomas, 2012). Even so, these findings provide support for the notion of gender differences in the manifestation of psychopathy, with relational aggression being more typical of females, and physical aggression being more characteristic of males.

In addition, research indicates that relative to their male counterparts, females tend to exhibit different types of violence (Robbins, Monahan, & Silver, 2003). Namely, their violence is most likely to be directed toward family members, and the magnitude of inflicted injuries is less serious. In addition, self-defense was identified as the primary reason for engaging in intimate partner violence among women (as opposed to retaliation among men), and their actions were often found to be situationally-motivated (Ross, 2011). Women also are arrested less frequently and for different crimes than men (Logan, 2009; Robbins et al., 2003; Skeem et al., 2011). Further, Goldstein et al. (1996) reported that relative to their male counterparts women diagnosed with Antisocial

Personality Disorder (APD), which captures the behavioral aspects of psychopathy, were more likely to be irresponsible as parents, to be physically violent toward their children or partners, and to engage in prostitution. Such tendencies are often considered a violation of their societal role as females (e.g., shallow expression of nurturance, lack of selflessness; see Verona & Vitale, 2006). As a result of these gender differences, female antisocial behavior might be less likely to be reflected on official criminal records, and existing assessment instruments may not capture aggression demonstrated by them.

The differences in manifestation of psychopathy across gender are likely linked to the development and clinical presentation of the disorder. For instance, while early-onset antisocial behavior has been linked to psychopathy among males (e.g., Frick & Marsee, 2006; Salekin, 2006), the onset of antisocial behavioral patterns among females is not typical until adolescence, and as discussed earlier, the expression of antisocial behavior appears to vary across gender (e.g., Crick & Grotpeter, 1995). Despite the differences in onset of conduct problems in males versus females, however, commonalities across gender have been reported in terms of poor impulse control and callous and unemotional interpersonal style (Silverthorn & Frick, 1999; Silverthorn, Frick & Reynolds, 2001). Further, based on research on the clinical presentation of incarcerated women in general, it appears that they tend to experience a larger range of Axis I symptoms or disorders (e.g., somatization, anxiety) than incarcerated males, have lower rates of APD, and are most often diagnosed with Borderline Personality Disorder (BPD; see Coolidge, Marle, Van Horn, & Segal, 2011; Verona & Vitale, 2006). In terms of comorbidity with psychopathy, patterns among women are similar to those of men—namely, APD, other cluster B disorders (e.g., BPD or Histrionic Personality Disorder [HPD]), and substance use disorders (SUDs) are among the most commonly co-occurring disorders (for a review, see Verona & Vitale, 2006; Wynn et al., 2012; see also Taylor & Lang, 2006). This is true primarily in terms of the antisocial and lifestyle aspects of psychopathy as measured with the PCL–R. In contrast, internalizing behaviors and suicidality have been found to be negatively related to the affective-interpersonal aspects of psychopathy only among women (see Verona & Vitale, 2006), even though findings among adolescent girls have not been entirely consistent (i.e., positive relationship between suicidal behavior and the affective, as well as the lifestyle and antisocial aspects of psychopathy have been reported, in addition to an inverse association with the interpersonal features of the disorder; see Sevecke, Lehmkuhl, & Krischer, 2009). In addition, while PPI-assessed psychopathy in college men appears to be strongly correlated with APD, for college women, psychopathy was most strongly related to HPD (Hamburger et al., 1996). In fact, it has been suggested that overall psychopathy may be typically expressed through externalizing behaviors in males, and via internalizing problems in women, but further research is needed to corroborate this hypothesis (Paris, 2007; Sevecke, Lehmkuhl, et al., 2009; Skeem et al., 2011).

Results from studies examining the base rates of psychopathy, APD and Conduct Disorder (CD) among women are also somewhat inconsistent. While some studies with correctional samples using observer-based measures (e.g., PCL, PCL–R and PCL:SV) reported overlapping base rates for females and males (e.g., Louth, Hare, & Linden, 1998; Strand & Belfrage, 2001; Strachan, 1993; Tien, Lamb, Bond, Gillstrom, & Paris, 1993), others have reported substantially lower base rates for females (Dolan & Völlm, 2009; Goldstein et al., 1996; Loucks, 1995; Neary, 1990; Nicholls et al., 2005; Salekin, Rogers, & Sewell, 1997; Vitale, Smith, Brinkley, & Newman, 2002; Warren et al., 2003) relative to the typical base rates reported for males (i.e. 15%–30% for males vs. 9%–23% for females; Vitale et al., 2002). Further, findings from studies conducted with non-criminal samples also differ—while some report higher mean scores for males versus females (e.g., Weiler & Widom, 1996; Forth, Brown, Hart, & Hare, 1996), others have found no gender difference in PCL–R scores (e.g., Cooney, Kadden, & Litt, 1990; Stafford & Cornell, 2003).

Similar results have been reported by self-report based studies examining psychopathy across gender (compare and contrast Lilienfeld & Hess, 2001; Miller, Watts, & Jones, 2011; Wilson et al., 1999; Zágon & Jackson, 1994; and Hamburger et al., 1996). With regard to the interpersonal affective versus antisocial scales of psychopathy measures (i.e., PCL–R or PPI), larger gender differences in scores have been reported for the interpersonal-affective scales of those instruments (see Skeem et al., 2011; Vablais, 2007).

1.5.4. Differences with Regard to Personality and Behavioral Correlates, and Recidivism

Gender differences have also been reported with regard to the personality and behavioral correlates of psychopathy. Specifically, personality correlates such as experience of emotion, empathy, lack of attachment, self-control and socialization, interpersonal dominance, as well as arrogance, calculation and narcissism, are relatively consistent across gender (e.g., Forth et al., 1996; Kreis, 2009; Miller, Watts, et al., 2011; O'Connor, 2003; Patrick, 1994; Rutherford, Cacciola, Alterman, & McKay, 1996; Salekin, Rogers, Ustad, & Sewell, 1998; Strachan, 1993; Vitale et al., 2002; Verona, Patrick & Joiner, 2001; Zágon & Jackson, 1994). Some exceptions have been noted by Miller, Watts, et al. (2011), who found that the antisocial factor of psychopathy was correlated more strongly with impulse-related tendencies among males, and with openness to experience among females. In addition, Kreis (2009) pointed out that women may present as less dominant and may engage in more impression management than their male counterparts.

Studies examining the behavioral correlates of psychopathy, however, have yielded more inconsistent results across gender. Poor treatment response, institutional adjustment, alcoholism, recidivism and criminal behavior have been shown to be significantly related to high scores on the PCL–R and the PCL:YV in male samples, but results have been less consistent in female samples (e.g., Catchpole & Gretton, 2003; Hemphill, Hare, et al., 1998; Hemphill, Templeman, et al., 1998; Kreis, 2009; Nicholls et al., 2007; Richards, Casey, & Lucente, 2003; Salekin et al., 1997; Verona & Vitale, 2006; Walters, 2003; Wynn et al., 2012). Specifically, findings on the relationship between violence and psychopathy in women appear to be ambiguous. Some studies have reported a strong association between high scores on the PCL–R and previous violence, non-violent criminality, arrests, or re-offending (e.g., Loucks & Zamble, 2000; Nicholls et al., 2005; Rutherford et al., 1996; Strachan, 1993; Vitale et al., 2002; Weiler & Widom, 1996), while others have reported poor to moderate associations between PCL–R scores and recidivism (e.g., Eisenbarth, Osterheider, Nedopil, & Stadtland, 2012; Salekin et al., 1998), or no significant associations between PCL–R scores and correctional officers' ratings of institutional infractions and future violence in female samples (e.g., Salekin et al., 1997). In addition, some recent studies found that PCL:YV scores were not predictive of future offending among adolescent females (Odgers et al., 2005; Vincent, Odgers, McCormick, & Corrado, 2008), and even though Odgers et al. (2005) reported that there was an association between deficient affective experiences and aggression, that effect was negated once victimization experiences were taken into account.

Further, in studies examining the relationship between psychopathy and recidivism in male samples, both Factor 1 and Factor 2 of the PCL–R have been found to be associated with recidivism (see Verona & Vitale, 2006). Nevertheless, Salekin et al. (1998) reported a significant relationship only for Factor 1 and recidivism in a female sample. Similar results were reported in a study of detained adolescent girls, where Factor 1 of the PCL:YV was more discriminating of psychopathy than Factor 2, which had been shown in prior research as well (Schrum & Salekin, 2006). Along the same lines, in a study of violent female offenders the affective deficits of psychopathy were found to improve the prediction of violent and non-violent institutional infractions over general psychopathy scores on the PCL–R (Davis, 2010). Similarly, in a meta-analytic study gender was found to be a significant moderator of PCL Total and Factor 1 scores, which explained future antisocial conduct better when samples had more female participants (Leistico et al., 2008). Taken together, these findings potentially suggest a stronger association between recidivism and psychopathy in men relative to women; yet, this assumption requires further empirical validation.

Contextual factors related to the violence being committed were found to vary across gender as well. Specifically, men were more likely than women to have been engaging in substance use and less likely to have been adhering to prescribed psychotropic medication prior to engaging in acts of violence (Robbins et al., 2003). Further, males have been reported to show more anger, regardless of the context, while females tend to experience a wider range of negative affects such as anger, sadness, fear, or guilt more frequently and more intensely (see Forouzan & Cooke, 2005). As pointed out by Skeem et al. (2011), one possible explanation for such findings is reflected in the multifactorial threshold models (Cloninger, Christiansen, Reich, & Gottesman, 1978) according to which for biological reasons (i.e., lower testosterone), as well as social norms prohibiting against over-aggression in females, a greater diathesis and associated traits are required for females to manifest psychopathy. Therefore, when psychopathy is detected among females with assessment measures designed for males, we might be dealing with individuals who have particularly heightened predisposition for disinhibited behavior (Skeem et al., 2011).

1.5.5. Factor Structure of Commonly-Used Psychopathy Measures

The factor structure of PCL–R assessed psychopathy across gender has also been examined in an attempt to determine if psychopathy measures are suitable for use across gender. Inconsistencies in the factor structure could be due to limitations of the original factor model or true gender differences in the structure of the instrument. So far, existing research indicates that failure to replicate the factor structure of psychopathy across gender is primarily due to limitations of the original two-factor model. For example, Salekin et al. (1997) conducted an exploratory factor analysis of the PCL–R with a female sample, and found that even though a two-factor model of psychopathy emerged, some of the PCL–R items loaded differentially on Factor 1 and Factor 2 for men and women. Gender differences in item loadings on the PCL–R were also reported by Dolan and Völlm (2009) based on a review of the existing literature, and by O'Connor (2003) based on confirmatory factor analyses conducted in female prison samples. Such differences in item loadings may be due to the fact that the instrument was developed in a specific sample, and may not tap into the same construct in other samples, thus, indicating the need for modification of the conceptualization of the structure of psychopathy for females (see Forouzan & Cooke, 2005).

Further, Sevecke, Pukrop, Kosson, and Krischer (2009) used the PCL:YV in a sample of German adolescents and found satisfactory fit for the three-factor model for males, but none of the models (i.e., two-, three- , or four-factor) were satisfactory for females. Likewise, O'Connor (2003) did not find support for the goodness of fit of the two-factor model of psychopathy among females. Nevertheless, other authors have reported support for the three- or four-factor models of psychopathy across gender. For instance, Warren et al. (2003) examined the goodness of fit of the two-, three-, and four-factor model of psychopathy in a female prison sample, and found the best fit of the data was achieved with the three-factor model, although the four-factor presented a good fit as well. Similarly, Dolan and Völlm (2009), Strand and Belfrage (2005), and Weizmann-Henelius et al. (2010) showed support for the three-factor model of the PCL–R/PCL:SV in female populations. The goodness of fit of the data for the three-factor model using the PCL:SV was also confirmed in a study by Skeem, Mulvey, & Grisso (2003), using a mixed gender sample, who reported that their findings were consistent across gender.

1.5.6. Suitability of Existing Measures to Assess Psychopathy across Gender

Even though there is recognition that there are some differences in test functioning and the extent to which items on the PCL–R are applicable across gender, some studies have suggested that the instrument is suited for use across gender (e.g., Bolt, Hare, Vitale, & Newman, 2004; Dolan & Völlm, 2009; Jackson & Richards, 2007). Nevertheless, claims regarding the equal suitability of psychopathy assessment instruments across gender were challenged by Forouzan and Cooke (2005). Specifically, the authors pointed out that such claims assume equivalence of the symptoms and characteristics of the disorder across gender, which may not be a valid assumption. In fact, Hare (1991) suggested that items on the PCL–R might need to be modified, as psychopathy might be “expressed” differently in females (p. 64), and thus may have limited utility in female samples (see also Salekin et al., 1997). Support for this hypothesis has been demonstrated in studies that have found lower internal consistency for PCL–R items in female samples, as well as by scholars expressing concern about the generalizability of the PCL–R to women (see Kreis, 2009; Kreis & Cooke, 2011; Logan, 2009; Nicholls & Petrila, 2005; O’Connor, 2003). For instance, Salekin et al. (1998) found the classification accuracy of the PCL–R to be “moderate to poor” in a female sample, where a cut-off score of 30 was used to classify inmates as psychopathic versus non-psychopathic. Namely, 90% of the inmates who recidivated were *non-psychopathic*, and only 9% of those who recidivated were classified as *psychopathic*.

Further, there is a lack of consensus as to whether the raw scores of the PCL–R/SV reflect the same level of psychopathy across gender. As a result, some studies have used traditional cut-off scores on the PCL–R (i.e., score of 30), while others have lowered the score. This has led to significant variations of base rates in psychopathy among women across samples (see Jackson, Rogers, Neumann, & Lambert, 2002;

Warren et al., 2003), and calls for further research and caution in interpreting the available literature (Falkenbach, 2008; Forouzan & Cooke, 2005; Logan, 2009).

Similar to the PCL–R, results from studies on the CAPP–IRS indicated that it may capture psychopathy in women, although some adjustments may be necessary (see Kreis & Cooke, 2008). Specifically, Kreis & Cooke (2011) reported support for the content validity of the CAPP–IRS across gender, and suggested that at symptom and domain levels of the CAPP, psychopathic men and women share key similarities, but there are also important gender differences, which were likely a matter of degree. With regard to gender differences, men were rated as higher in the Attachment, Dominance, Behavioral, and Cognitive domains, and at the symptom level, “self-aggrandizing,” “sense of invulnerability,” “self-centered,” “domineering,” “reckless,” “disruptive,” “aggressive,” “lacks anxiety,” and “unempathic” were more relevant to psychopathy in men. As for women, symptoms such as “manipulative,” “lacks emotional stability,” and “unstable self-concept” were found to be more relevant to psychopathy. The authors concluded that although some symptoms or domains were found to be more prominent in psychopathic men versus psychopathic women (and vice versa), they were not specific to psychopathy in only one gender.

All in all, this suggests that although gender differences should not be ignored in the assessment of psychopathy, existing measures are likely to have at least some utility in assessing psychopathy in women, although some modification of the measures may be necessary to ensure assessment accuracy. Particular caution in the interpretation of findings would be needed in areas where gender differences are likely to be detected. As noted earlier, from evolutionary psychology theory perspective gender differences would only be expected in domains relevant to successful reproduction such as aggression, dominance, risk-taking, interpersonal skills, and emotionality (Kreis, 2009; Kreis & Cooke, 2011). Gender differences in the manifestation of psychopathy would also be expected in those same domains from social dominance theory (i.e., aggression and dominance domains; Sidanius & Pratto, 1999) and relational theory perspectives (i.e., risk-taking, interpersonal skills, and emotionality domains; Miller, 1976, as cited in Convington, 2007). Specifically, in consideration of their respective roles in the reproductive process, in comparison to men, women would be expected to be less dominant and less risk-taking. In addition, relative to men, women would be less physically aggressive, but rather relationally aggressive. Nevertheless, they would be capable of being on par with men with regard to physical aggression if need be or if they would personally gain from it. Further, women would have especially well-developed interpersonal skills, and would typically use them as a primary manipulative or exploitive strategy. It is also likely that they would be less status-seeking and overtly grandiose than men. Finally, differences in the emotional responses of men versus women would be expected in terms of intensity, frequency, and external expression of emotions, with a relatively higher degree for all among women, which they may use as a manipulative or exploitive tactic (for a discussion, see Kreis, 2009). As noted by Kreis (2009) given the etiology of psychopathy is yet to be fully understood, the explanation offered in terms of expected gender differences is speculative in nature. Even so, the evolutionary psychological theory, social dominance theory, and relational theory provide a useful framework in understanding where to expect differences across gender.

It is important to recognize, however, that even though existing research on the assessment of psychopathy in women provides a good foundation of knowledge on the topic, the findings are far from being unanimous. The lack of agreement extends not only to the utility of existing assessment instruments, but also to the theoretical conceptualization of the construct, as well as findings regarding base rates and behavioral correlates of psychopathy among women. These discrepancies dictate the need for further research.

2. Current Study

This study was designed to further the validation of the PPI–R. Establishing the psychometric soundness of a measure that is fairly new is in and of itself crucial. In addition, given the PPI–R was developed for use with non-criminal samples it is important to determine whether or not it could be used with criminal populations, especially since the base rates of psychopathy among criminals are relatively high. Further, although there are a few studies that have examined some of the psychometric properties of the PPI–R, there is currently no research on the predictive validity of the measure vis-à-vis crime and violence. It is worth pointing out that the PPI was developed with the intention of creating "a relatively 'pure' measure" (Lilienfeld & Andrews, 1996, p. 491) of psychopathy, which emphasizes personality traits, rather than behavior aspects of it. Therefore they did not include many items on criminality. They reasoned their decision for doing so by stating:

> … most self-report psychopathy measures appear primarily to assess antisocial acts, rather than the personality traits traditionally deemed central to the syndrome (Harper, Hare, & Hakstian, 1989). Consequently, much of the research on psychopathy is of questionable generalizability to the traditional concept of psychopathy delineated by Cleckley (1941/1982) and others. (p. 489)

The lack of emphasis on criminally related items in the PPI–R does not change the fact that there is a well-established association between psychopathy and social deviance or criminality. Thus, there is no reason to assume that as a measure designed to assess the core traits of psychopathy the PPI–R would have no utility in identifying an association with social deviance or criminality. Considering that this association is of interest in criminal justice settings, as it defines the role of psychopathy in violence risk assessment, evaluating the predictive validity of the PPI–R with regard to future crime and violence was deemed important.

Examining the effects of gender on the relationship between psychopathy and future crime or violence is also important given that the literature on psychopathy in women, although expanding in terms of the number of studies being published, is still rather sparse when it comes to systematic investigations on the topic. Even so, thus far existing research and theory suggest that gender differences in psychopathy are likely to be detected and therefore should be explored. The importance of evaluating the incremental validity of the PPI–R becomes apparent in light of its potential applications in practical settings. Namely, being able to assess and diagnose psychopathy properly is very important in correctional settings. Unfortunately, measures of personality such as the MMPI–2, CPI, and the MCMI–II have not been particularly useful in assessing psychopathy, as they appear to assess general tendencies toward socially deviant or criminal behavior, and are therefore low in specificity. This highlights the need to evaluate the PPI–R as it was specifically designed to assess psychopathy. The decision to evaluate the PPI–R as opposed another measure of psychopathy was driven by its promising psychometric properties emerging in the literature, and also the well-established properties of its predecessor, the PPI.

2.1. Research Questions and Hypotheses

To fulfill the goals of the present study, four research questions were examined:

2.1.1. Research Question 1: Reliability of the PPI–R

The PPI–R was originally developed for use with non-criminal populations. Nevertheless, in light of the strong association between psychopathy and an increased risk for violence and recidivism, evaluating the internal consistency of the PPI–R in a correctional sample was considered essential. Given the theoretical structure of the concept of psychopathy (i.e., multifaceted), and in consideration of prior research on the PPI and the PPI–R, an adequate to high degree of internal consistency was expected (e.g., Blonigen et al., 2003; Lilienfeld & Widows, 2005).

2.1.2. Research Question 2: Predictive Validity of the PPI–R with Respect to Recidivism and Type of the Offense(s)

It was hypothesized that results from this study will provide support for the predictive validity of the PPI–R in terms of crime and violence following release from custody. Specifically, in consideration of the existing literature on the relationship between psychopathy and crime, it was expected that individuals who scored higher on the PPI–R will be more likely to engage in crime and violence subsequent to their release from custody. In addition, the predictive utility of the SCI and FD factors of the PPI–R were examined separately. In accordance with prior research it was expected that the SCI factor, which corresponds with Factor 2 of the PCL–R, will be a stronger predictor of future crime and violence than the FD factor, which corresponds with Factor 1 of the PCL–R.

2.1.3. Research Question 3: Incremental Validity of the PPI–R with Respect to Recidivism

Incremental Validity Relative to General Self-Report Measures of Personality

Multi-trait inventories typically have an advantage over single-disorder inventories as the former include more predictors. However, as discussed previously, most of the personality measures commonly used to assess psychopathy (e.g., selected scales of the MMPI–2, MCMI–II, PAI) appear to measure non-specific behavioral deviance, rather than core features of psychopathy (see Lilienfeld & Fowler, 2006). As a result, their utility in terms of the assessment of psychopathy is not optimal. Therefore, it was expected that results from this study will provide support for the incremental validity of the PPI–R with respect to future offending relative to general measures of personality (i.e., NEO–FFI and PAI). With regard to the PPI–R factors, it was expected that the SCI factor will fare better than the FD factor in terms of incremental validity. Of note, rather than examining the incremental validity of the PPI–R with respect to all of the scales of the NEO–FFI and the PAI, only selected scales were used in the analyses. Specifically, in consideration of prior research, the Aggression (AGG) and the Antisocial (ANT) scales of the PAI were selected for use in the analyses, as there is support in the literature for their positive association with recidivism (e.g., Boccaccini, Murrie, Hawes, Simpler, &

Johnson, 2010; Buffington-Vollum, Edens, Johnson, & Johnson, 2002; Salekin et al., 1997; Walters & Duncan, 2005). Similarly, the Neuroticism (N), Conscientiousness (C), and Agreeableness (A) scales of the NEO–FFI were selected for use in the analyses, as research reveals support for the relationship between violence and low conscientiousness and agreeableness, and high neuroticism (e.g., Caprara, Barbaranelli, & Zimbardo,1996; Miller & Lynam, 2003; Miller, Lynam, & Leukefeld, 2003; Skeem, Miller, Mulvey, Tiemann, & Monahan, 2005).

Incremental Validity Relative to the CRNA

As a strictly conservative test of the predictive validity of the PPI–R, its performance was compared to that of the Community Risk/Needs Assessment (CRNA; Glackman, n.d.). The CRNA is currently used by British Columbia's Department of Public Safety and Solicitor General, and served as a benchmark in this study. It was also expected that the PPI–R will fare well with respect to predicting recidivism relative to a comprehensive risk/needs assessment instrument such as the CRNA. Keeping in mind that psychopathy has been found to be one of the most prominent predictors of recidivism (see Douglas et al., 2006; Hart, 1998b; Hart & Hare, 1997; Hemphill, Hare, et al., 1998; Hemphill, Templeman, et al., 1998), it is important to evaluate the utility of psychopathy measures such as the PPI–R in assessing recidivism risk, to determine if it adds incrementally to the information offered by the CRNA.

2.1.4. Research Question 4: Moderating Effects of Gender on PPI–R-Assessed Psychopathy

Do PPI–R Scores Differ across Gender?

Even though results from existing studies on the base rates of psychopathy across gender are inconclusive (i.e., some have reported significantly higher scores for males while others have found no significant differences across gender), most of the studies that have used self-report measures to assess psychopathy have reported gender differences in scores, with males scoring higher (e.g., Lilienfeld & Hess, 2001; Miller, Watts, et al., 2011; Wilson et al., 1999; Zágon, & Jackson, 1994). Therefore it was expected that males participating in this study will score higher on the PPI–R than their female counterparts.

Does Gender Moderate the Predictive Utility of the PPI–R with Respect to Recidivism?

In consideration of existing research (see Leistico et al., 2008; Salekin et al., 1998; Schrum & Salekin, 2006; Verona & Vitale, 2006), it was expected that gender differences will be detected with regard to the association between the PPI–R total and factor scores and recidivism. Of note, given that studies have reported mixed and at times contradicting results regarding the relationship between psychopathy and recidivism across gender, it was considered most sensible to frame a non-directional hypothesis.

Does Gender Moderate the Relationship between PPI–R-Assessed Psychopathy and Type of Offense(s)?

Finally, the literature is also mixed with regard to the strength of the relationship between psychopathy and different types of recidivism (i.e., general vs. violent) for males versus females (see Grimes, Lee, & Salekin, 2011). Nevertheless, given the manifestation of psychopathy appears to differ across gender, where physical aggression tends to occur more frequently among males, while relational aggression appears to be more characteristic of females (see Robbins et al., 2003; Verona & Vitale, 2006), it was expected that males with high scores on the PPI–R will engage in more severe offense(s) than females.

2.2. Method

2.2.1. Participants

Participants were recruited from two correctional facilities in the Greater Vancouver area, British Columbia, Canada, where they were serving less than a two-year sentence. Given there are relatively few studies focusing on psychopathy in women, the goal was to have a sample that was relatively equally split in terms of gender. Study participants were recruited if they were between the ages of 19 and 50, able to communicate in English, had no chart diagnosis of mental retardation, and were not exhibiting acute psychotic symptoms (e.g., delusions, hallucinations, disorganized cognition or behavior, etc.), which could have impeded data collection. The language requirement was implemented as the researchers collecting data were monolingual for English. In addition, the age restriction was implemented in order to reduce the possibility of having participants suffering from age-related issues (e.g., various forms of dementia and other degenerative brain disorders), and also in consideration of the fact that base rates of violence decline with age (i.e., a trend which has been well-noted in criminology; see Hagan, 2011; Plass, 2007). While addressing issues of psychopathy among the elderly is important, it is beyond the scope of this study and warrants a separate evaluation. There were no restrictions on participation based on attributes such as race, ethnicity, culture, religion, sexual orientation, or disability (other than mental retardation). The goal was to recruit a total of 120 participants, equally split between genders.

A few sources of information were used to estimate the desired sample size, using an alpha level of .05 and power of .80, which has become an accepted level of power needed for a worthwhile investigation (Aiken & West, 1991). First, general guidelines for determining the minimum sample size needed to obtain reasonably stable estimates in logistic or survival models were taken into consideration. According to these guidelines a minimum of 10 to 15 (Babyak, 2004; Peduzzi, Concato, Feinstein, & Holford, 1995; Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996) or 20 observations/events per candidate predictor were necessary to allow good estimates (Harrell, 1997; Harrell, 2012; see also Harrell, Lee, Califf, Pryor, & Rosati, 1984).

Next, web-based statistical calculators for a-priori sample size determination (i.e., Free Statistics Calculators; Soper, 2011) were used. Soper's statistical calculators have been used broadly and have been referenced in a number of published articles across different disciplines (e.g., Beltran, Segura, & Bello, 2012; Dattalo, 2009; Diseth, Danielsen, & Samdal, 2012; Jensen, Fraser, Shankardass, Epstein, & Khera, 2009; Marambe, Vermunt, & Boshuizen, 2012; Soper, Demirkan, Goul, & St. Louis, 2012; Wattal, Schuff, Mandviwalla, & Williams, 2010; Yeom & Heidrich, 2009, among others). Based on preliminary statistical power estimations using Soper's calculators for multiple regression including three to four predictors or hierarchical multiple regression analysis including two to six predictors, which were used in this study, the needed sample size to detect moderate effect size departures from the null distribution was 76 to 84, and 55 to 79 respectively (Soper, 2011). As for detecting moderate effect size differences in the PPI–R scores across gender, the needed sample was estimated to be 51 participants per group using Soper's calculator for independent samples *t*-tests for a one-tailed hypothesis. The sample size needed for correlational analysis was estimated using G*Power software (Erdfelder, Faul, & Buchner,1996), which yielded a desired *N* of 82. These sample size estimations were consistent with guidelines offered by Cohen (1992) in determining desired sample sizes for commonly used statistical analyses.

As for detecting interaction effects, according to Aiken and West (1991) the required total sample size was 55 for moderate size departures from the null distribution, assuming the predictors are error-free; the needed sample size would increase substantially as the reliability of the predictors decreases. Specifically, as the reliability of the predictors drops from 1.00 to .80, the required sample size would be slightly more than double (Aiken & West, 1991). Per these guidelines, the reliability of the PPI–R scores and gender were taken into consideration. Namely, while the reliability of the PPI–R scores would be expected to be lower than 1.00, the internal consistency coefficients reported in the literature were typically around or above .80. Of note, as described in the *Result* section, alpha coefficients for the PPI–R indices used in the moderation analyses ranged from .837 to .939 in this study. As for gender, it was expected that it would be measured without error. Therefore, a sample of 120 participants was considered adequate for the detection of moderate interaction effects if they were present. All in all, based on these a-priori power estimations for regression, correlational, independent samples *t*-tests, and moderation analyses, the specified *N* (i.e., 120) was deemed acceptable and sufficient to yield meaningful results (Cohen, 1988, p.452).

2.2.2. Comparative Measures

NEO–Five Factor Inventory (NEO–FFI)

The NEO-FFI (Costa & McCrae, 1992b) is a 60-item scale developed to measure normal adult personality based on the Five-Factor Model (FFM) of personality, which uses five domains (listed below) to define personality and account for characterological differences among people. The NEO–FFI is the short form of the original 240-item NEO–Personality Inventory Revised (NEO–PI–R), assessing features of neuroticism (N), extraversion (E), openness to experience (O), agreeableness (A), and conscientiousness (C). Items are scored on a 5-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. Research findings confirm its good psychometric properties. Specifically, alpha coefficients calculated in the development sample ranged from .74 (A) to .89 (N) (average α = .80) indicating good internal consistency (Costa & McCrae, 1992b). There is evidence for satisfactory test-retest reliability ranging from .80 (A) to .87 (O) over a six-month period, and from .73 (A) to .86 (O) over a 30-month period (Murray, Rawlings, Allen, & Trinder, 2003; see also Botwin & Juni, 1995). In addition, the NEO–FFI has good convergent and discriminant validity with personality measures such as MMPI–2 and MCMI–II (Zeiger, 1996). Research indicates that the NEO–FFI has good correspondence with the NEO–PI–R (average scale r = .87), even though its reliability and validity have been reported to be slightly lower than the NEO–PI–R for which domain level reliabilities ranged from .86 to .95 (Botwin & Juni, 1995; Skeem et al., 2005).

Personality Assessment Inventory (PAI)

The PAI (Morey, 1991) is a 344-item instrument, designed to assess abnormal personality and psychopathology features. It consists of 22 non-overlapping scales, including 4 validity scales, 11 clinical scales, 5 treatment scales, and 2 interpersonal scales. Items on the PAI are scored on a 4-point scale: F= *False, Not at All True*, ST = *Slightly True*, MT = *Mainly True*, VT = *Very True*. Grade 4 reading level is required to complete the scale. Research provides support for adequate scale and subscale reliability (i.e., alpha coefficients ranged from .45 to .90 [median =.81] for the normative sample), scale test-retest reliability over 3-4 weeks ranged from .31 to .92 [median .82], and subscale test-retest reliability ranged from .68 to .85 [median .78] (see Boyle & Kavan, 1995). There is also evidence for the validity of the clinical and validity scales of the PAI with different samples (see Boyle & Kavan, 1995; Douglas, Guy, Edens, Boer, & Hamilton, 2007; Douglas, Hart & Kropp, 2001; Edens, Hart, Johnson, Johnson, & Olver, 2000; Morey, 2000). Finally, the convergent and discriminant validity of the PAI have been examined in relation to the MMPI and the Marlowe-Crowne Social Desirability Scale (MC–SDS; Crowne & Marlowe, 1960) and results revealed weak to moderate correlations (Boyle & Kavan, 1995; Morey, 2001).

Community Risk/Needs Assessment (CRNA)

The CRNA (Glackman, n.d.), also referred to as the Community Risk/Needs Management Scale, was developed specifically for British Columbia Corrections. It combines measures of criminal history and recidivism risk with the offenders' specific needs, and as a result provides a comprehensive assessment tool for parole or probation officers to evaluate the risk and needs of offenders on an ongoing basis (Motiuk, 1997). CRNAs are typically completed by probation officers or case managers, and summary ratings take into account supervision level, needs assessment, and risk assessment. Factors such as employment, family support, positive associations, behavioral and emotional stability, and drug and alcohol use are taken into account during the assessment of needs. Ratings are *low*, *moderate*, and *high*, and are based on information about the individual gathered through interview and file review. The Risk rating is based on the Statistical Information for Recidivism scale (SIR; Nuffield, 1982), which combines criminal history and demographic information in a scoring system to estimate the recidivism risk for different groups of offenders. It is presumed that because the CRNA evaluates both risk and needs, it could be used to guide community based interventions that are meant to keep inmates from returning back to prison (see Motiuk, 1997). The CRNA was validated by a field test and an operational review through the Correctional Services of Canada (Motiuk, 1997), as well as a few external studies. Outcomes from the field data study evaluating the predictive validity of the CRNA revealed that offenders were easily differentiated by their case managers based on their level of needs, and the level of needs was consistently related to the conditional release outcome during a six-month follow-up period (Motiuk & Porporino, 1989). In addition, the operational review of the instrument revealed that by combining criminal history risk and needs ratings, 95% of the offenders rated as *low risk*/*low need* were successful (i.e., no new offenses while on conditional release) within 6 months of their CRNA assessment. At the same time, substantially lower percentage (i.e., 64%) of offenders rated as higher risk/needs (i.e., any of the following: *low risk*/*high needs*, *high risk*/*low needs*, *high risk*/*medium needs*, *high risk*/*high needs*) were successful while on conditional release (Motiuk, 1997). Further, Glackman, Ratel, Swaab, Trytten, & Watts (2002) found that CRNA items were correlated with recidivism rates, and demonstrated 70% to 75% classification accuracy of offenders' recidivism status, as well as predictive accuracy in terms of supervision level ratings, with correct classification rates ranging between 71% and 83%. Support for stability of the CRNA ratings, correct classification of offenders' recidivism status, and its overall utility as a classification tool for community case management was reported by Glackman & Trytten (2000). Given its utility in assessing risk for recidivism, the CRNA was used as a provisional "benchmark" for the performance of the PPI–R in terms of predictive validity with regard to recidivism, and the specific ratings employed in the analyses included: (a) Summary rating, (b) Supervision Level, (c) Need rating, and (d) Risk rating. Information regarding the number of prior court dispositions, the number of prior supervision failures, the number of prior failures to comply, age at first arrest, and imprisonment after a conviction were also collected and used to establish the descriptive characteristics of the sample.

2.2.3. Criterion Measure

Official criminal records of participants were used as a criterion measure and were accessed through British Columbia's electronic offender management system, CORNET. It contains detailed information about offenders' criminal history, sentence status, as well as in-custody and community case management, including program participation/completion. For the purposes of this study the following information was recorded: (a) presence of new charges, convictions, and/or breaches (i.e., recidivism); (b) whether or not recidivism (if any) included single or multiple offenses; (c) time not at risk, which included any period of time during the follow-up phase of the study when participants were remanded into custody, thus, not at risk for recidivism in the community; (d) length of time until new offense(s); and (e) type of offense(s). The type of offense(s) were grouped as: (1) *violent* (i.e., constitute offenses against a person including verbal, physical, and sexual violence, and/or resulted in physical harm to another individual); (2) *non-violent* (i.e., defined as minor crimes that did not involve offenses against a person such as property or drug offenses, court/legal infractions, moving violations, prostitution, etc.); and (3) *other* (i.e., included breaches or a combination of breaches and non-violent offenses, for which it could not be established whether or not they were violent in nature). Of note, recidivism (described in section [a] above) and type of offense(s) (described in section [e] above) were used as separate outcome variables.

2.2.4. *Procedure*

Staff at the correctional facilities helped to identify individuals suitable for the study. As a general practice, inmates' mental health is evaluated for psychiatric and substance use issues upon admission. These evaluations are completed by trained staff (i.e., typically nurses), and individuals exhibiting symptoms are flagged in the system as special care in terms of medications or substance abuse treatment (e.g., methadone treatment) may be required. Individuals flagged in the system as exhibiting acute mental health symptoms (including acute substance use-related symptoms such as drug-induced psychosis), which could interfere with data collection, were not recruited for the study.

The assessments took place within two provincial jails in the Lower Mainland, British Columbia. A random sample of the inmates identified by staff as potential participants according to the selection criteria, who agreed to be approached for study participation, were invited to take part in the study. They were scheduled for a session, during which they were provided with informed consent, supplemented by a description of the study and clarification of its requirements and purpose. Limits of confidentiality were discussed and they were notified that their standing with the correctional system would not be affected by their decision to participate (or not participate) in the study. Participants who agreed to participate were then interviewed and asked to complete self-report questionnaires. Self-report measures selected for use in this study assessed psychopathic features and behavioral patterns of psychopathy (i.e., PPI–R), as well as various aspects of personality in general (i.e., NEO–FFI and PAI). A semi-structured interview protocol was used to gather demographic information, as well as information about past antisocial behavior, mental health, treatment involvement, and social history. Demographic information along with individuals' responses on the PPI–R, PAI, and NEO–FFI were used to answer research questions 1, 2, and 3. In addition, participants' criminal records were reviewed within 6 to 26 months following their release from custody to determine whether they had engaged in criminal acts subsequent to their index offense as a way of addressing research questions 2, 3, and 4. Participants were provided with a $20 honorarium for their participation.

The validity of self-report measures, especially when used in correctional populations, has been questioned on the grounds that offenders are not always inclined to tell the truth (Cooke et al., 2005). Nevertheless, most of the selected instruments include validity scales which are helpful in determining the consistency and validity of participants' responses. In addition, a recent study revealed support for the validity of self-report psychopathy measures, thus lessening concerns regarding the positive response bias associated with the use of such measures (Ray et al., 2012). Thus, no serious problems were expected to emerge as a result of the extensive use of self-report questionnaires.

2.2.5. Ethics Approval

Ethics approval was obtained from both British Columbia Corrections and Simon Fraser University, and addressed the nature, purpose, and rationale of the study. The requests for ethics approval included a description of study participants, selection criteria and ways of recruitment, as well as a summary of the tasks that participants were engaged in as part of the project. Participants in the study were not exposed to any risks of physical or psychological harm, and were informed that their criminal record would be reviewed within a year after their release from custody. They were also informed of the regulations for mandatory reporting, although it was not expected that information obtained during the study administration would be subject to mandatory reporting. All identifying information of participants was kept confidential; it was not included on study materials or in databases created for the study.

2.2.6. Data Manipulation and Data Analytic Issues

Of the original sample (i.e., N = 125), 112 individuals (i.e., 56 males and 56 females) provided responses on the PPI–R, 115 (i.e., 59 males and 56 females) completed the NEO–FFI, and 99 (i.e., 50 males and 49 females) provided answers on the PAI. The random responding rules of the PPI–R and the PAI were used to determine whether a profile was valid. Specifically, scores of 39 or higher on IR40 scale of the PPI–R occurred in less than 5% of the normative sample (see Lilienfeld & Widows, 2005), and were therefore deemed invalid in this study. Out of the total sample, 84 individuals (i.e., 41 males and 43 females) produced valid profiles on the PPI–R. As for the PAI, a *t*-score of 80 on two of the validity scales: Inconsistency (INC) and Infrequency (INF), has been recommended as a cut-off for random responding among correctional samples (see Edens & Ruiz, 2005). This rule was applied in the current study, and of the total sample 89 individuals (i.e., 45 males and 44 females) produced valid profiles. Of note, only one of the research questions (i.e., research question 3) required the joint use of the random responding rules for the PPI–R and the PAI. There was not much overlap between the individuals who did not complete the PPI–R versus the PAI, and no overlap between those who provided invalid responses on one measure versus the other, which ultimately led to excluding 45% of the original sample (i.e., 56 profiles) from the analyses for research question 3.

It is worth pointing out that the high prevalence of invalid PPI–R or PAI profiles is not a phenomenon specific to this study alone, but it is a rather commonly encountered issue (see Nikolova, Hendry, Douglas, Edens, & Lilienfeld, 2012). It appears to reflect one of the main shortcomings of self-report measures (i.e., random responding), and is often related to the study sample (i.e., incarcerated populations). Thus, despite the a-priori power estimations, power was lower due to invalid/missing data. Specifically, according to the sample size estimations described in the *Method* section, the reduced sample size used in the analyses most likely resulted in reduced power for research question 4 (i.e., moderating effects of gender). The final sample used in the remaining research questions, however, was still greater than the minimum sample needed to detect moderate effect size departures from the null distribution as determined based on the a-priori power estimations, and therefore it is likely that there were no adverse effect on power for those research questions. Nevertheless, in order to compensate for the reduced power in research question 4, and to determine whether missing data had a negative impact on the patterns of association that emerged in this study, some of the main analyses were repeated with the entire sample, as well as after employing less stringent exclusion criteria for the PPI–R protocols. Results are presented in the *Supplemental Analyses* section of this document.

Further, due to missing data, scale/subscale scores on the NEO–FFI and the PAI were prorated. As recommended by the authors of the NEO–FFI, Costa and McCrae (1992b), protocols containing 10 or more missing values were deemed invalid and were not used in the analyses. For those with nine or fewer items left blank, neutral responses were used to replace missing responses. In addition, a conservative approach was taken for any protocols for which there were more than four missing items per domain—such protocols were considered invalid and were not included in the analyses. Further, the PAI manual specifies that scale or subscale scores should not be interpreted if 20% or more of item-level data on a scale or a subscale are missing (Morey, 2007). Therefore, PAI scores were prorated based on the mean for completed items only if less than 20% of the item-level data were missing per scale/subscale. Protocols for which 20% or more of the item-level data were missing from specific scales/subscales were not included in the analyses. Furthermore, scoring software was used to calculate PPI–R scores. It contained algorithms for dealing with missing data as specified in the PPI–R manual. Namely, similar to the PAI, if 20% or more of item-level data were missing on a single scale, the relevant scale score could not be computed. Additionally, if more than 30 items in total were missing from a given protocol, it could not be scored and was considered invalid (Lilienfeld & Widows, 2005).

2.2.7. Data Analyses

Research Question 1: Reliability of the PPI–R

The internal consistency of the PPI–R in the current sample was evaluated by calculating Cronbach's alpha coefficients as well as mean inter-item correlations (*MIC*) and corrected item-to-total correlations (*CITC*) for each of the PPI–R content scales. According to Nunnally and Bernstein (1994, pg. 264) alpha coefficients of .70 and higher are indicative of satisfactory reliability. *MIC* values ranging at minimum from .15 to .50 are considered to be an indicator for satisfactory internal consistency reliability (Clark & Watson, 1995). *CITC*'s revealed whether the internal consistency reliability of the PPI–R would improve if certain items are removed, and if so, by how much. It is worth pointing out that as a measure of internal consistency alpha reflects the intercorrelatedness of a set of items, rather than their homogeneity or unidimensionality (Cortina, 1993). Internal consistency is necessary, yet, not sufficient for homogeneity, and therefore it is an inadequate index of unidimensionality. For instance, alpha coefficients for different sets of items can be equal even when the item intercorrelation matrices for those sets are radically different from one another. It is also true that alpha can be high even if a set of items is multidimensional given the items are relatively intercorrelated (Cortina, 1993). Further, in addition to being a function of intercorrelatedness between a set of items, alpha is a function of the number of items included in a test, and as the number of items increases, alpha increases. For instance a scale with 20 or more items will have an alpha coefficient greater than .70, even if the intercorrelations between the items are small. Therefore, the number of items in a scale could mask the dimensionality of the scale. In summary, even though alpha increases as a function of item intercorrelations, and decreases as a function of multidimensionality, it "can be high in spite of low item intercorrlations and multidimensionality" (Cortina, 1993, pg. 103). It is not a measure of unidimensionality, and it would be wrong to use it as such as it could lead to incorrect conclusions (e.g., assuming that a measure is comprised of a single factor when that is not the case; Schmitt, 1996). Therefore, precision estimates of alpha coefficients were also calculated, and were used to determine the dimensionality of each of the scales. Precision estimates were measured in terms of the standard error of item intercorrelations, which is a function of the variance of item intercorrelations (Cortina, 1993). Precision estimates values of 0 reflect unidimensionality for a given scale, while values greater than 0 suggest departure from unidimensionality.

Further, Cronbach's alpha coefficients and *MIC* values were deemed inappropriate estimates of the internal consistency of the PPI–R total and factor scores as they are not unidimensional. In other words, except for factor C, which is based on a single scale, the PPI–R total and factor scores consist of multiple scales measuring different constructs, and in fact, the FD and SCI factors have been found to be orthogonal (Lilienfeld & Fowler, 2006; Marcus et al., 2012). As for alpha coefficients, they are known to largely underestimate the internal consistency of multidimensional scales, with the underestimation being more prominent in the presence of small correlations between the factors or dimensions of a given scale (Cortina, 1993; Kamata, Turhan, & Darandari, 2003; Schmitt, 1996). Therefore, stratified alpha coefficients were used to evaluate the internal consistency of the PPI–R total and factor scores. Stratified alphas were first proposed by Cronbach, Schönemann, and McKie (1965) as reliability estimates of multidimensional composite scores (i.e., scores from measures/scales comprised of heterogeneous items that can be grouped into subtests based on their content). They have been shown to perform better than other reliability estimates of multidimentional composite scores (i.e., multidimensional omega or maximal reliability; see He, 2009; Kamata et al., 2003), and were therefore selected for use in this study.

Research Question 2:
Predictive Validity of the PPI–R with Respect to Recidivism and Type of the Offense(s)

Multivariate analyses were used to examine the predictive validity of the PPI–R. Specifically, survival analyses were employed as they are suitable for uneven follow-up periods, and take into account time to re-offense (Luke & Homan, 1998). This was important in the current study given that the follow-up period used to determine whether participants engaged in criminal acts following release from custody was variable in length depending on the date of recruitment (i.e., ranging from 6 to over 26 months). Separate sets of survival analyses using a Cox model were carried out to evaluate the predictive validity of the PPI–R total, factor, and content scale scores with regard to recidivism in general, as well as with respect to the type of post release offense(s). In addition, survival analyses using a Cox model were carried out to determine whether the PPI–R has predictive utility in terms of differentiating between the type of post release offense(s) committed by the individuals who recidivated. These analyses were conducted with a subsample that included only those who recidivated following their release from custody for the index offense.

Of note, with regard to the content scale scores, the first step included conducting bivariate analyses to determine which of the scales were significantly correlated with recidivism. Subsequently, only scales that were significantly correlated with recidivism at the bivariate level were included in the survival analyses. This was done considering there are eight content PPI–R scales in total and the sample size used in the analyses ranged between 76 and 84 (depending on the outcome variable used), thus, entering all of the content scales into a single survival analysis would have substantially lowered the power of the analysis.

In addition, given that receiver operating characteristic (ROC) analysis is less sensitive to base rates of the criterion than correlation coefficients, it was carried out to measure the predictive accuracy of the PPI–R. The area under the curve (*AUC*) of the ROC is an index of predictive accuracy of the predictor and ranges from 0 (perfect negative prediction) to 1 (perfect positive prediction). *AUC* values of .50 are considered chance prediction, while those ranging between .75 and .80 are considered moderate/large to large effect sizes (see Nicholls, Ogloff, & Douglas, 2004). AUCs are interpreted as the probability that a randomly selected recidivist scored higher on the PPI–R than a randomly selected non-recidivist.

For all of the variables, forced entry method was used, where all variables (i.e., (a) PPI–R total score and recidivism or type of post release offense[s], (b) PPI–R factor scores and recidivism or type of post release offense[s], and (c) PPI–R content scale scores and recidivism or type of post release offense[s]) were entered into a single step to ensure that all variables were included in the regression equation. In survival analysis, the hazard represents the *risk* (i.e., the immediate potential) of the event occurring (which in this case was recidivism), and time to the event is modeled as the outcome. The hazard ratio (*HR*) estimates a relative risk that compares the rate of event occurrence for those who have recidivated versus those who have not.

In addition, given that the majority of the individuals who recidivated did so during the first 6 months following their release from custody, a series of logistic regression analyses were conducted to examine the predictive validity of the PPI–R for a set follow-up period (namely 6 months), where the PPI–R total, factor, and select scale scores were used as predictors. First, a series of univariate analyses were conducted to determine which of the PPI–R scores demonstrated significant associations with recidivism within 6 months. The next step was to enter those scores as predictors into multivariable logistic regression models. Implementing two different types of analyses to evaluate the predictive validity of the PPI–R was done as a way of evaluating the statistical conclusion validity of the survival analyses with regard to this research question. Additionally, utilizing logistic regression in addition to survival analyses to address this research question was deemed worthwhile as having a set follow-up period can be policy relevant and of practical importance in the fields of law enforcement and criminal justice.

In the present study, the observed value of odds ratios (in the case of logistic regression) or hazard ratios (in the case of survival analysis) can be interpreted as indicating an association between PPI–R scores and the increased relative risk of recidivism. While odds/hazard ratios of 1.0 indicate no association between PPI–R scores and recidivism, those greater than 1.0 indicate a positive association (i.e., high scores on the PPI–R indicate an increased risk for recidivism), and those less than 1.0

indicate a negative association (i.e., decreased risk for recidivism associated with high PPI–R scores). As an interpretive guideline, Fleiss, Williams, & Dubro (1986) suggested that when dealing with dichotomous predictors, odds ratios of 2.5 and higher are considered to represent clinically or practically meaningful associations, whereas according to Haddock, Rindskopf, & Shadish (1998) odds ratios of 3.0 or greater are considered to be large. It is important to note that when dealing with continuous predictor variables that have large potential score ranges, odds or hazard ratios will have small values as they reflect the effect of a one-unit increase in the predictor variable.

A test of differences between correlations was used to aid in exploring the potential differential effects of the SCI and FD factor scores on recidivism over the 6-month follow-up period. Specifically, an equation provided by King (2007) was used to obtain semi-standardized beta coefficients, which in turn were used to compare the strength of the prediction across the variables. The beta coefficient ranges from -1.0 to 1.0, and measures the change in the predicted probability that corresponds to one standard deviation change in the predictor. The coefficient is considered only semi-standardized because the predictor itself was standardized, which was deemed sufficient given the comparison between predictors was within the same model.

Research Question 3:
Incremental Validity of the PPI–R with Respect to Recidivism

Incremental Validity Relative to General Self-Report Measures of Personality

Two data analytic approaches were used to evaluate the incremental validity of the PPI–R with respect to recidivism relative to general self-report measures of personality traits. First, point biserial correlations were computed between the criterion measure (i.e., recidivism) and the scale/factor scores of the PPI–R, the AGG and ANT scales of the PAI, as well as the Conscientiousness (C), Neuroticism (N), and Agreeableness (A) scales of the NEO–FFI. Next, a series of hierarchical regression analyses were computed, where the PAI and NEO–FFI scales listed above, if significant at the bivariate level, were entered together in the first block of predictors, while the PPI–R total or factor scores were entered in the second block. A separate regression analysis was carried out for each of the PPI–R scores. Of note, these analyses were carried out for the entire follow-up period where survival analyses using a Cox model were employed, as well as for the 6-month follow-up period where logistic regression analyses were conducted. Entry and removal criteria were set at p = .05 to enter, and p = .10 to remove. The decision to choose a hierarchical over a stepwise approach to test the incremental validity of the PPI–R was influenced by the fact that a hierarchical approach tends to produce results that are tested in a theory-driven manner and are more generalizable in comparison to those from a stepwise approach (Hunsley & Meyer, 2003).

Incremental Validity Relative to the CRNA

In addition, CRNA ratings available in participants' criminal records were used as a provisional "benchmark" for the performance of the PPI–R with regard to assessing risk for recidivism, and as a way of evaluating the incremental validity of the PPI–R in that regard. Ratings completed close to the index offense (i.e., immediately after, or if not available, immediately before the index offense) were used as a comparison. Specifically, point biserial correlations were computed between the PPI–R scores and CRNA ratings and recidivism, as a way of evaluating the level of correspondence between them. Further, the incremental validity of the PPI–R was evaluated by implementing the steps outlined in the previous section (i.e., *Incremental validity relative to self-report measures of personality)*. Specifically, point biserial correlations were computed first to determine significant correlations between the PPI–R and the CRNA. Subsequently, a series of hierarchical regression analyses were carried out for the PPI–R total and factor scores that were correlated significantly with the CRNA ratings, where the CRNA ratings were entered in the first block of predictors, while the PPI–R total or factor scores were entered in the second block. Of note, survival analyses using a Cox model were carried out for the entire follow-up period, and logistic regression analyses were used for the 6-month follow-up period. Entry and removal criteria were once again set at p = .05 to enter, and p = .10 to remove.

Research Question 4:
Moderating Effects of Gender on PPI–R-Assessed Psychopathy

Do PPI–R Scores Differ across Gender?

Independent samples t-test were used to determine whether PPI–R scores differed across gender. A Bonferroni correction was used to prevent Type I error rate inflation. In addition, effect sizes for any detected gender differences were estimated using Cohen's *d*.

Does Gender Moderate the Predictive Utility of the PPI–R with Respect to Recidivism?

Next, hierarchical regression analysis was used to determine whether gender moderated the predictive utility of the PPI–R total, as well as the SCI and FD factor scores, vis-à-vis crime and violence. This was done by centering continuous variables and entering gender and PPI–R scale scores in the first block of predictors, and their interaction term in the second block of predictors. The gender variable was dummy coded and males served as the reference group (i.e., male = 0, female = 1). Of note, a separate regression analysis was run for the total and for each of the factor scores to ensure that the statistical power of the regression model would not be reduced by entering too many predictors at once.

Does Gender Moderate the Relationship between PPI–R-Assessed Psychopathy and Type of Offense(s)?

The same steps were taken to examine whether gender moderated the relationship between PPI–R-assessed psychopathy and the type of offense(s). In addition, hierarchical regression analyses were used to determine whether gender moderated the utility of the PPI–R in differentiating between the type of post release offense(s) committed by the individuals who recidivated. These analyses were carried out with a subsample that included only those individuals who recidivated and the same steps as described above were implemented.

3. Results

3.1. Sample Characteristics

The information presented in this section is based on data from participants who provided valid responses on the PPI–R (i.e., *n* = 84; data from participants who provided invalid responses, responded to an insufficient number of items, or provided no responses at all, are not included here). Of note, for the analyses that focused on the type of offense(s) outcome variable and included only participants who recidivated, the sample size was reduced to 59. Participants in the study were almost equally split by gender (i.e., 43 females and 41 males, or in the case of the type of offense(s) outcome, where only those who recidivated were included, 32 females and 27 males), and the mean age at the time of recruitment was 33.04 years (*SD* = 8.04). A majority of the sample was Caucasian (*n* = 60, or 71%), followed by Aboriginal (*n* = 14, or 17%), East Indian (*n* = 4, or 5%), Black (*n* = 3, or 4%), and Other (*n* = 3, or 4%). A majority of the participants were never married (*n* = 61, or 73%), or at the time of recruitment were in a common law relationship (*n* = 10, or 12%). English was a first language for a majority of the sample (*n* = 66, or 79%), and a majority had not completed high school (*n* = 51, or 61%).

With regard to the participants' index offense(s), 29 (35%; 42% males vs. 28% females) engaged in acts that were classified as *violent*, 29 (35%; 32% males vs. 38% females) engaged in *non-violent* acts, and 26 (31%; 27% males vs. 35% females) engaged in *other* criminal acts (i.e., breaches or a combination of non-violent offenses and breaches). As for the type of post release offense (i.e., recidivism), 23 (27%; 52% males vs. 28% females) engaged in *violent* offenses, 12 (14%; 11% males vs. 28% females) committed *non-violent* offenses, and 24 (29%; 37% males vs. 44% females) engaged in *other* offenses. Details about participants' prior criminal history were also gathered and included: (a) age of first arrest or conviction, (b) number of prior court dispositions, (c) failures to comply, or (d) supervision periods, and data was missing for

5 participants. Of the 79 (94%) for whom data was available, a majority (*n* = 29, or 35%; 30% males vs. 44% females) had their first arrest or conviction between the ages of 18 and 24. In addition, a majority had 5 or more prior court dispositions (*n* = 54, or 64%; 75% males vs. 62% females), 3 or more failures to comply (*n* = 56, or 67%; 73% males vs. 69% females), and 3 or more prior supervision periods (*n* = 53, or 63%; 73% males vs. 62% females). With regard to the individuals who were imprisoned after a prior conviction, data were missing for 7 (8%) individuals, and of the remaining 77 (92%; 92% males vs. 95% females), 72 (86%; 92% males vs. 95% females) had a history of multiple incarcerations (see Table 1 for more details).

Table 1. Demographic Characteristics of Study Sample

		Total Sample (*N* = 84)	
Characteristic		***n***	**%**
Gender			
	Male	43	51.2
	Female	41	48.8
Ethnicity			
	Caucasian	60	71.4
	Black	3	3.6
	Aboriginal	14	16.7
	East Indian	4	4.8
	Other	3	3.6
Marital status			
	Never married	61	72.6
	Never married or common-law	1	1.2
	Presently married	2	2.4
	Presently common-law	10	11.9
	Divorced	4	4.8
	Widowed	1	1.2
	Separated	5	6.0
Education			
	High school not completed	51	60.7
	High school diploma or GED	19	22.6
	Some college	10	11.9
	Post-secondary degree	4	4.8

Characteristic		Total Sample (*N* = 84)	
		n	%
First language			
	English	66	78.6
	Other	16	19.0
	Vietnamese	1	1.2
	Filipino	1	1.2
Type of index offense			
	Violent	29	34.5
	Non-violent	29	34.5
	Other	26	31.0
Type of recidivism			
	Violent	23	27.4
	Non-violent	12	14.3
	Other	24	28.6
Prior incarceration			
	NO	5	6.0
	YES	72	85.7
	Missing	7	8.3
Age at first arrest of conviction			
	25 and over	23	27.4
	18 to 24	29	34.5
	14 to 17	20	23.8
	13 and UNDER	7	8.3
	Missing	5	6.0
Number of prior court dispositions			
	0	4	4.8
	1	7	8.3
	2 to 4	14	16.7
	5 or more	54	64.3
	Missing	5	6.0
Number of prior supervision periods			
	0	8	9.5
	1	11	13.1
	2	7	8.3

Characteristic		Total Sample (N = 84)	
		n	%
	3 or more	53	63.1
	Missing	5	6.0
Number of prior failures to comply			
	0	7	8.3
	1	8	9.5
	2	8	9.5
	3 or more	56	66.7
	Missing	5	6.0

3.2. Assessment of Assumptions

Assumptions for normality and linearity of the data were checked by evaluating the skewness and kurtosis of each variable, as well as examining scatter plots for each of the predicted correlations. Based on the skewness and kurtosis, as well as the produced scatter plots of each variable, it was determined that the assumptions of normality and linearity were not violated. The bivariate correlations between the predictors were examined to assess for multicollinearity in the regression analyses, and there was no indication of any issues in that regard. The assumption of homogeneity of error variance was tested using Levene's test of equality of variances, which revealed non-significant results, suggesting that group variance could be treated as equal. The proportional hazards (*PH*) assumption was checked by examining the residual plots of the PPI–R scores and it was determined that the *PH* assumption was not violated.

In addition, the data were examined for potential measurement error by calculating Cronbach's alpha coefficients and *MIC* values for each of the subscales of the NEO–FFI and the PAI that were used to examine the incremental validity of the PPI–R. The internal consistency for all of the subscales ranged from acceptable to good (i.e., α-coefficients ranging .663 to .913, *MIC* values ranging from .137 to .364; see Table 2). Overall, it could be concluded that the statistical power was not affected by measurement error.

Table 2. Internal Consistency Reliability of the PPI–R and Comparative Measures

Scale	Cronbach's Alpha/Stratified Alpha**	*SE*	Precision Estimate	*MIC*
NEO_N/12	.817	3.44	.01	.269
NEO_A/12	.663	3.52	.02	.137
NEO_C/12	.780	3.12	.02	.240
PAI_ANT/24	.842	4.44	.01	.168
PAI_AGG/18	.913	3.60	.01	.364
PPI–R total score/131 **	.939	9.73	--	--
SCI factor score/70 **	.936	7.01	--	--
FD factor score/45 **	.883	5.83	--	--
C factor score/16	.837	3.29	.01	.255
ME content scale score/20	.864	3.87	.01	.242
RN content scale score/16	.831	3.55	.01	.232
BE content scale score/15	.852	3.21	.02	.273
CN content scale score/19	.809	3.38	.01	.184
SOI content scale score/18	.847	3.49	.01	.237
F content scale score/14	.848	3.57	.02	.283
STI content scale score/13	.825	3.01	.01	.266

Note. NEO_N/12 = Neuroticism/12 items; NEO_A/12 = Agreeableness/12 items; NEO_C/12 = Conscientiousness/12 items; PAI_ANT/24 = Antisocial Features/24 items; PAI_AGG/18 = Aggression/18 items; PPI–R = Psychopathic Personality Inventory–Revised; SCI = Self Centered Impulsivity/70 items; FD = Fearless Dominance/45 items; C = Coldheartedness/16 items; ME = Macheavelian Egocentricity/20 items; RN = Rebellious Nonconformity/16 items; BE = Blame Externalization/15 items; CN = Carefree Nonplanfulness/19 items; SOI = Social Influence/18 items; F = Fearlessness/14 items, STI = Stress Immunity/13 items; *SE* = standard error; *MIC* = mean inter-item correlation. The precision estimate is provided as an indication of dimensionality of each of the scales. It was derived based on the following formula: Precision estimate = SD_r / [(1/2 * k * [k - 1]) - 1]1/2 , where r = MIC and k = the number of items per scale (Cortina, 1993). Stratified alpha coefficients (marked with **) were calculated for the PPI–R total, as well as SCI and FD factor scores, based on the following formula: $\alpha_c = 1 - \Sigma s_i = 1\ \delta_i^2 (1-\alpha_i) / \delta_c^2$, where α_c = stratified alpha, or the reliability of the composite score, s = represents the number of strata or subtests, α_i = coefficient alpha calculated on the i^{th} stratum or subtest, i = i^{th} strata or substest, δ_i^2 = variance of stratum/subtest i, δ_c^2 = the variance of the composite score.

3.3. Descriptive Information

Measures of central tendency, error, range, and variance were calculated for the PPI–R total and factor *t*-scores. Mean scores for each of the scales were as follows: 63.37 (*SD* = 13.25) for the total score, 63.54 (*SD* = 10.77) for the SCI factor score, 53.89 (*SD* = 12.18) for the FD factor score, and 48.99 (*SD* = 9.58) for the C factor score (see Table 3 for more details). Of note, there was no restriction in the range of the PPI–R total, factor, and scale scores that could have had a negative impact on power.

Table 3. Descriptive Characteristics of the PPI–R Total and Factor scores

		PPI–R total score	SCI factor	FD factor	C factor
N	Valid	84	84	84	84
	Missing	0	0	0	0
Mean		63.37	63.54	53.89	48.99
SE_M		1.45	1.18	1.33	1.05
Median		63.50	65.00	52.00	48.00
Mode		66	66	52	52
SD		13.25	10.77	12.18	9.58
Variance		175.51	116.01	148.36	91.84
Skewness		.304	-.145	.431	.881
SE_{SKEW}		.263	.263	.263	.263
Kurtosis		-.371	-.283	-.385	1.386
SE_{KURT}		.520	.520	.520	.520
Range		57	51	52	51
Minimum		39	36	32	31
Maximum		96	87	84	82
Percentiles	10	46.50	49.00	38.00	37.00
	25	53.25	56.00	46.00	43.00
	50	63.50	65.00	52.00	48.00
	75	72.00	71.75	62.00	52.00
	90	81.00	77.00	72.50	62.00

Note. PPI–R = Psychopathic Personality Inventory–Revised; SCI = Self-Centered Impulsivity; FD = Fearless Dominance; C = Coldheartedness.

3.4. Research Question 1: Reliability of the PPI–R

The internal consistency of the PPI–R was evaluated by calculating Cronbach's alpha coefficients or stratified alphas as well as *MIC* and *CITC* for each of the PPI–R scales. Precision estimates for alpha coefficients were used as a measure of dimensionality of the PPI–R scales.

3.4.1. Cronbach's Alpha Coefficients/Stratified Alpha Coefficients

Cronbach's alpha coefficients were found to be satisfactory for all of the PPI–R content scales. Specifically, alpha coefficients were as follows: for ME α = .864, for SOI α = .847, for F α = .848, for RN α = .831, for STI α = .825, for CN α = .809, for BE α = .852, and for C α = .837. Detailed information, including standard errors for alpha coefficients, is provided in Table 2. Precision estimates for the BE and F content scale were .02, and for the rest of the scales were .01, indicating minimal departure from unidimensionality. The stratified alpha coefficients for the PPI–R total and factor scores were also satisfactory, and were as follows: for the PPI–R total score α_c = .939, and for the SCI and FD factors stratified alphas were α_c = .936 and α_c = .883, respectively. Of note, as indicated previously, the C factor score is identical to the C content scale score, and therefore, Cronbach's alpha and *MIC*, rather than stratified alpha, were used to estimate its internal consistency reliability.

3.4.2. Corrected Item-To-Total Correlations and Mean Inter-Item Correlations

MIC values for all content scale scores were within the recommended range of .15 -- .50 (i.e., ranging from .184 to .283), indicating satisfactory internal consistency. Detailed information is provided in Table 2. In addition, based on examination of the *CITC* values, there were only a few items within each scale, which if removed, would have led to improvement in the internal consistency reliability of the PPI–R content scales. Specifically, for the ME scale, removal of item 45 would have improved α to .867. For the SOI scale, removal of item 68 would have resulted in an α = .849. Removal of item 35 would have yielded an α = .849 for the F scale. Removal of three items on the RN scale (i.e., items 48, 58, and 127) would have yielded α = .836, α =

.837, or α = .832 respectively. For the C scale, removal of item 142 would have resulted in an α = .840. Removal of items 50 and 54 on the STI scale would have yielded α = .826 or α = .829, respectively. Removal of item 51 on the CN scale would have led to an α = .812. Finally, removal of items 16, 19, and 82, on the BE scale would have resulted in the following α coefficients: α = .859, α = .857, or α = .853, respectively. Even so, in all instances the improvement would have been negligible, enhancing alpha only by .001 to .007.

3.5. Research Question 2: Predictive Validity of the PPI–R with Regard to Recidivism and Type of Offense(s)

3.5.1. Predictive Validity until Time to Re-Offend (Over the Entire Follow-Up Period)

The average community follow-up period after release from custody was 663.62 days (*SD* = 129.69). Nevertheless, to account for any periods of post-release re-incarceration, analyses were based on the actual number of days spent in the community (*M* = 272.49, *SD* = 281.20). Point biserial correlation coefficients between the PPI–R scores and recidivism at the bivariate level are presented in Table 4, and only the ones that were significantly correlated with recidivism (i.e., the PPI–R total and SCI factor scores, r = .339, p = .002 for both) were included in the survival analyses. Detailed information regarding the ROC analyses of the relationship between PPI–R total and factor scores and recidivism, as well as type of the offense(s) (i.e., *violent*, *non-violent*, and *other*), are presented in Table 5. In summary, *AUC*s for the total and SCI factor scores with regard to recidivism were moderate and significant, while the relationship between the FD and C factor scores and recidivism was modest and non-significant. In addition, the *AUC* values for the relationship between the PPI–R total score and *violent* offenses were moderate and significant. The rest of the *AUC* values with regard to the type of the offense(s) were low to modest and non-significant.

Table 4. Bivariate Correlations between PPI–R Total, Factor, and Scale Scores, and Overall Recidivism

Scale	Recidivism
PPI–R total score	.339**
SCI factor score	.339**
FD factor score	.162
C factor score	.136
ME content scale score	.315**
RN content scale score	.219*
BE content scale score	.220*
CN content scale score	.283**
SOI content scale score	.111
F content scale score	.111
STI content scale score	.113

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

Table 5. Areas Under the Curve (AUCs) for Receiver Operating Characteristics Analysis for Recidivism and Type of Offense(s)

Variable		*AUC*	*SE*	CI (95%)	*p*-value
Recidivism					
	PPI–R total score	0.718	0.063	[.595, .841]	.002
	SCI factor score	0.704	0.062	[.582, .826]	.003
	FD factor score	0.594	0.067	[.463, .726]	.174
	C factor score	0.604	0.072	[.463, .746]	.132
Violent offenses					
	PPI–R total score	0.644	0.064	[.518, .770]	.043
	SCI factor score	0.634	0.072	[.493, .775]	.059
	FD factor score	0.608	0.071	[.470, .747]	.127
	C factor score	0.545	0.078	[.391, .699]	.527
Non-violent offenses					
	PPI–R total score	0.435	0.078	[.282, .587]	.470
	SCI factor score	0.481	0.079	[.326, .635]	.833
	FD factor score	0.381	0.076	[.232, .531]	.190
	C factor score	0.482	0.069	[.348, .617]	.843

Variable		*AUC*	*SE*	CI (95%)	*p*-value
Other offenses					
	PPI–R total score	0.622	0.068	[.488, .756]	.081
	SCI factor score	0.590	0.066	[.461, .718]	.200
	FD factor score	0.562	0.072	[.422, .702]	.376
	C factor score	0.574	0.064	[.448, .700]	.292

Note. *AUC* = area under the curve; *SE* = standard error; CI = confidence interval.

Detailed information regarding the survival analyses, including full model details, is presented in Table 6 (i.e., recidivism) and Table 7 (i.e., the type of post release offense[s]). The survival curves for the entire sample, as well as for each gender, are presented in Figures 1 and 2 respectively. The log-rank test showed no significant difference between the survival curves for males versus females (p = .846). As a reminder, while the *recidivism* outcome variable captures whether or not an individual engaged in criminal activities subsequent to their release from custody for the index offense, the *type of offense(s)* variable groups any criminal activity that might have occurred into three categories based on the severity or gravity of the offense(s) (i.e., 1. *violent*; 2. *non-violent*; and 3. *other* = breaches, or a combination of *non-violent* offenses and breaches). While all of the final models with regard to recidivism were significant, the only significant final model with respect to the type of offense(s) was that of the PPI–R total score vis-a-vis *violent* offenses. With regard to the total score, the survival analyses revealed that the PPI–R total score was significantly and independently predictive of recidivism (i.e., HR = 1.029, p =.001, Wald = 10.368). The PPI–R total score was also significant in predicting *violent* offenses (i.e., HR = 1.036, p = .012, Wald = 6.349), but was not significant in predicting *non-violent* or *other* offenses. In terms of the factor score analyses, only the SCI factor score was significantly predictive of recidivism (i.e., HR = 1.035, p = .011, Wald = 6.407). None of the factor scores were significant in predicting the type of post release offenses. It is worth pointing out, however, that when correlations between the PPI–R scores and type of offense(s) were computed separately for males and females, there was a significant correlation between the SCI factor and *violent* offenses for females (i.e., r = .308, p = .045), but not for males (i.e., r = .079, p = .623). The content scales scores that were significantly correlated with recidivism at the bivariate level (i.e., ME, RN, BE, and CN) were not significant in predicting recidivism or the type of post release offense(s) based on the survival analyses. Finally, none of the PPI–R scores were significant in terms of differentiating between the type of post release offenses (i.e., *violent* vs. *non-violent* vs. *other)* committed by the individuals who recidivated (see Table 8 for details).

Table 6. Predictive Validity of the PPI–R vis-à-vis Recidivism

Scale	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
PPI–R total [a]	0.029	0.009	10.368	1.029 [1.011, 1.047]	.001	0.35
SCI factor score [b]	0.034	0.013	6.407	1.035 [1.008, 1.062]	.011	0.36
FD factor score [b]	0.007	0.012	0.343	1.007 [0.984, 1.031]	.558	0.36
C factor score [b]	0.005	0.013	0.159	1.005 [0.980, 1.030]	.690	0.36
ME content scale score [c]	0.031	0.019	2.592	1.032 [0.993, 1.072]	.107	0.38
RN content scale score [c]	-0.004	0.015	0.071	0.996 [0.967, 1.026]	.790	0.38
BE content scale score [c]	0.005	0.017	0.085	1.005 [0.972, 1.039]	.771	0.38
CN content scale score [c]	0.027	0.017	2.524	1.027 [0.994, 1.061]	.112	0.38

Note. *SE* = standard error; e^B = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 453.703, $\chi 2$ (df = 1, n = 84) = 10.586, p = .001.
[b] Model -2LL = 452.972, $\chi 2$ (df = 3, n = 84) = 11.057, p = .011.
[c] Model -2LL = 451.973, $\chi 2$ (df = 4, n = 84) = 11.901, p = .018.

Table 7. Predictive Validity of the PPI–R vis-à-vis Type of Post Release Offense(s)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
Violent offenses						
PPI–R Total [a]	0.035	0.014	6.349	1.036 [1.008, 1.064]	.012	0.28
SCI factor score [b]	0.033	0.021	2.326	1.033 [0.991, 1.077]	.127	0.28
FD factor score [b]	0.018	0.019	0.879	1.018 [0.981, 1.056]	.348	0.28
C factor score [b]	0.005	0.021	0.057	1.005 [0.965, 1.046]	.811	0.28
ME content scale score [c]	0.032	0.030	1.116	1.033 [0.973, 1.096]	.291	0.25
RN content scale score [c]	0.004	0.024	0.032	1.004 [0.958, 1.053]	.857	0.25
BE content scale score [c]	0.013	0.027	0.218	1.013 [0.960, 1.068]	.640	0.25
CN content scale score [c]	0.008	0.027	0.084	1.008 [0.957, 1.062]	.772	0.25

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
Non-Violent Offenses						
PPI–R Total [d]	0.021	0.022	0.939	1.021 [0.979, 1.065]	.332	0.11
SCI factor score [e]	0.051	0.032	2.561	1.053 [0.989, 1.121]	.110	0.19
FD factor score [e]	-0.022	0.029	0.560	0.979 [0.925, 1.036]	.454	0.19
C factor score [e]	0.004	0.027	0.023	1.004 [0.953, 1.058]	.879	0.19
ME content scale score [f]	0.029	0.050	0.331	1.029 [0.933, 1.134]	.565	0.25
RN content scale score [f]	-0.026	0.032	0.700	0.974 [0.915, 1.036]	.403	0.25
BE content scale score [f]	0.015	0.037	0.174	1.015 [0.945, 1.091]	.677	0.25
CN content scale score [f]	0.066	0.038	3.037	1.069 [0.992, 1.151]	.081	0.25
Other offenses						
PPI–R Total [g]	0.026	0.014	3.464	1.026 [0.999--1.055]	.063	0.21
SCI factor score [h]	0.026	0.021	1.599	1.027 [0.986, 1.069]	.206	0.21
FD factor score [h]	0.009	0.019	0.245	1.009 [0.973, 1.047]	.620	0.21
C factor score [h]	0.006	0.020	0.100	1.006 [0.967, 1.048]	.751	0.21
ME content scale score [i]	0.029	0.030	0.905	1.029 [0.970, 1.091]	.341	0.22
RN content scale score [i]	-0.001	0.023	0.003	0.999 [0.954, 1.045]	.956	0.22
BE content scale score [i]	-0.006	0.027	0.056	0.994 [0.942, 1.048]	.812	0.22
CN content scale score [i]	0.026	0.026	1.011	1.026 [0.976, 1.080]	.315	0.22

Note. *SE* = standard error; e^B = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).

[a] Model -2LL = 178.695, $\chi2$ (df = 1, n = 84) = 6.557, p = .010.
[b] Model -2LL = 178.655, $\chi2$ (df = 3, n = 84) = 6.584, p = .086.
[c] Model -2LL = 179.536, $\chi2$ (df = 4, n = 84) = 5.358, p = .252.
[d] Model -2LL = 82.290, $\chi2$ (df = 1, n = 76) = .948, p = .330.
[e] Model -2LL = 80.289, $\chi2$ (df = 3, n = 76) = 2.750, p = .432.
[f] Model -2LL = 78.371, $\chi2$ (df = 4, n = 76) = 4.849, p = .303.
[g] Model -2LL = 192.338, $\chi2$ (df = 1, n = 83) = 3.524, p = .060.
[h] Model -2LL = 192.303, $\chi2$ (df = 3, n = 83) =3.532, p = .317.
[i] Model -2LL = 191.774, $\chi2$ (df = 4, n = 83) = 4.068, p = .397.

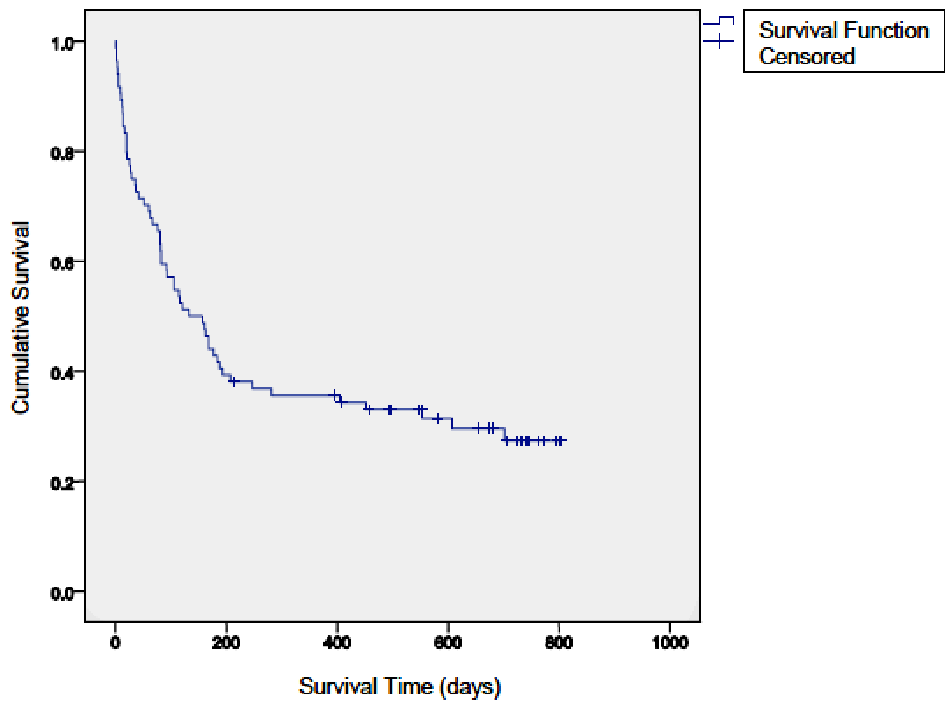

Figure 1. ***Kaplan-Meier Survival Estimate***

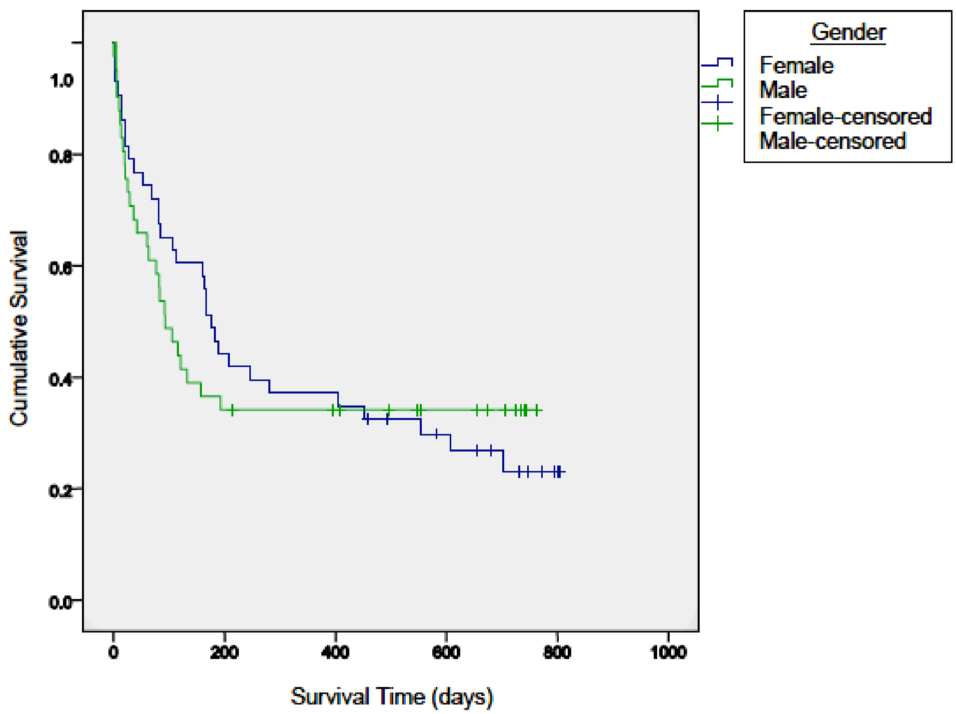

Figure 2. ***Kaplan-Meier Survival Estimate by Gender***

Table 8. ***Utility of the PPI–R to Differentiate between the Type of Post Release Offense(s) among Those Who Recidivated***

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
Violent offenses						
PPI–R Total [a]	0.021	0.015	1.969	1.021 [0.992, 1.052]	.161	0.18
SCI factor score [b]	0.009	0.023	0.162	1.009 [0.965, 1.056]	.688	0.21
FD factor score [b]	0.026	0.021	1.507	1.026 [0.985, 1.069]	.220	0.21
C factor score [b]	-0.006	0.026	0.053	0.994 [0.944, 1.047]	.817	0.21
ME content scale score [c]	0.005	0.030	0.032	1.005 [0.948, 1.066]	.858	0.16
RN content scale score [c]	0.016	0.023	0.483	1.016 [0.972, 1.062]	.487	0.16
BE content scale score [c]	-0.001	0.031	0.002	0.999 [0.940, 1.061]	.967	0.16
CN content scale score [c]	-0.009	0.027	0.100	0.991 [0.940, 1.045]	.751	0.16
Non-Violent Offenses						
PPI–R Total [d]	0.018	0.027	0.479	1.019 [0.967, 1.073]	.489	0.10
SCI factor score [e]	0.029	0.038	0.588	1.030 [0.956, 1.109]	.443	0.11
FD factor score [e]	-0.001	0.040	0.001	0.999 [0.924, 1.080]	.982	0.11
C factor score [e]	0.000	0.051	0.000	1.000 [0.904, 1.106]	.993	0.11
ME content scale score [f]	-0.035	0.050	0.479	0.966 [0.875, 1.066]	.489	0.21
RN content scale score [f]	0.053	0.040	1.726	1.054 [0.974, 1.140]	.189	0.21
BE content scale score [f]	-0.008	0.054	0.022	0.992 [0.893, 1.102]	.883	0.21
CN content scale score [f]	0.002	0.047	0.002	1.002 [0.914, 1.099]	.961	0.21
Other offenses						
PPI–R Total [g]	0.010	0.015	0.473	1.010 [0.981, 1.041]	.492	0.09
SCI factor score [h]	0.001	0.023	0.003	1.001 [0.958, 1.047]	.955	0.11
FD factor score [h]	0.014	0.021	0.447	1.014 [0.974, 1.056]	.504	0.11
C factor score [h]	-0.001	0.026	0.000	0.999 [0.949, 1.052]	.982	0.11
ME content scale score [i]	0.007	0.029	0.061	1.007 [0.951, 1.067]	.805	0.14
RN content scale score [i]	0.013	0.022	0.336	1.013 [0.970, 1.058]	.562	0.14
BE content scale score [i]	-0.025	0.030	0.686	0.975 [0.919, 1.035]	.407	0.14
CN content scale score [i]	0.008	0.026	0.092	1.008 [0.957, 1.062]	.762	0.14

Note. *SE* = standard error; e^B = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 151.978, $\chi 2$ (df = 1, n = 59) = 1.997, p = .158.

[b] Model -2LL = 151.408, $\chi 2$ (df = 3, n = 59) = 2.557, p = .465.
[c] Model -2LL = 152.408, $\chi 2$ (df = 4, n = 59) = 1.537, p = .820.
[d] Model -2LL = 49.550, $\chi 2$ (df = 1, n = 51) = .485, p = .486.
[e] Model -2LL = 49.356, $\chi 2$ (df = 3, n = 51) = .661, p = .882.
[f] Model -2LL = 47.724, $\chi 2$ (df = 4, n = 51) = 2.242, p = .691.
[g] Model -2LL = 165.327, $\chi 2$ (df = 1, n = 58) = .475, p = .491.
[h] Model -2LL = 165.127, $\chi 2$ (df = 3, n = 58) = .679, p = .878.
[i] Model -2LL = 164.633, $\chi 2$ (df = 4, n = 58) = 1.119, p = .891.

3.5.2. Predictive Validity for a Set Follow-Up Period of 6 Months

Of the 125 participants, 88 (70%) recidivated over the course of the entire follow-up period (i.e., 0 to 26 months). Nevertheless, data was used only from the 84 participants who produced valid PPI–R profiles. Of them, 48 (57%) recidivated within the first 6 months following their release from custody, and therefore a set follow-up period of 6 months was used in the logistic regression analyses.

Results from the univariate analyses are presented in Table 9, where odds ratios reflect the magnitude of the associations between the PPI–R scores (i.e., total, factor, and select scale scores that showed significant correlations) and recidivism over the specified follow-up period (i.e., 6 months). Specifically, the PPI–R total score, two of the factor scores (i.e., SCI and FD), as well as two of the scale scores (i.e., ME and RN) were determined to be significant predictors of recidivism during the 6-month follow-up period.

Table 9. Univariate Logistic Regression -- Odds Ratios for the Associations between PPI–R Scores and Recidivism over the 6-month Follow-Up Period

Scale	0 to 6 months (*OR*)
PPI–R total score	1.061**
SCI factor score	1.059*
FD factor score	1.043*
C factor score	1.035
ME content scale score	1.066*
RN content scale score	1.039*
BE content scale score	1.043
CN content scale score	1.040

Scale	0 to 6 months (*OR*)
SOI content scale score	1.036
F content scale score	1.030
STI content scale score	1.021

*$p \leq .05$. **$p \leq .01$.

Table 10 presents detailed information on the multivariable logistic regression analyses conducted to determine the predictive validity of the PPI–R scores with regard to recidivism over the 6-month follow-up period. Specifically, with the PPI–R total score entered as a predictor, a test of the full model against the constant only model yielded statistically significant results, and based on the Nagelkerke R-squared, the variance explained by the model was moderate, at 16%. This indicated that the PPI–R total score could be used to distinguish between individuals who recidivated versus those who did not ($\chi 2 = 10.366$, $p = .001$, $df = 1$). Prediction accuracy was 73% overall (83% for those who recidivated and 58% for those who did not). As evidenced by the Wald criterion the PPI–R total score was a significant predictor ($p = .003$). The odds ratio value (*Exp(B)* = 1.061) indicates that for every one point increase in the PPI–R total score, participants were 1.061 times more likely to recidivate (i.e., 6%).

Table 10. Multivariable Logistic Regression -- Odds Ratios for the Associations between PPI–R Scores and Recidivism over the 6-month Follow-Up Period

Scale	*B*	*SE (B)*	Wald	*OR* (95% CI)	*p*-value
PPI–R total score [a]	0.059	0.020	8.783	1.061 [1.020, 1.103]	.003
SCI factor score [b]	0.050	0.024	4.469	1.051 [1.004, 1.101]	.035
FD factor score [b]	0.033	0.021	2.572	1.034 [0.993, 1.076]	.109
ME content scale score [c]	0.055	0.032	2.891	1.056 [0.992, 1.125]	.089
RN content scale score [c]	0.011	0.025	0.210	1.011 [0.963, 1.062]	.647

Note. *SE* = standard error; *OR* = odds ratios; CI = confidence interval.
[a] Model -2LL = 104.362, $\chi 2$ ($df = 1$, $n = 84$) = 10.366, $p = .001$.
[b] Model -2LL = 105.036, $\chi 2$ ($df = 2$, $n = 84$) = 9.692, $p = .008$.
[c] Model -2LL = 107.316, $\chi 2$ ($df = 1$, $n = 84$) = 7.413, $p = .025$.

Similarly, when the SCI and FD factor scores were entered as predictors, a test of the full model against the constant only model was statistically significant, and the variance explained by the model was moderate, at 15% (i.e., Nagelkerke R-squared = .146). Therefore, it could be concluded that those two factor scores could also be used to distinguish between individuals who recidivated versus those who did not ($\chi 2$ = 9.962, p = .008, df = 2). The overall prediction accuracy of this model was 71% (81% for those who recidivated and 58% for those who did not). Based on the Wald criterion only the SCI factor was a significant predictor in the model (p = .035). The odds ratio value (*Exp(B)* = 1.051) indicates that for every one point increase in the SCI score, the likelihood of recidivism increased 1.051 times.

With regard to the scale scores, when the ME and RN scales were entered as predictors, a test of the full model against the constant only model was statistically significant, and based on the Nagelkerke R-squared, the variance explained by the model was modest, at 11%. This indicated that those two scale scores could also be used to distinguish between individuals who recidivated versus those who did not ($\chi 2$ = 7.413, p = .025, df = 2). The overall prediction accuracy of this model was 63% (77% for those who recidivated and 44% for those who did not). The scale scores themselves were no longer significant predictors.

Finally, based on the test of differences between correlations, the SCI factor evidenced a coefficient of 0.131, which represented 13% of the maximum possible change in the probability of recidivism, as opposed to a coefficient of 0.098 for the FD factor, which represented 9% of the total change possible in the probability of recidivism.

3.6. Research Question 3: Incremental validity of the PPI–R with Regard to Recidivism

3.6.1. Incremental Validity Relative to General Self-Report Personality Inventories

Point biserial correlations were computed between the criterion measure (i.e., recidivism) and the total/factor scores of the PPI–R, the Aggression (AGG) and

Antisocial features (ANT) scales of the PAI, as well as the Conscientiousness (C), Neuroticism (N), and Agreeableness (A) scales of the NEO–FFI. Results revealed that the PPI–R total and SCI factor scores (r = .342, p = .004 and r = .326, p = .006), as well as the ANT scale of the PAI (r = .295, p = .014), were correlated positively with recidivism over the entire follow-up period (see Table 11). Results were somewhat different with regard to recidivism over the 6-month follow-up period. In particular, the PPI–R total, SCI and FD factor scores (r = .328, p = .006, r = .265, p = .028, and r = .268, p = .026 respectively), as well as the ANT and AGG scale of the PAI (r = .302, p =.012 and r = .289, p =.016 respectively), were correlated positively with recidivism (details provided in Table 11).

Table 11. Bivariate Correlations between the PPI–R, PAI, NEO–FFM Scores and Recidivism

	Recidivism	
Scale	Entire Follow-up Period	6-month Follow-up Period
PPI–R total score	.342**	.328**
SCI factor score	.326**	.265*
FD factor score	.210	.268*
C factor score	.139	.127
PAI ANT scale	.295*	.302*
PAI AGG scale	.191	.289*
NEO N scale	-.008	-.011
NEO A scale	-.173	-.159
NEO C scale	-.030	.066

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

Next, two survival analyses were carried out (i.e., [1] PPI–R total and ANT scale, and [2] SCI factor and ANT scale) to examine the incremental validity of the PPI–R relative to the ANT scale over the entire follow-up period. Results revealed that while overall models were significant, and the ANT scale when entered alone in the model was predictive of recidivism (i.e., HR = 1.040, p = .001, Wald = 10.717), adding the PPI–R scores to the models did not add incrementally to the prediction of recidivism (see Table 12 for detailed information regarding the hazard ratios and the final models).

Table 12. **_Incremental Validity of the PPI–R Relative to the PAI vis-à-vis Recidivism over the Entire Follow-Up Period_**

Variable	*B*	*SE (B)*	Wald	e^{B} (95% CI)	*p*-value	Model Φ
PAI ANT scale [a]	0.032	0.019	3.021	1.033 [.996, 1.071]	.082	0.41
PPI–R total [a]	0.007	0.014	0.278	1.008 [.980, 1.036]	.598	0.41
PAI ANT scale [b]	0.037	0.020	3.441	1.038 [.998, 1.080]	.064	0.40
SCI factor score [b]	0.003	0.021	0.018	1.003 [.963, 1.044]	.893	0.40

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 361.303, $\chi 2$ (df = 2, n = 69) = 11.331, p = .003.
[b] Model -2LL = 361.567, $\chi 2$ (df = 2, n = 69) = 10.975, p = .004.

In addition, three sets of hierarchical logistic regression analyses were computed for each of the scales that were found to be significantly correlated with recidivism over the 6-month follow-up period at the bivariate level (i.e., [1] PPI–R total, ANT, and AGG, [2] SCI factor, ANT, and AGG scale, and [3] FD factor, ANT, and AGG). Tests of the full models against the constant only models yielded statistically significant results. The Nagelkerke R-squared was moderate across the models, showing that the variance explained ranged from 16% to 19%. In terms of the individual scales, however, none of them were found to be significant predictors of recidivism when entered into the models (see Table 13 for details). This indicated that while the scales did not contribute unique variance to the outcome, they predicted recidivism when taken together.

Table 13. **_Incremental Validity of the PPI–R vis-à-vis Recidivism over the 6-Month Follow-Up Period_**

	B	*SE (B)*	Wald	df	*p*-value	*OR* (95% CI)
Model 1 (PPI–R total score and ANT, AGG) [a]						
ANT scale	0.016	0.033	0.230	1	.632	1.016 [0.953, 1.083]
AGG scale	0.026	0.023	1.352	1	.245	1.027 [0.982, 1.073]
PPI–R total score	0.033	0.030	1.213	1	.271	1.034 [0.974, 1.097]
Constant	-4.583	1.836	6.234	1	.013	0.010
Model 2 (SCI factor score and ANT, AGG) [b]						
ANT scale	0.032	0.040	0.667	1	.414	1.033 [0.956, 1.117]
AGG scale	0.031	0.022	1.986	1	.159	1.031 [0.988, 1.077]

	B	SE (B)	Wald	df	p-value	OR (95% CI)
SCI factor score	0.010	0.044	0.049	1	.825	1.010 [0.927, 1.100]
Constant	-4.648	1.885	6.077	1	.014	0.010
Model 3 (FD factor score and ANT, AGG) [c]						
ANT scale	0.034	0.026	1.724	1	.189	1.034 [0.984, 1.087]
AGG scale	0.025	0.023	1.197	1	.274	1.025 [0.981, 1.072]
FD factor score	0.030	0.024	1.602	1	.206	1.030 [0.984, 1.079]
Constant	-5.336	1.959	7.418	1	.006	0.005

Note. *SE* = standard error; *df* = degrees of freedom; *OR* = odds ratio; CI = confidence interval.
[a] Model -2LL = 83.303, $\chi 2$ (df = 3, n = 69) = 9.888, p = .020.
[b] Model -2LL = 84.496, $\chi 2$ (df = 3, n = 69) = 8.694, p = .034.
[c] Model -2LL = 82.877, $\chi 2$ (df = 3, n = 69) = 10.313, p = .016.

3.6.2. Incremental Validity Relative to the CRNA

Point biserial correlations were computed between the criterion measure (i.e., recidivism) and CRNA ratings, as well as the PPI–R scores and CRNA ratings. All of the CRNA ratings (i.e., overall Summary, Supervision Level, Need, and Risk) were correlated positively with recidivism (r = .558, p < .001; r = .560, p < .001; r = .309, p =.006; and r = .421, p < .001 respectively). Further, results revealed significant correlations between the PPI–R total, SCI, FD and C factor scores and the Risk rating (r = .422, p < .001; r = .346, p = .002; r = .260, p = .021; and r = .258, p =.022 respectively). In addition, the C factor score was significantly correlated with the Summary CRNA rating (r = .265, p = 0.018), and the Supervision Level rating (r = .255, p = 0.023; see Table 14). These findings showed support for the fact that the PPI–R is associated with risk estimates and risk factors as measured by the CRNA.

Table 14. Bivariate Correlations between the PPI–R Scores, CRNA Ratings, and Recidivism (Entire Follow-Up/6-Month Follow-Up Period)

	1	2	3	4	5	6	7	8	9	10
1. Recidivism -- entire follow-up period	1									
n	84									
2. Recidivism -- 6-month follow-up period	--	1								
n		84								

	1	2	3	4	5	6	7	8	9	10
3. Summary CRNA rating	.558**	.432**	--							
n	79	79								
4. Supervision Level rating	.560**	.436**	1.000**	--						
n	80	80	79							
5. Needs rating	.309**	.294**	.664**	.665**	--					
n	79	79	78	79						
6. Risk rating	.421**	.351**	.734**	.725**	.353**	--				
n	79	79	78	79	79					
7. Total score	.339**	.340**	.192	.200	.018	.422**	--			
n	84	84	79	80	79	79				
8. SCI factor score	.339**	.284*	.112	.121	-.041	.346**	.852**	--		
n	84	84	79	80	79	79	84			
9. FD factor score	.162	.237*	.127	.135	.024	.260*	.686**	.262*	--	
n	84	84	79	80	79	79	84	84		
10. C factor score	.136	.153	.265*	.255*	.156	.258*	.436**	.143	.274*	--
n	84	84	79	80	79	79	84	84	84	

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

Next, six survival analyses were carried out (i.e., [1] PPI–R total and Risk CRNA rating, [2] SCI factor and Risk CRNA rating scale, [3] FD factor and Risk CRNA rating, [4] C factor and Risk CRNA rating, [5] C factor and Summary CRNA rating, and [6] C factor and Supervision CRNA rating) to examine the potential incremental validity of the PPI–R relative to the CRNA over the entire follow-up period. Results revealed that all of the overall models were significant ($p \leq .001$ for all), and while the CRNA ratings were predictive of recidivism (i.e., [1] *HR* = 2.063, $p = .003$, Wald = 8.769; [2] *HR* = 2.089, $p = .002$, Wald = 9.272; [3] *HR* = 2.199, $p = .001$, Wald = 11.282; [4] *HR* = 2.223, $p = .001$, Wald = 11.592, [5] *HR* = 4.487, $p < .001$, Wald = 15.795, and [6] *HR* = 4.569, $p < .001$, Wald = 16.223), adding the PPI–R scores to the model did not add incrementally to the prediction of recidivism (see Table 15 for detailed information regarding the hazard ratios and the full models).

Table 15. Incremental Validity of the PPI–R vis-à-vis Recidivism over the Entire Follow-Up Period

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
CRNA Risk ratings [a]	0.724	0.245	8.769	2.063 [1.277, 3.33]	.003	0.44
PPI–R total [a]	0.014	0.010	1.997	1.014 [0.995, 1.033]	.158	0.44
CRNA Risk ratings [b]	0.737	0.242	9.272	2.089 [1.300, 3.357]	.002	0.44
SCI factor score [b]	0.021	0.013	2.557	1.021 [0.995, 1.048]	.110	0.44
CRNA Risk ratings [c]	0.788	0.235	11.282	2.199 [1.388, 3.482]	.001	0.42
FD factor score [c]	0.007	0.011	0.423	1.007 [0.986, 1.029]	.515	0.42
CRNA Risk ratings [d]	0.799	0.235	11.592	2.223 [1.404, 3.522]	.001	0.42
C factor score [d]	0.005	0.012	0.147	1.005 [0.981, 1.028]	.701	0.42
CRNA Supervision Level ratings [e]	1.519	0.377	16.223	4.569 [2.181, 9.570]	.000	0.50
C factor score [e]	0.002	0.012	0.030	1.002 [0.978, 1.027]	.863	0.50
CRNA Summary ratings [f]	1.501	0.378	15.795	4.487 [2.140, 9.407]	.000	0.50
C factor score [f]	0.004	0.012	0.084	1.004 [0.980, 1.028]	.771	0.50

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 420.734, $\chi 2$ (df = 2, n = 79) = 15.584, $p < .001$.
[b] Model -2LL = 420.152, $\chi 2$ (df = 2, n = 79) = 15.416, $p < .001$.
[c] Model -2LL = 422.287, $\chi 2$ (df = 2, n =79) = 14.132, $p = .001$.
[d] Model -2LL = 422.562, $\chi 2$ (df = 2, n = 79) = 13.794, $p = .001$.
[e] Model -2LL = 415.694, $\chi 2$ (df = 2, n = 80) = 20.074 $p < .001$.
[f] Model -2LL = 407.423, $\chi 2$ (df = 2, n = 79) = 19.783, $p < .001$.

In addition, logistic regression analyses were computed for the same combination of PPI–R scores and CRNA ratings as above, as they were found to be significantly correlated with recidivism over the 6-month follow-up period at the bivariate level (see Table 14 above for details). Tests of the full models against the constant only models yielded significant results (model significance ranged from $p < .001$ to $p = .006$), and the Nagelkerke R-squared was moderate across the models, showing that the variance explained ranged from 17% to 25%. In addition, even though the CRNA ratings were significant predictors of recidivism, none of the PPI–R scores evidenced incremental validity once entered into the model (see Table 16 for details).

Table 16. Incremental Validity of the PPI–R vis-à-vis Recidivism over the 6- Month Follow-Up Period

	B	*SE (B)*	Wald	*df*	*p*-value	*OR* (95% CI)
Model 1 (PPI–R total score and CRNA Risk ratings) [a]						
CRNA Risk ratings	0.876	0.402	4.753	1	.029	2.400 [1.092, 5.273]
PPI–R total score	0.035	0.022	2.454	1	.117	1.035 [0.991, 1.081]
Constant	-3.994	1.463	7.449	1	.006	0.018
Model 2 (SCI factor score and CRNA Risk ratings) [b]						
CRNA Risk ratings	0.971	0.392	6.149	1	.013	2.641 [1.226, 5.690]
SCI factor score	0.032	0.025	1.641	1	.200	1.033 [0.983, 1.085]
Constant	-4.115	1.729	5.666	1	.017	0.016
Model 3 (FD factor score and CRNA Risk ratings) [c]						
CRNA Risk ratings	1.011	0.378	7.134	1	.008	2.748 [1.309, 5.768]
FD factor score	0.021	0.022	0.930	1	.335	1.022 [0.978, 1.067]
Constant	-3.290	1.374	5.734	1	.017	0.037
Model 4 (C factor score and CRNA Risk ratings) [d]						
CRNA Risk ratings	1.036	0.379	7.470	1	.006	2.817 [1.340, 5.970]
C factor score	0.018	0.028	0.428	1	.513	1.018 [0.964, 1.076]
Constant	-3.091	1.488	4.317	1	.038	0.045
Model 5 (C factor score and CRNA Supervision Level ratings) [e]						
CRNA Risk ratings	1.902	0.559	11.584	1	.001	6.701 [2.241, 20.037]
C factor score	0.010	0.028	0.119	1	.730	1.010 [0.956, 1.066]
Constant	-5.266	1.802	8.543	1	.003	0.005
Model 6 (C factor score and CRNA Summary ratings) [f]						
CRNA Risk ratings	1.863	0.559	11.090	1	.001	6.444 [2.152, 19.292]
C factor score	0.012	0.028	0.192	1	.662	1.012 [0.958, 1.070]
Constant	-5.312	1.808	8.634	1	.003	0.005

Note. *SE* = standard error; *df* = degrees of freedom; *OR* = odds ratio; CI = confidence interval.
[a] Model -2LL = 94.839, $\chi 2$ (df = 2, n = 79) = 12.530, p = .002.
[b] Model -2LL = 95.730, $\chi 2$ (df = 2, n = 79) = 11.639, p = .003.
[c] Model -2LL = 96.459, $\chi 2$ (df = 2, n =79) = 10.909, p = .004.
[d] Model -2LL = 96.975, $\chi 2$ (df = 2, n = 79) = 10.393, p = .006.

[e] Model -2LL = 92.876, $\chi 2$ (df = 2, n = 80) = 16.221 $p < .001$.
[f] Model -2LL = 92.126, $\chi 2$ (df = 2, n = 79) = 15.854, $p < .001$.

3.7. Research Question 4: Moderating Effects of Gender on PPI–R-Assessed Psychopathy

3.7.1. Do PPI–R Scores Differ across Gender?

Independent samples *t*-test was conducted to determine whether PPI–R scores differed across gender, using a Bonferroni correction to prevent Type I error rate inflation. There were significant differences in the PPI–R total scores of men (M = 67.78, SD = 13.09) and women (M = 59.16, SD = 12.10), t (82) = 3.13, p = .001, $CI_{.9875}$ 1.596, 15.639, with a medium to large effect size (d = .68) calculated using Cohen's *d* formula. Further, there were significant differences in the FD factor scores of men (M = 57.98, SD = 10.83) and women (M = 50.00, SD = 12.37), t (82) = 3.16, p = .001, $CI_{.9875}$ 1.525, 14.426, with a medium to large effect size (d = .69). Finally, there were significant differences in the C factor scores of men (M = 52.37, SD = 10.75) and women (M = 45.77, SD = 7.04), t (82) = 3.34, $p < .001$, $CI_{.9875}$ 1.556, 11.641, with a medium to large effect size (d = .73). There were no significant differences in the SCI factor scores of men (M = 65.20, SD = 11.38) and women (M = 61.95, SD = 10.07), t (82) = 1.39, p = .085, $CI_{.9875}$ -2.730, 9.213; Cohen's effect size value (d = .30) for the SCI factor scores suggested low practical significance (see Table 17 and Table 18). These results suggest that at least some of the PPI–R scores differed across gender. Specifically, men obtained significantly higher scores on the PPI–R total, as well as the FD and C factors, but there were no significant differences in the scores of women and men on the SCI factor.

Table 17. Group Statistics by Gender

	Gender	*n*	Mean	SD
PPI–R total score	male	41	67.78	13.093
	female	43	59.16	12.103
SCI factor score	male	41	65.20	11.378
	female	43	61.95	10.036

	Gender	*n*	Mean	SD
FD factor score	male	41	57.98	10.829
	female	43	50.00	12.236
C factor score	male	41	52.37	10.754
	female	43	45.77	7.044

Note. *SD* = standard deviation.

Table 18. Independent Samples T-Test

						98.75% CI	
	t	*df*	Sig. (1-tailed)	Mean Difference	*SE* Difference	Lower	Upper
PPI–R total score	3.134	82	.001	8.618	2.749	1.596	15.639
SCI factor score	1.386	82	.085	3.242	2.338	-2.730	9.213
FD factor score	3.158	82	.001	7.976	2.526	1.525	14.426
C factor score	3.342	82	.001	6.598	1.974	1.556	11.641

Note. *t* = *t* statistic; *df* = degrees of freedom; Sig. = significance value; *SE* = standard error; CI = confidence interval.

3.7.2. Does Gender Moderate the Predictive Utility of the PPI–R with Respect to Recidivism?

First, bivariate correlations were used to evaluate the association between the PPI–R total and factor scores, as well as gender, and recidivism across the entire sample, and results are presented in Table 19. Given the associations between the PPI–R scores and recidivism were already presented in research question 2 above, they will not be repeated here. As for gender, it was correlated positively with the PPI–R total, FD and C factor scores (i.e., $r = .327$, $p = .002$; $r = .329$, $p = .002$; and $r = .346$, $p = .001$ respectively). There were no significant correlations between gender and the SCI factor score (i.e., $r = .151$, $p = .169$) or recidivism (i.e., $r = -.094$, $p = .397$).

Table 19. Bivariate Correlations between PPI–R Scores and Gender, Recidivism, and Type of Offense(s)

			Type of Offense(s)		
	Gender	Recidivism	Violent	Non-Violent	Other
PPI–R total score	.327**	.339**	.238*	-.073	.164
SCI factor score	.151	.339**	.199	.002	.146

			Type of Offense(s)		
	Gender	Recidivism	Violent	Non-Violent	Other
PPI–R total score	.327**	.339**	.238*	-.073	.164
FD factor score	.329**	.162	.175	-.142	.101
C factor score	.346**	.136	.093	-.042	.078
Gender	1	-.094	.148	-.194	-.090

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

Next, a hierarchical survival analysis was used to determine whether gender moderated the predictive utility of the PPI–R total score vis-à-vis crime and violence over the entire follow-up period. As a reminder, gender was dummy coded, where males served as the reference group (i.e., male = 0, female = 1); thus, the results are presented from females' perspective. Results indicated that while the overall model was significant and the PPI–R total score was predictive of future crime and violence (*HR* = 1.028, *p* = .034, Wald = 4.488), gender was not (*HR* = 1.249, *p* = .428, Wald = 0.629), and no moderating effects were found (*HR* = 1.009, *p* = .623, Wald = 0.242; see Table 20 for details).

Table 20. ***Moderation Analyses for Gender and the PPI–R Total Score vis-à-vis Future Crime and Violence***

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
PPI–R total score [a]	0.027	0.013	4.488	1.028 [1.002, 1.054]	.034	0.37
Gender [a]	0.222	0.281	0.629	1.249 [0.721, 2.165]	.428	0.37
Gender x PPI.R total score [a]	0.009	0.019	0.242	1.009 [0.973, 1.047]	.623	0.37

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 452.662, $\chi 2$ (*df* = 3, *n* = 84) = 11.586, *p* = .009.

Similarly, a hierarchical survival analysis was used to evaluate the moderating effects of gender on the predictive validity of the SCI factor score vis-à-vis crime and violence over the entire follow-up period. Results revealed that while the overall model was significant and the SCI factor score was a significant predictor of crime and violence (*HR* = 1.037, *p* = .034, Wald = 4.519), gender was not (*HR* = 1.094, *p* = .741, Wald =

0.109), and there were no moderating effects (*HR* = 1.008, *p* =.754, Wald = 0.098; see Table 21 for details).

Table 21. Moderation Analyses for Gender and the SCI Factor Score vis-à-vis Future Crime and Violence

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
SCI Factor score [b]	0.036	0.017	4.519	1.037 [1.003, 1.072]	.034	0.35
Gender [b]	0.090	0.273	0.109	1.094 [0.641, 1.869]	.741	0.35
Gender x SCI Factor score [b]	0.008	0.025	0.098	1.008 [0.960, 1.058]	.754	0.35

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[b] Model -2LL = 453.407, $\chi 2$ (*df* = 3, *n* = 84) = 10.017, *p* = .018.

3.7.3. Does Gender Moderate the Relationship between PPI–R-Assessed Psychopathy and Type of Offense(s)?

The same steps as in the previous research question were taken to examine whether gender moderated the relationship between PPI–R-assessed psychopathy and type of offense(s). First, bivariate analyses were used to examine the association between the PPI–R total, as well as factor scores, and type of offense(s) (i.e., *violent*, *non-violent,* and *other*). While the association between the PPI–R total score and *violent* offenses was significant (i.e., *r* = .238, *p* = .029), the rest of the results were non-significant (see Table 19 above). Results were also non-significant with regard to the association between gender and type of the offense (i.e., *r* = .148, *p* = .179 for *violent* offenses; *r* = -.194, *p* = .076 for *non-violent* offenses; and *r* = -.090, *p* = .414 for *other* offenses).

In terms of the hierarchical regression analyses, Cox regression was carried out over the entire follow-up period and detailed information regarding the final models is presented in Tables 22 through 33. As in the previous research question, males served as the reference group and the results are presented from females' perspective. In summary, none of the final models with regard to the type of offense(s) were significant. In addition, there were no significant main effects of the PPI–R scores or gender, or moderating effects of gender on the predictive utility of the PPI–R scores with regard to the type of the offense(s).

Table 22. Moderation Analyses for Gender and the PPI–R Total Score vis-à-vis Gravity of the Offense (VIOLENT offenses)

Variable	B	SE (B)	Wald	e^B (95% CI)	p-value	Model Φ
PPI–R total score [a]	0.022	0.018	1.451	1.022 [0.986, 1.059]	.228	0.29
Gender [a]	-0.438	0.449	0.949	0.645 [0.267, 1.557]	.330	0.29
Gender x PPI.R total score [a]	0.028	0.031	0.832	1.029 [0.968, 1.093]	.362	0.29

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 177.237, $\chi 2$ (df = 3, n = 84) = 7.268, p = .064.

Table 23. Moderation Analyses for Gender and the PPI–R Total Score vis-à-vis Gravity of the Offense (NON-VIOLENT offenses)

Variable	B	SE (B)	Wald	e^B (95% CI)	p-value	Model Φ
PPI–R total score [b]	0.044	0.038	1.326	1.045 [0.970, 1.126]	.249	0.22
Gender [b]	1.149	0.749	2.350	3.154[0.726, 13.697]	.125	0.22
Gender x PPI.R total score [b]	-0.013	0.047	0.082	0.987 [0.900, 1.082]	.775	0.22

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[b] Model -2LL = 79.431, $\chi 2$ (df = 3, n = 76) = 3.580 p = .311.

Table 24. Moderation Analyses for Gender and the PPI–R Total Score vis-à-vis Gravity of the Offense (OTHER offenses)

Variable	B	SE (B)	Wald	e^B (95% CI)	p-value	Model Φ
PPI–R total score [c]	0.026	0.021	1.489	1.027 [0.984, 1.071]	.222	0.24
Gender [c]	0.404	0.452	0.797	1.497 [0.617, 3.633]	.372	0.24
Gender x PPI.R total score [c]	0.009	0.029	0.100	1.009 [0.953, 1.069]	.752	0.24

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[c] Model -2LL = 191.210, $\chi 2$ (df = 3, n = 83) = 4.804, p = .187.

Table 25. ***Moderation Analyses for Gender and the SCI Factor Score vis-à-vis Gravity of the Offense (VIOLENT offenses)***

Variable	*B*	*SE (B)*	Wald	e^{B} (95% CI)	*p*-value	Model Φ
SCI factor score [d]	0.018	0.023	0.591	1.018 [0.973, 1.065]	.442	0.29
Gender [d]	-0.671	0.460	2.129	0.511 [0.207, 1.259]	.145	0.29
Gender x SCI factor score [d]	0.066	0.043	2.375	1.068 [0.982, 1.161]	.123	0.29

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[d] Model -2LL = 176.153, $\chi 2$ (df = 3, n = 84) = 7.115, p = .068.

Table 26. ***Moderation Analyses for Gender and the SCI Factor Score vis-à-vis Gravity of the Offense (NON-VIOLENT offenses)***

Variable	*B*	*SE (B)*	Wald	e^{B} (95% CI)	*p*-value	Model Φ
SCI factor score [e]	0.081	0.051	2.527	1.085 [0.981, 1.199]	.112	0.23
Gender [e]	1.004	0.752	1.782	2.730 [0.625, 11.930]	.182	0.23
Gender x SCI factor score [e]	-0.049	0.062	0.639	0.952 [0.844, 1.074]	.424	0.23

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[e] Model -2LL = 78.294 $\chi 2$ (df = 3, n = 76) = 3.968, p = .265.

Table 27. ***Moderation Analyses for Gender and the SCI Factor Score vis-à-vis Gravity of the Offense (OTHER offenses)***

Variable	*B*	*SE (B)*	Wald	e^{B} (95% CI)	*p*-value	Model Φ
SCI factor score [f]	0.042	0.029	2.137	1.043 [0.986, 1.103]	.144	0.20
Gender [f]	0.349	0.453	0.595	1.418 [0.584, 3.442]	.440	0.20
Gender x SCI factor score [f]	-0.012	0.039	0.097	0.988 [0.914, 1.067]	.756	0.20

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[f] Model -2LL = 192.152, $\chi 2$ (df = 3, n = 83) = 3.324, p = .344.

Table 28. Moderation Analyses for Gender and the FD Factor Score vis-à-vis Gravity of the Offense (VIOLENT offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
FD factor score [g]	0.029	0.024	1.539	1.030 [0.983, 1.079]	.215	0.25
Gender [g]	-0.452	0.454	0.990	0.637 [0.262, 1.550]	.320	0.25
Gender x FD factor score [g]	-0.005	0.035	0.022	0.995 [0.929, 1.066]	.883	0.25

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[g] Model -2LL =180.084, $\chi 2$ (df = 3, n = 84) = 5.123, p = .163.

Table 29. Moderation Analyses for Gender and the FD Factor Score vis-à-vis Gravity of the Offense (NON-VIOLENT offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
FD factor score [h]	0.001	0.060	0.000	1.001 [0.889, 1.127]	.984	0.15
Gender [h]	0.889	0.725	1.503	2.433 [0.587, 10.085]	.220	0.15
Gender x FD factor score [h]	0.012	0.069	0.032	1.012 [0.884, 1.159]	.859	0.15

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[h] Model -2LL =81.471, $\chi 2$ (df = 3, n = 76) = 1.670, p = .644.

Table 30. Moderation Analyses for Gender and the FD Factor Score vis-à-vis Gravity of the Offense (OTHER offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
FD factor score [i]	0.004	0.030	0.018	1.004 [0.947, 1.064]	.894	0.20
Gender [i]	0.222	0.427	0.272	1.249 [0.541, 2.882]	.602	0.20
Gender x FD factor score [i]	0.030	0.036	0.696	1.030 [0.960, 1.106]	.404	0.20

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[i] Model -2LL =192.876, $\chi 2$ (df = 3, n = 83) = 3.270, p = .352.

Table 31. Moderation Analyses for Gender and the C Factor Score vis-à-vis Gravity of the Offense (VIOLENT offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
C factor score [j]	0.021	0.022	0.953	1.021 [0.979, 1.065]	.329	0.22
Gender [j]	-0.733	0.519	1.996	0.480 [0.174, 1.329]	.158	0.22
Gender x C factor score [j]	-0.061	0.057	1.140	0.941 [0.842, 1.052]	.286	0.22

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[j] Model -2LL =180.859, $\chi 2$ (df = 3, n = 84) = 4.097, p = .251.

Table 32. Moderation Analyses for Gender and the C Factor Score vis-à-vis Gravity of the Offense (NON-VIOLENT offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
C factor score [k]	-0.006	0.047	0.015	0.994 [0.906, 1.091]	.903	0.34
Gender [k]	0.892	0.675	1.749	2.441 [0.650, 9.161]	.186	0.34
Gender x C factor score [k]	0.045	0.063	0.502	1.046 [0.924, 1.183]	.479	0.34

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[k] Model -2LL =80.800, $\chi 2$ (df = 3, n = 76) = 2.626, p = .453.

Table 33. Moderation Analyses for Gender and the C Factor Score vis-à-vis Gravity of the Offense (OTHER offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
C factor score [l]	0.011	0.027	0.166	1.011 [0.959, 1.065]	.684	0.14
Gender [l]	0.276	0.432	0.409	1.318 [0.565, 3.074]	.522	0.14
Gender x C factor score [l]	0.029	0.044	0.444	1.029 [0.945, 1.121]	.505	0.14

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[l] Model -2LL =194.108, $\chi 2$ (df = 3, n = 83) = 1.733, p = .630.

Further, survival analyses were carried out over the entire follow-up period to determine whether gender moderated the utility of the PPI–R in differentiating between the type of post release offense(s) committed by the individuals who recidivated. As a reminder, the subsample used for these analyses included only individuals who recidivated. Detailed information regarding the final models is presented in Tables 34 through 36. In summary, all of the final models with regard to *violent* offenses were significant. In addition, results revealed significant main effects for gender in each of the models pertaining to *violent* offenses (i.e., when gender was entered as a predictor together with the total and each of the factor scores). With regard to *non-violent* offenses, gender also yielded a main effect when entered in a model with the C factor score. Results with regard to *violent* offenses were as follows: $HR = 0.190$, $p = .002$, Wald = 9.743 for model [a] (i.e., including the total score as predictor), $HR = 0.131$, $p < .001$, Wald = 13.148 for model [b] (i.e., including the SCI factor), $HR = 0.286$, $p = .012$, Wald = 6.262 for model [c] (i.e., including the FD factor), and $HR = 0.181$, $p = .004$, Wald = 8.168 for model [d] (i.e., including the C factor; see Table 34). The main effect of gender with regard to *non-violent* offenses in model [d] (i.e., including the C factor score as a predictor) was $HR = 0.136$, $p = .049$, Wald = 3.867 (see Table 35).

Further, there was a moderation effect of gender ($HR = 1.153$ for females and $HR = 0.867$ for males, $p = .004$, Wald = 8.088) on the predictive utility of the SCI factor score with regard to *violent* offenses in this subsample. The interaction is presented in Figure 3. Specifically, under conditions of high SCI factor scores, males and females had comparable rates of violent recidivism. Conversely, under conditions of low SCI factor scores, males had significantly higher frequency of violent recidivism. The SCI factor score itself and gender (as already reported above) were also found to be significant predictors of *violent* offenses in the model ($p = .035$ and $p < .001$ respectively; see Table 34). Of note, when broken down by gender, the bivariate correlations between the SCI factor score and *violent* re-offending were non-significant and in the opposite direction of each other (i.e., $r = -.185$, $p = .356$ for men, and $r = .262$, $p = .147$ for women). No moderating effects of gender were found on the SCI factor score with regard to *non-violent* or *other* offenses in this subsample. Results were also non-significant for the moderating effects of gender on the total score and the rest of the factor scores (i.e., FD and C) and type of offense(s) (see Tables 34 through 36).

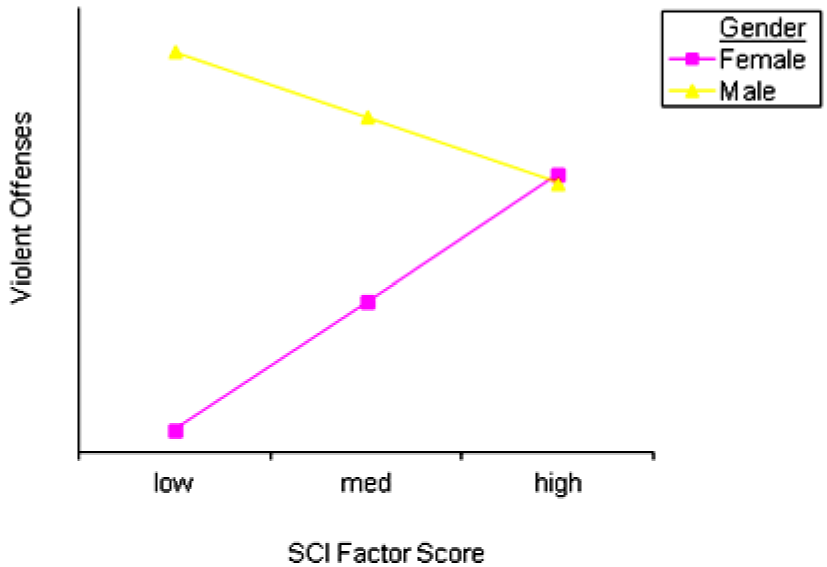

Figure 3. ***Moderating Effects of Gender on the Relationship between SCI Factor Score and Violent Offenses***

Table 34. ***Moderation Analyses for Gender and the PPI–R Scores vis-à-vis Utility of the PPI–R to Differentiate between the Type of Post-Release Offense(s) (VIOLENT offenses)***

Variable	***B***	***SE (B)***	**Wald**	**e^B (95% CI)**	***p*-value**	**Model Φ**
PPI–R total score [a]	-0.020	0.021	0.912	0.980 [0.941, 1.021]	.339	0.46
Gender [a]	-1.659	0.531	9.743	0.190 [0.067, 0.539]	.002	0.46
Gender x PPI.R total score [a]	0.061	0.036	2.887	1.063 [0.991, 1.141]	.089	0.46
SCI factor score [b]	-0.065	0.031	4.432	0.937 [0.882, 0.996]	.035	0.58
Gender [b]	-2.035	0.561	13.148	0.131 [0.043, 0.393]	.000	0.58
Gender x SCI factor score [b]	0.143	0.050	8.088	1.153 [1.045, 1.273]	.004	0.58
FD factor score [c]	0.025	0.026	0.962	1.026 [0.975, 1.079]	.327	0.45
Gender [c]	-1.250	0.500	6.262	0.286 [0.108, 0.763]	.012	0.45
Gender x FD factor score [c]	-0.014	0.039	0.126	0.986 [0.914, 1.065]	.723	0.45
C factor score[d]	-0.001	0.027	0.001	0.999 [0.948, 1.054]	.979	0.43
Gender [d]	-1.711	0.599	8.168	0.181 [0.056, 0.584]	.004	0.43
Gender x C factor score [d]	-0.087	0.068	1.613	0.917 [0.802, 1.048]	.204	0.43

Note. *SE* = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the

following formula: Φ = √ ($\chi2$ / N), (Rosenthal, 1991).
[a] Model -2LL = 141.630, $\chi2$ (df = 3, n = 59) = 12.351, p = .006.
[b] Model -2LL = 135.864, $\chi2$ (df = 3, n = 59) = 19.876, p < .001.
[c] Model -2LL =143.375, $\chi2$ (df = 3, n = 59) = 12.176, p = .007.
[d] Model -2LL =142.390, $\chi2$ (df = 3, n = 59) = 10.980, p = .012.

Table 35. Moderation Analyses for Gender and the PPI–R Scores vis-à-vis Utility of the PPI–R to Differentiate between the Type of Post-Release Offense(s) (NON-VIOLENT offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
PPI–R total score [a]	-0.033	0.039	0.721	0.967 [0.896, 1.044]	.396	0.31
Gender [a]	-2.037	1.051	3.756	0.130 [0.017, 1.023]	.053	0.31
Gender x PPI.R total score [a]	0.061	0.057	1.140	1.063 [0.950, 1.190]	.286	0.31
SCI factor score [b]	-0.042	0.059	0.514	0.959 [0.855, 1.075]	.473	0.30
Gender [b]	-2.045	1.097	3.478	0.129 [0.015, 1.110]	.062	0.30
Gender x SCI factor score [b]	0.076	0.077	0.970	1.079 [0.928, 1.254]	.325	0.30
FD factor score [c]	-0.025	0.045	0.312	0.975 [0.893, 1.065]	.576	0.28
Gender [c]	-1.691	0.932	3.291	0.184 [0.030, 1.146]	.070	0.28
Gender x FD factor score [c]	0.033	0.063	0.266	1.033 [0.913, 1.169]	.606	0.28
C factor score [d]	-0.073	0.067	1.185	0.929 [0.815, 1.060]	.276	0.34
Gender [d]	-1.998	1.016	3.867	0.136 [0.019, 0.993]	.049	0.34
Gender x C factor score [d]	0.104	0.098	1.133	1.110 [0.916, 1.344]	.287	0.34

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: Φ = √ ($\chi2$ / N), (Rosenthal, 1991).
[a] Model -2LL = 46.003, $\chi2$ (df = 3, n = 51) = 5.040, p = .169.
[b] Model -2LL = 46.190, $\chi2$ (df = 3, n = 51) = 4.596, p = .204.
[c] Model -2LL =46.843, $\chi2$ (df = 3, n = 51) = 4.034, p = .258.
[d] Model -2LL =45.652, $\chi2$ (df = 3, n = 51) = 5.956, p = .114.

Table 36. Moderation Analyses for Gender and the PPI–R Scores vis-à-vis Utility of the PPI–R to Differentiate between the Type of Post-Release Offense(s) (OTHER offenses)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
PPI–R total score [a]	-0.007	0.025	0.075	0.993 [0.946, 1.043]	.784	0.15
Gender [a]	-0.435	0.493	0.777	0.647 [0.246, 1.702]	.378	0.15
Gender x PPI.R total score [a]	0.024	0.033	0.509	1.024 [0.959, 1.093]	.476	0.15

Variable	B	SE (B)	Wald	e^B (95% CI)	p-value	Model Φ
SCI factor score [b]	-0.011	0.034	0.100	0.989 [0.925, 1.058]	.752	0.13
Gender [b]	-0.452	0.499	0.821	0.636 [0.240, 1.691]	.365	0.13
Gender x SCI factor score [b]	0.021	0.045	0.209	1.021 [0.934, 1.116]	.647	0.13
FD factor score [c]	-0.001	0.030	0.002	0.999 [0.941, 1.059]	.965	0.16
Gender [c]	-0.392	0.454	0.745	0.676 [0.278, 1.645]	.388	0.16
Gender x FD factor score [c]	0.020	0.037	0.296	1.020 [0.949, 1.097]	.587	0.16
C factor score [d]	-0.011	0.033	0.113	0.989 [0.928, 1.054]	.736	0.14
Gender [d]	-0.398	0.466	0.729	0.672 [0.269, 1.675]	.393	0.14
Gender x C factor score [d]	0.032	0.052	0.397	1.033 [0.934, 1.143]	.529	0.14

Note. SE = standard error; e^{β} = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 164.425, $\chi 2$ (df = 3, n = 58) = 1.343, p = .719.
[b] Model -2LL = 164.866, $\chi 2$ (df = 3, n = 58) = 0.949, p = .814.
[c] Model -2LL =164.310, $\chi 2$ (df = 3, n = 58) = 1.433, p = .698.
[d] Model -2LL =164.679, $\chi 2$ (df = 3, n = 58) = 1.123, p = .772.

3.8. Supplemental Analyses

3.8.1. Invalid/Missing data

Given that a large number of cases were excluded due to invalid/missing data, the survival analyses used to determine the predictive validity of the PPI–R were repeated with less stringent profile validity criteria for the PPI–R. Specifically, the analyses with regard to recidivism and type of offense(s) over the entire follow-up period were first carried out using the entire sample, and then using profiles with an IR40 score below 45. A score of 45 was selected as a cut off for these analyses as it was used in the normative sample to identify “highly atypical” profiles (Lilienfeld & Widows, 2005). This was done to determine whether having more power would have an impact on the observed patterns of associations. While results were identical to the main findings of the study at the bivariate level, the supplemental analyses yielded a few more significant associations at the multivariable level (details are provided in Tables 37 through 39). Similarly, analyses for the moderating effects of gender on the performance of the PPI–R scores with regard to recidivism were also repeated using the entire sample, as well as using a cut off score of 45 on IR40. This was done as power for the moderation analyses was lower than determined by the a-priori power calculations due to invalid/missing data.

Table 37. Bivariate Correlations between PPI–R Total, Factor and Scale scores and Overall Recidivism

	Recidivism	
	Entire Sample	**IR40 < 45**
PPI–R total score	.284**	.317**
SCI factor score	.305**	.333**
FD factor score	.096	.142
C factor score	.049	.061
ME content scale score	.278**	.322**
RN content scale score	.190*	.245*
BE content scale score	.216*	.239*
CN content scale score	.199*	.164
SOI content scale score	.042	.067
F content scale score	.155	.158
STI content scale score	.009	.060

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

Table 38. Predictive Validity of the PPI–R vis-à-vis Recidivism

Variable	***B***	***SE (B)***	**Wald**	**e^B (95% *CI*)**	***p*-value**	**Model Φ**
Entire sample						
PPI–R total [a]	0.029	0.009	11.207	1.029 [1.012, 1.047]	.001	0.32
SCI factor score [b]	0.043	0.013	11.589	1.044[1.018, 1.070]	.001	0.35
FD factor score [b]	0.001	0.010	0.014	1.001 [0.981, 1.021]	.907	0.35
C factor score [b]	0.002	0.011	0.029	1.002 [0.980, 1.024]	.864	0.35
ME content scale score [c]	0.029	0.015	3.581	1.029 [0.999, 1.060]	.058	0.35
RN content scale score [c]	0.000	0.011	0.000	1.000 [0.978, 1.023]	.990	0.35
BE content scale score [c]	0.013	0.014	0.813	1.013 [0.985, 1.041]	.367	0.35
CN content scale score [c]	0.019	0.014	1.879	1.020 [0.992, 1.048]	.170	0.35
IR40 < 45						
PPI–R total [d]	0.032	0.009	12.872	1.032 [1.015, 1.050]	.000	0.36

Variable	*B*	*SE (B)*	Wald	e^B (95% *CI*)	*p*-value	Model Φ
SCI factor score [e]	0.041	0.013	9.845	1.042 [1.015, 1.069]	.002	0.38
FD factor score [e]	0.008	0.011	0.512	1.008 [0.986, 1.030]	.474	0.38
C factor score [e]	0.000	0.012	0.000	1.000 [0.976, 1.025]	.987	0.38
ME content scale score [f]	0.034	0.017	4.260	1.035 [1.002, 1.070]	.039	0.39
RN content scale score [f]	0.004	0.013	0.093	1.004 [0.979, 1.029]	.760	0.39
BE content scale score [f]	0.012	0.016	0.568	1.012 [0.981, 1.043]	.451	0.39
CN content scale score [f]	0.008	0.015	0.262	1.008 [0.978, 1.038]	.609	0.39

Note. *SE* = standard error; e^β = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; *CI* = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991)
[a] Model -2LL = 644.773, $\chi 2$ (df = 1, n = 112) = 11.305, p = .001.
[b] Model -2LL = 641.556, $\chi 2$ (df = 3, n = 112) = 13.728, p = .003.
[c] Model -2LL = 650.759, $\chi 2$ (df = 4, n = 113) = 14.083, p = .007.
[d] Model -2LL = 549.971, $\chi 2$ (df = 1, n = 99) = 13.071, p < .001.
[e] Model -2LL = 548.212, $\chi 2$ (df = 3, n = 99) = 14.216, p = .003.
[f] Model -2LL = 547.554, $\chi 2$ (df = 4, n = 99) = 14.906, p = .005.

Table 39. Prospective Validity of the PPI–R vis-à-vis Type of Post Release Offense(s)

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
Entire Sample						
Violent offenses						
PPI–R total [a]	0.033	0.013	6.341	1.034 [1.007, 1.061]	.012	0.24
SCI factor score [b]	0.046	0.020	5.531	1.047 [1.008, 1.089]	.019	0.25
FD factor score [b]	0.002	0.016	0.020	1.002 [0.972, 1.033]	.886	0.25
C factor score [b]	0.005	0.017	0.099	1.005 [0.972, 1.040]	.754	0.25
ME content scale score [c]	0.045	0.024	3.533	1.046 [0.998, 1.096]	.060	0.29
RN content scale score [c]	-0.002	0.018	0.009	0.998 [0.964, 1.034]	.925	0.29
BE content scale score [c]	0.023	0.022	1.032	1.023 [0.979, 1.069]	.310	0.29
CN content scale score [c]	-0.002	0.022	0.007	0.998 [0.955, 1.043]	.931	0.29
Non-Violent offenses						
PPI–R total [d]	0.013	0.022	0.349	1.013 [0.970, 1.059]	.555	0.06
SCI factor score [e]	0.043	0.031	1.907	1.044 [0.982, 1.111]	.167	0.16
FD factor score [e]	-0.026	0.027	0.932	0.974 [0.925, 1.027]	.334	0.16
C factor score [e]	0.004	0.026	0.022	1.004 [0.954, 1.056]	.883	0.16

Variable	*B*	*SE (B)*	Wald	e^B (95% CI)	*p*-value	Model Φ
ME content scale score [f]	0.012	0.037	0.109	1.012 [0.941, 1.089]	.742	0.20
RN content scale score [f]	-0.020	0.026	0.605	0.980 [0.931, 1.031]	.437	0.20
BE content scale score [f]	-0.005	0.033	0.021	0.995 [0.933, 1.061]	.884	0.20
CN content scale score [f]	0.063	0.033	3.661	1.065 [0.998, 1.137]	.056	0.20
Other offenses						
PPI–R total [g]	0.031	0.013	5.206	1.031 [1.004, 1.058]	.023	0.22
SCI factor score [h]	0.039	0.019	4.040	1.040 [1.001, 1.080]	.044	0.23
FD factor score [h]	0.010	0.016	0.383	1.010 [0.979, 1.041]	.536	0.23
C factor score [h]	-0.002	0.018	0.014	0.998 [0.964, 1.033]	.906	0.23
ME content scale score [i]	0.018	0.024	0.566	1.018 [0.972, 1.066]	.452	0.22
RN content scale score [i]	0.009	0.018	0.248	1.009 [0.974, 1.046]	.618	0.22
BE content scale score [i]	0.013	0.022	0.321	1.013 [0.969, 1.058]	.571	0.22
CN content scale score [i]	0.022	0.022	0.987	1.022 [0.979, 1.067]	.320	0.22
IR40 < 45						
Violent offenses						
PPI–R total [j]	0.038	0.013	7.976	1.038 [1.012, 1.066]	.005	0.29
SCI factor score [k]	0.045	0.020	5.001	1.046 [1.006, 1.088]	.025	0.29
FD factor score [k]	0.011	0.017	0.476	1.012 [0.979, 1.045]	.490	0.29
C factor score [k]	0.002	0.019	0.011	1.002 [0.966, 1.040]	.915	0.29
ME content scale score [l]	0.045	0.026	3.064	1.046 [0.995, 1.099]	.080	0.32
RN content scale score [l]	0.002	0.019	0.014	1.002 [0.965, 1.041]	.906	0.32
BE content scale score [l]	0.028	0.024	1.337	1.028 [0.981, 1.078]	.248	0.32
CN content scale score [l]	-0.012	0.024	0.267	0.988 [0.943, 1.035]	.606	0.32
Non-Violent offenses						
PPI–R total [m]	0.021	0.023	0.837	1.021 [0.976, 1.068]	.360	0.10
SCI factor score [n]	0.048	0.032	2.241	1.049 [0.985, 1.117]	.134	0.16
FD factor score [n]	-0.015	0.028	0.292	0.985 [0.933, 1.040]	.589	0.16
C factor score [n]	-0.001	0.029	0.002	0.999 [0.944, 1.056]	.967	0.16
ME content scale score [o]	0.028	0.042	0.440	1.028 [0.947, 1.116]	.507	0.20
RN content scale score [o]	-0.013	0.028	0.219	0.987 [0.934, 1.043]	.640	0.20
BE content scale score [o]	0.003	0.036	0.006	1.003 [0.935, 1.076]	.940	0.20
CN content scale score [o]	0.051	0.036	2.004	1.053 [0.980, 1.130]	.157	0.20

Variable	B	SE (B)	Wald	e^B (95% CI)	p-value	Model Φ
Other offenses						
PPI–R total [p]	0.030	0.014	4.537	1.030 [1.002, 1.059]	.033	0.22
SCI factor score [q]	0.033	0.020	2.579	1.033 [0.993, 1.075]	.108	0.22
FD factor score [q]	0.013	0.017	0.564	1.013 [0.979, 1.048]	.453	0.22
C factor score [q]	-0.001	0.020	0.002	0.999 [0.960, 1.039]	.962	0.22
ME content scale score [r]	0.025	0.026	0.872	1.025 [0.973, 1.079]	.350	0.22
RN content scale score [r]	0.012	0.021	0.339	1.012 [0.972, 1.054]	.561	0.22
BE content scale score [r]	-0.001	0.025	0.003	0.999 [0.950, 1.050]	.959	0.22
CN content scale score [r]	0.010	0.024	0.171	1.010 [0.964, 1.058]	.679	0.22

Note. *SE* = standard error; e^B = univariate transformation of the estimated Beta coefficient, which represents the hazard ratio; CI = confidence interval. The model phi coefficient is provided as an effect size estimate for the predictive strength of the overall model. It was derived based on the following formula: $\Phi = \sqrt{(\chi 2 / N)}$, (Rosenthal, 1991).
[a] Model -2LL = 267.996, $\chi 2$ (df = 1, n = 112) = 6.418, p = .011.
[b] Model -2LL = 266.837, $\chi 2$ (df = 3, n = 112) = 7.169 p = .067.
[c] Model -2LL = 264.811, $\chi 2$ (df = 4, n = 113) = 9.481, p = .050.
[d] Model -2LL = 103.811, $\chi 2$ (df = 1, n = 99) = .349, p = .555.
[e] Model -2LL = 101.609, $\chi 2$ (df = 3, n = 99) = 2.452, p = .484.
[f] Model -2LL = 109.061, $\chi 2$ (df = 4, n = 100) = 4.072, p = .396.
[g] Model -2LL = 272.330, $\chi 2$ (df = 1, n = 112) = 5.262, p = .022.
[h] Model -2LL = 271.523, $\chi 2$ (df = 3, n = 112) = 5.859, p = .119.
[I] Model -2LL = 271.833, $\chi 2$ (df = 4, n = 113) = 5.657, p = .226.
[j] Model -2LL = 233.219, $\chi 2$ (df = 1, n = 99) = 8.164, p = .003.
[k] Model -2LL = 232.656, $\chi 2$ (df = 3, n = 99) = 8.413, p = .038.
[l] Model -2LL = 230.511, $\chi 2$ (df = 4, n = 99) = 10.320, p = .035.
[m] Model -2LL = 91.615, $\chi 2$ (df = 1, n = 90) = .840, p = .359.
[n] Model -2LL = 89.977, $\chi 2$ (df = 3, n = 90) = 2.322, p = .508.
[o] Model -2LL = 88.946, $\chi 2$ (df = 4, n = 90) = 3.535, p = .473.
[p] Model -2LL = 224.690, $\chi 2$ (df = 1, n = 98) = 4.602, p = .032.
[q] Model -2LL = 224.417, $\chi 2$ (df = 3, n = 98) = 4.769, p = .189.
[r] Model -2LL = 224.486, $\chi 2$ (df = 4, n = 98) = 4.767, p = .312.

Results revealed similar predictive patterns for the PPI–R scores as reported in the main analyses. Specifically, all of the final models were statistically significant. In addition, the total score was predictive of recidivism in both analyses—with the entire sample (i.e., *HR* = 1.029, p = .001, Wald = 11.207), and in a sub-sample where the IR40 score < 45 inclusion criterion was implemented (i.e., *HR* = 1.032, p < .001, Wald = 12.872). With regard to the factor scores, only the SCI factor was significantly predictive of recidivism, which was the case in both analyses: *HR* = 1.044, p = .001, Wald = 11.589

(i.e., entire sample), and *HR* = 1.042, *p* = .002, Wald = 9.845 (i.e., sub-sample with IR40 scores < 45). Of the content scale scores, only ME was significantly predictive of recidivism when a cut off of 45 for the IR40 scale was used (i.e., *HR* = 1.035, *p* = .039, Wald = 4.260).

With regard to the type of offense(s), based on the entire sample, the final models were significant for the PPI–R total and scale scores for *violent* offenses, and for the PPI–R total score for *other* offenses. In addition, the PPI–R total and SCI factor scores were predictive of *violent* and *other* offenses (i.e., [1] for the total score: *HR* = 1.034, *p* = .012, Wald = 6.341, and *HR* = 1.031, *p* =.023, Wald = 5.206 respectively; and [2] for the SCI factor score: *HR* = 1.047, *p* = .019, Wald = 5.531, and *HR* = 1.040, *p* = .044, Wald = 4.040 respectively). Further, based on a sub-sample where the IR40 score < 45 inclusion criteria was implemented, the final models were significant for all of the PPI–R scores with respect to *violent* offenses, as well as for the PPI–R total score with regard to *other* offenses. Also, the PPI–R total score was predictive of *violent* and *other* offenses (i.e., *HR* = 1.038, *p* = .005, Wald = 7.976, and *HR* = 1.030, *p* = .033, Wald = 4.537 respectively), while the SCI factor score was predictive of *violent* recidivism (i.e., *HR* = 1.046, *p* = .025, Wald = 5.001).

Similar to the survival analyses, the logistic regression analyses used to evaluate the predictive validity of the PPI–R vis-à-vis recidivism over the 6-month follow-up period were also repeated while less stringent inclusion criteria were used (i.e., by including the entire sample, as well as profiles that had IR40 scores < 45). The patterns of association between the PPI–R scores and recidivism within the 6-month follow-up period were fairly similar to those reported above. Namely, the total score, the SCI factor score, and three of the content scale score (i.e., ME, RN, and BE) were significantly correlated with recidivism at the univariate level in both analyses (i.e., the entire sample, and the sub-sample with IR40 scores < 45). Detailed information is provided in Table 40.

Table 40. Univariate Logistic Regression -- Odds Ratios for the Associations between PPI–R Scores and Recidivism over the 6-Month Follow-Up Period

Variable	**0 to 6 months (*OR*)**
Entire Sample	
PPI–R total score	1.060**
SCI factor score	1.068**
FD factor score	1.019
C factor score	1.027
ME content scale score	1.075**
RN content scale score	1.037*
BE content scale score	1.050*
CN content scale score	1.029
SOI content scale score	1.022
F content scale score	1.027
STI content scale score	0.990
IR40 < 45	
PPI–R total score	1.063**
SCI factor score	1.067**
FD factor score	1.033
C factor score	1.030
ME content scale score	1.080**
RN content scale score	1.042*
BE content scale score	1.048*
CN content scale score	1.021
SOI content scale score	1.031
F content scale score	1.030
STI content scale score	1.004

*$p \leq .05$, two-tailed. **$p \leq .01$, two-tailed.

At the multivariable level, results were significant for the PPI–R total score, SCI factor score, and ME content scale score in both analyses, indicating that those scores could be used to distinguish between individuals who recidivated versus those who did not. Detailed information on the multivariable logistic regression analyses is presented in Table 41. Specifically, when the entire sample was, used all of the final models were significant, and the Nagelkerke R-squared was modest to moderate across the models, showing that the variance explained ranged from 12% to 14%. Results for the total score were: $\chi 2 = 11.466$, $p = .001$, $df = 1$, and the prediction accuracy of the overall model was 64% (74% for individuals who recidivated and 52% for those who did not). For the SCI factor: $\chi 2 = 10.384$, $p = .001$, $df = 1$, with prediction accuracy for the overall model at 66% (81% for those who recidivated, and 48% for those who did not). Results for the ME content scale score were as follows: $\chi 2 = 12.392$, $p = .006$, $df = 3$, with 63% prediction accuracy of the overall model (76% for those who recidivated and 46% for those who did not).

Table 41. Multivariable Logistic Regression -- Odds Ratios for the Associations between PPI–R Scores and Recidivism during the 6-Month Follow-up Period

Variable	*B*	*SE (B)*	Wald	*OR* (95% CI)	*p*-value
Entire Sample					
PPI–R total score [a]	0.059	0.019	9.877	1.060 [1.022, 1.100]	.002
SCI factor score [b]	0.066	0.022	9.168	1.068 [1.023, 1.114]	.002
ME content scale score [c]	0.059	0.029	4.336	1.061 [1.004, 1.122]	.037
RN content scale score [c]	0.003	0.021	0.027	1.003 [0.962, 1.046]	.870
BE content scale score [c]	0.022	0.024	0.863	1.022 [0.976, 1.071]	.353
IR40 < 45					
PPI–R total score [d]	0.062	0.019	10.114	1.063 [1.024, 1.105]	.001
SCI factor score [e]	0.065	0.022	8.415	1.067 [1.021, 1.115]	.004
ME content scale score [f]	0.065	0.030	4.569	1.067 [1.005, 1.133]	.033
RN content scale score [f]	0.008	0.022	0.132	1.008 [0.965, 1.054]	.717
BE content scale score [f]	0.013	0.026	0.279	1.014 [0.964, 1.066]	.598

Note. *SE* = standard error; *OR* = odds ratios; CI = confidence interval.
[a] Model -2LL = 142.511, $\chi 2$ ($df = 1$, $n = 112$) = 11.466, $p = .001$.
[b] Model -2LL = 144.768, $\chi 2$ ($df = 1$, $n = 113$) = 10.384, $p = .001$.
[c] Model -2LL = 142.761, $\chi 2$ ($df = 3$, $n = 113$) = 12.392, $p = .006$.
[d] Model -2LL = 124.462, $\chi 2$ ($df = 1$, $n = 99$) = 11.962, $p = .001$.
[e] Model -2LL = 126.860, $\chi 2$ ($df = 1$, $n = 99$) = 9.564, $p = .002$.
[f] Model -2LL = 123.847, $\chi 2$ ($df = 3$, $n = 99$) = 12.576, $p = .006$.

Further, when a cut off score of 45 for the IR40 scale was used, all of the final models were once again significant, with a modest to moderate Nagelkerke R-squared across the models, showing that the variance explained ranged from 12% to 16%. Results for the total score were: $\chi 2$ = 11.962, p = .001, df = 1, and the prediction accuracy of the overall model was 67% (76% for individuals who recidivated and 56% for those who did not). Results for the SCI factor score were as follows: $\chi 2$ = 9.564, p = .002, df = 1, with 66% prediction accuracy for the overall model (i.e., 80% for those who recidivated and 49% for those who did not). Finally, results for the ME content scale score were: $\chi 2$ = 12.576, p = .006, df = 3, and the prediction accuracy for the overall model was 65% (74% for those who recidivated and 53% for those who did not).

Next, with regard to the moderating effects of gender, bivariate correlations were carried out first to evaluate the association between the PPI–R total and factor scores, as well as gender, and recidivism across the entire sample. The results revealed very similar patterns of associations as in the main analyses. Namely, the PPI–R total and SCI factor scores were correlated positively with recidivism (i.e., r = .284, p = .002; and r = .305, p = .001 respectively). In addition, gender was correlated positively with the PPI–R total, FD and C factor scores (i.e., r = .282, p = .003; r = .321, p = .001; and r = .281, p = .003 respectively), but there were no significant correlations between gender and the SCI factor score (i.e., r = .073, p = .440) or recidivism (i.e., r = -.122, p = .177).

The next step involved hierarchical survival analysis using Cox model to determine whether gender moderated the predictive utility of the PPI–R total score vis-à-vis crime and violence over the entire follow-up period. As stated previously, gender was dummy coded, where males served as the reference group (i.e., male = 0, female = 1); thus, the results are presented from females' perspective. Results revealed patterns of associations that were nearly identical to the main analyses when the PPI–R total score and gender were entered as predictors (i.e., the only difference was the emergence of a main effect for gender, which was not detected in the main analyses). Specifically, the overall model was significant (i.e., Model -2LL = 639.772, $\chi 2$ (df = 3, n = 112) = 17.206, p = .001), and the PPI–R total score and gender were predictive of future crime and violence (HR = 1.030, p = .023, Wald = 5.193; HR = 1.617, p = .048, Wald = 0.629 respectively), but no moderating effects were found (HR = 1.012, p = .510, Wald = 0.435. As for the SCI factor score, results revealed patterns of associations that were identical to the main analyses. Namely, while the overall model was significant (i.e., Model -2LL = 649.126, $\chi 2$ (*df* = 3, *n* = 113) = 15.998, *p* = .001), and the SCI factor score was a significant predictor of crime and violence (*HR* = 1.036, *p* = .037, Wald = 4.353), gender was not (*HR* = 1.330, *p* = .226, Wald = 1.464), and there were no moderating effects (*HR* = 1.020, *p* =.397, Wald = 0.718).

The bivariate patterns of associations were identical to the ones based on the entire sample when a cut off score of 45 on IR40 was used. Specifically, there were significant positive correlations between the PPI–R total and SCI factor scores and recidivism (i.e., *r* = .317, *p* = .001; and *r* = .333, *p* = .001 respectively). Further, gender was correlated positively with the PPI–R total, FD and C factor scores (i.e., *r* = .299, *p* = .003; *r* = .355, *p* < .001; and *r* = .288, *p* = .004 respectively). There were no significant correlations between gender and the SCI factor score (i.e., *r* = .102, *p* = .315) or recidivism (i.e., *r* = -.108, *p* = .288). As for the hierarchical survival analyses, the patterns of associations were identical to the main analyses. Specifically, when the PPI–R total score and gender were entered as predictors, the overall model was significant (i.e., Model -2LL = 548.033, $\chi 2$ (*df* = 3, *n* = 99) = 15.055, *p* = .002) and the PPI–R total score was a significant predictor of crime and violence (*HR* = 1.032, *p* = .015, Wald = 5.967), however, gender was not (*HR* = 1.356, *p* = .239, Wald = 1.384), and there were no moderating effects (*HR* = 1.010, *p* =.603, Wald = 0.271). Similarly, with the SCI factor and gender as predictors, the overall model was significant (i.e., Model -2LL = 548.051, $\chi 2$ (*df* = 3, *n* = 99) = 13.763, *p* = .003) and the SCI factor score was a significant predictor of crime and violence (*HR* = 1.041, *p* = .018, Wald = 5.641), however, gender was not (*HR* = 1.148, *p* = .585, Wald = 0.298), and there were no moderating effects (*HR* = 1.012, *p* =.626, Wald = 0.238).

4. Discussion

This study was designed with a few goals in mind. First, given that the PPI–R is a relatively new measure, evaluating its reliability in a correctional sample was deemed important as a way of expanding existing research, especially since it was originally developed for use with non-criminal populations. Further, examining the predictive validity of the PPI-R was considered essential in and of itself as there are currently no studies that have focused on this aspect of its psychometric properties. This in turn could have practical implications specifically relevant to correctional settings and could speak to the utility of the PPI–R.

Another goal for this study was to evaluate the performance of the PPI–R vis-à-vis future offending in comparison to the PAI and the NEO–FFI, which are general measures of personality. Specifically, prior research has demonstrated that some of the general measures of personality tend to assess non-specific behavioral deviance, and are not particularly useful in assessing personality features of psychopathy. As a result, they cannot be used to make a differential diagnosis of psychopathy in correctional settings (see Sandoval et al., 2000). The use of a measure such as the PPI–R, which addresses both, the personality and behavioral aspects of psychopathy, may make the assessment and diagnosis of psychopathy more reliable. Therefore, it was deemed important to evaluate whether the PPI–R (as opposed to the PAI or NEO–FFI) captures unique variance with regard to future offending, hence performs better than a general measure of personality, as that would indicate that it could be used with confidence to identify individuals who are at high risk to engage in institutional infractions or recidivate once released from custody.

Similarly, it was deemed important to evaluate the incremental validity of the PPI–R relative to the CRNA, which is a comprehensive risk and needs assessment instrument. Risk/needs assessment instruments such as the CRNA are known to yield information directly relevant to the assessment of recidivism risk, thus, it was used as a provisional “benchmark” for the performance of the PPI–R. Risk/needs assessment instruments do not capture psychopathic tendencies, however. Yet, the strength of the association between psychopathy and recidivism cannot be ignored—psychopathy has been found to be one of the best predictors of recidivism (see Douglas et al., 2006; Hart, 1998b; Hart & Hare, 1997; Hemphill, Hare, et al., 1998; Hemphill, Templeman, et al., 1998). Therefore, it was deemed essential to determine whether the PPI–R would yield information regarding the risk of recidivism above and beyond what would be known based on solely on the CRNA.

Further, although the construct of psychopathy has been examined at length among men, review of the literature revealed a lack of unanimous research findings with respect to psychopathy among women. Specifically, there is an apparent need to evaluate not only the construct itself, but also the utility of existing psychopathy measures for the assessment of psychopathic traits and patterns of behaviors in female samples. Therefore, this study examined whether PPI–R scores differed across gender, and also the potentially moderating effects of gender on the relationship between PPI–R-assessed psychopathy and future violence, crime, or type of offense(s).

4.1. Research Question 1: Reliability of the PPI–R

Considering the recommendations by Nunnally and Bernstein (1994) regarding alpha coefficients, and Clark and Watson (1995) regarding *MIC* values, the internal consistency reliability for the PPI–R content scales in this sample was satisfactory. This was also true with regard to the PPI–R total and factor scores based on stratified alpha coefficients, which was consistent with prior research (see Lilienfeld & Widows, 2005; Ray, Weir, Poythress, & Rickelm, 2011; Uzieblo et al., 2010).

In addition, the *CITC* values were also examined to determine whether all items included in the PPI–R scales were representative of the construct. It appeared that the removal of a few items would have led to a slight improvement of the internal consistency of their respective scale. Nevertheless, the amount of improvement was considered to be negligible, and therefore it was concluded that based on this sample's results, all of the items included in the PPI–R are representative of psychopathy.

4.2. Research Question 2: Predictive Validity of the PPI–R vis-à-vis Crime and Violence

This study found partial support for the predictive validity of the PPI–R. Specifically, the results from the survival analyses were in line with the hypothesis and yielded support for the predictive validity of the PPI–R total and SCI factor scores vis-à-vis recidivism, where a point increase in the total or SCI scores was associated with a 3% or 4% increased likelihood of recidivism respectively. There was no support, however, for the predictive validity of the FD and C factor, or any of the content scales vis-à-vis recidivism. Further, there was support for the predictive utility of the PPI–R total score with regard to *violent* offenses, where a point increase in the total score was associated with a 4% increased likelihood of violent recidivism. Nevertheless, none of the PPI–R factor or content scales evidenced predictive validity with regard to the type of the offense(s). It is worth pointing out, however, that even though non-significant, there appeared to be some interesting trends in terms of the association between the PPI–R scores and type of the offense(s). Specifically, while the associations between the PPI–R scores and *violent* offenses were positive, they were negative with regard to *non–violent* offenses, except for the SCI factor score. Given no interpretation of those patterns of associations can be offered here as they were non-significant, it might be worth exploring whether gender composition of the sample plays a role, as the literature has shown that men and women tend to engage in different types of violence or crime (see Robbins et al., 2003; Skeem et al., 2011). There was no support for the utility of the PPI–R in differentiating between the type of post release offense(s) among individuals who recidivated.

Results from the logistic regression analyses, which were used to evaluate the predictive validity of the PPI–R over a set follow-up period (i.e., 6 months), were similar to those from the survival analyses. Namely, while the PPI–R total, SCI and FD factor, and ME and RN scale scores were all significant predictors of recidivism at the univariate level, only the PPI–R total and the SCI factor scores remained significant at the multivariable level.

Given there are currently no published studies on the predictive validity of the PPI–R specifically with regard to recidivism, there is no direct basis for comparison of these results. Nevertheless, findings from this study regarding the relationship between PPI–R-assessed psychopathy and recidivism in general are in line with prior research (see Douglas et al., 2006). In addition, as expected (see Hemphill, Hare, et al., 1998; Wormith, Olver, Stevenson, & Girard, 2007), the SCI (which corresponds to Factor 2 of the PCL–R and reflects behavioral aspects of psychopathy) was found to be a stronger predictor of future crime and violence than the FD factor, which was significant only at the univariate level. Needless to say, these results need to be replicated before any conclusions about their generalizability could be made.

All in all, these findings are promising in terms of potential practical implications for the utility of the PPI–R, especially in correctional settings. Specifically, if implemented, PPI–R scores could be used as a guide to treatment planning, program participation, and case management of offenders while in custody, as well as following their release into the community. Such findings are of course crucial as they support the use of a measure that could reveal information regarding the level of recidivism risk of offenders. This in turn could have a significant positive impact on the safety and security of staff and inmates at correctional facilities, which are of utmost importance.

4.3. Research Question 3: Incremental Validity of the PPI–R vis-à-vis Recidivism

4.3.1. Incremental Validity Relative to General Self-Report Personality Inventories

Conducting incremental validity analyses is important as they reveal whether the construct being evaluated adds any information relevant to predicting outcomes beyond what is known based on other important and well-established predictors (see Douglas et al., 2006; Edens, Skeem, & Douglas, 2006). While this study found support for the predictive utility of at least some of the PPI–R scores based on bivariate, as well as non-incremental multivariate analyses, there was no support for the incremental validity of the total score or any of the factor scores. In other words, in this sample, contrary to what was expected, the PPI–R had no unique predictive strength with regard to recidivism (i.e., it did not provide any unique information that could be useful in predicting recidivism) relative to risk-relevant indices from general self-report measures of personality traits and patterns of behavior. While these findings may be generalizable, alternatively they might be due to specific characteristic of this sample, or as a result of different operational definitions used in the measures. It is also important to highlight that medium effect sizes were expected and used as a guide in the a-priori sample size calculations, as if detected, they would yield meaningful results. Yet, this may not have been realistic given research has shown that incremental validity effect sizes are generally small, and therefore require large sample sizes in order to be detected (see Hunsley & Meyer, 2003). Thus, the sample size of this study alone could have been the reason for the lack of significant findings with regard to the incremental validity of the PPI-R. There are currently no other studies that have examined the incremental validity of the PPI–R, which calls for replication of the analyses carried out here.

4.3.2. Incremental Validity Relative to the CRNA

Further, the PPI–R was compared to an independent, commonly used risk/needs assessment measure, the CRNA (including Summary, Supervision Level, Need, and Risk ratings). This was done to determine the extent to which the two correlated, as well as to compare their associations with recidivism. Results revealed significant correlations between the PPI–R total and factor scores (i.e., SCI, FD, and C) and the Risk rating, as well as the C factor score and the Summary CRNA and the Supervision Level rating. In addition, all of the CRNA ratings, as well as the PPI–R total and SCI factor scores were correlated positively with recidivism. Taken together these results show support for the convergent validity of the PPI–R.

Nevertheless, there was no support for the incremental validity of the PPI–R relative to the CRNA in relation to recidivism risk. This indicates that using the PPI–R in addition to the CRNA in an assessment for the risk of recidivism would not add unique information above and beyond what the CRNA offers. Yet, the PPI–R might be useful to gain information regarding personality traits and motivations for engaging in criminal activity. This in turn might be helpful in detecting the challenges in managing the individual and determining appropriate ways of doing so. Given that the sample size used here was relatively small, no conclusions can be made as to whether these findings are generalizable to other samples or settings.

4.4. Research Question 4: Moderating Effects of Gender on PPI–R-Assessed Psychopathy

4.4.1. Do PPI–R Scores Differ across Gender?

Consistent with the majority of existing studies and in line with the hypothesis, males in this sample scored significantly higher than females on the PPI–R total, as well as FD and C factor scores (see Lilienfeld & Hess, 2001; Miller, Watts, et al., 2011; Wilson et al., 1999; Zágon & Jackson, 1994). There were no significant differences across gender on the SCI factor score, which is in line with findings from studies that have reported larger gender differences in scores on the interpersonal-affective scales of the PCL-R and the PPI (Skeem et al., 2011; Vablais, 2007). Taken together, the findings from this study provide at least partial support for the notion that the manifestation of psychopathy may vary across gender, which is reflected in the differences in scores. It is worth pointing out that even though the sample included in the analyses was slightly lower than what was needed to detect moderate effect size departures from the null distribution, power was apparently still adequate to detect differences in some of the PPI–R scores across gender. While the observed gender differences may in fact be true differences, alternatively, they may reflect bias in the assessment measures (i.e., biased operationalization). Thus, to address this possibility, additional analyses on a larger scale such as Item Response Theory (IRT) may be required, which was not possible to do here due to the sample size limitations. In addition, these findings raise the question of whether these differences reflect limitations of the original factor model of psychopathy or true gender differences in the structure of the PPI–R. This question, however, is beyond the scope of this study and requires further investigation.

4.4.2. *Does Gender Moderate the Predictive Utility of the PPI–R with Respect to Recidivism?*

Results revealed some significant associations between PPI–R scores, gender, and recidivism at the bivariate level. Specifically, there were significant positive correlations between the PPI–R total and SCI factor scores and recidivism. In addition, gender was correlated positively with the PPI–R total, FD and C factor scores, but there were no significant correlations between gender and the SCI factor score, recidivism, or type of offense(s). As mentioned previously, there is currently no direct basis for comparison for these results as no previous studies validating the PPI–R have addressed these very questions. Nevertheless, studies that have examined the association between psychopathy (assessed with measures such as the PCL–R or the PPI) and recidivism revealed similar results (i.e., there appears to be a well-established relationship between psychopathy and recidivism). In addition, the current findings are in line with studies that have shown a stronger relationship between future crime and the behavioral aspects of psychopathy (which are captured by the SCI factor of the PPI–R), rather than the interpersonal aspects of the disorder (see Douglas et al., 2006; Yang et al., 2010). With regard to the association between gender and psychopathy, once again, there is no direct basis for comparison, as prior studies have examined that question in either exclusively male or exclusively female samples (rather than mixed samples), and have yielded inconsistent results.

In terms of the moderation analyses, the PPI–R total score was predictive of future crime and violence in one of the prediction models, and the SCI factor score was found to be a significant predictor in another prediction model. These findings indicate that recidivism rates increase as PPI–R total and SCI factor scores increase, which as discussed above, is generally consistent with previous literature (see Douglas et al., 2006). Nevertheless, contrary to what was expected, there were no main or moderating effects of gender on the relationship between PPI–R-assessed psychopathy and recidivism. This implies that the PPI–R was not differentially predictive of recidivism across gender in this sample. It is also important to keep in mind that medium interaction effect sizes were expected given the associations between psychopathy and recidivism reported in the literature are low for women and moderate to large for men. Nevertheless, that may not have been realistic as effect sizes for interactions are generally small, and therefore require a relatively large sample size in order to be detected (see Frazier, 2004). Thus, potentially existing moderating effects of gender on the predictive utility of the PPI-R relative to recidivism may not have been detected simply due to the relatively small sample utilized in the current study. Naturally, replication of the analyses conducted in this study is needed to determine the generalizability of these findings.

4.4.3. Does Gender Moderate the Relationship between PPI–R-Assessed Psychopathy and Type of Offense(s)?

The moderation analyses of gender revealed no significant main effects for gender or the PPI–R scores, and no moderating effects of gender on the performance of the PPI–R with regard to the type of offense(s). Even though moderating effects of gender were expected, these findings are consistent with some prior studies, but not others, as the available literature reveals mixed outcomes in terms of the strength of the relationship between psychopathy and different types of recidivism (i.e., violent vs. general) across gender (see Grimes et al., 2011). Once again, it is important to highlight that as in the previous research question, the lack of moderating effects of gender on the predictive utility of the PPI-R relative to the type of offense(s) may simply be due to the relatively small sample. With this in mind, and given that there are no prior studies that have specifically examined the moderating effects of gender on the association between PPI–R-assessed psychopathy and type of offense(s), replication of these analyses is important.

Based on a subsample of the individuals who recidivated, there were some significant findings in terms of the moderating effects of gender on the utility of the PPI–R scores to differentiate between the type of offense(s). Specifically, for those who engaged in *violent* post-release offense(s), results revealed significant main effects for gender in the presence of the total or any one of the factor scores entered as predictors in the analyses, where males were more likely to engage in violence compared to females. This pattern of associations is consistent with some prior studies, but not others, as the available literature reveals mixed outcomes as to how strong of a predictor of violent recidivism psychopathy is across gender (see Grimes et al., 2011). In addition, for those who engaged in *non-violent* post-release offense(s), a significant main effect for gender was found in the presence of the C factor score, where males were more likely to commit *non-violent* offenses than females. This pattern of associations is generally consistent with previous research which has shown that even though psychopathic women tend to be involved in chronic non-violent criminality (see Warren et al., 2003; Warren & South, 2006), men overall exhibit higher rates of antisocial behavior and criminality (see Hicks et al., 2011; Stanford & Felthous, 2011).

Further, for the individuals who committed *violent* post-release offense(s) the SCI factor score was found to be a significant predictor of *violent* offenses when entered in a model with gender, where gender significantly moderated the relationship between the SCI factor score and *violent* offenses. The pattern of associations revealed in this model was interesting. Specifically, males and females who scored high on the SCI factor did not differ in terms of their commission of *violent* offenses, which is generally in line with findings by Edens et al. (2008) who reported strong associations between Factor II of the PPI (corresponding to the SCI factor of the PPI–R) and aggressive misconduct. Nevertheless, females who scored low on the SCI factor had low rates of committing *violent* offenses, while the opposite was true for males. This finding is consistent with the conception that while males are more likely to express psychopathy through physical aggression, psychopathic females tend to engage in relational aggression such as back-stabbing, manipulation, rumor spreading, etc. (Nicholls & Petrila, 2005; Strand & Belfrage, 2005; Verona & Vitale, 2006). There were no other significant moderating effects of gender on the utility of the PPI–R scores to differentiate between the type of offense(s) committed by individuals who recidivated in this sample. In light of that, it is possible that the significant moderating effects of gender on the relationship between the SCI factor score and *violent* offenses that emerged here were specific to the subsample used or were due to chance.

All in all, despite the lack of moderating effects of gender on the predictive validity of the PPI–R with regard to recidivism and type of offense(s), gender differences were detected in most of the PPI–R scores, and moderating effects of gender emerged in a subsample that included only those who recidivated. This suggests that psychopathy likely manifests differently across gender, which is in line with existing literature. It is important to reiterate, however, that due to invalid/missing data the final sample included in the analyses was lower than the original sample, which led to lower power for the moderation analyses in particular. This in turn resulted in restricted ability to fully address the moderating effects of gender on PPI–R-assessed psychopathy with regard to recidivism and type of the offense(s). Thus, even though supplemental analyses were ran on the entire sample, as well as after implementing less stringent exclusion criteria for PPI–R scores in order to compensate for the loss in power, the results presented here should be considered preliminary at best, and need to be interpreted with extra caution.

In addition, given the lack of prior research on the questions evaluated in this study, further exploration is warranted. Looking into the context of recidivism (i.e., time since release from custody, degree of premeditation, relationship to the victim(s), motivation for the offense, the presence of supervisory release condition that might have been violated, etc.), as well as the type of offense(s) (i.e., *violent* vs. *non-violent*; or category of the offense [i.e., against a person, property, drug offenses, traffic infractions, etc.]), could shed some light on the factors driving such behavior. Finally, personality and behavioral correlates or co-morbid disorders could also prove useful in terms of helping us better understand what is driving the differences in the manifestation of psychopathy across gender.

4.5. Supplemental Analyses

4.5.1. Invalid/Missing Data

As nearly 33% of the original sample was excluded due to incomplete or invalid PPI–R profiles, it was important to evaluate whether the reduction in sample size had a negative impact on patterns of associations detected in this study. To address this issue some of the main analyses (i.e., predictive validity and moderation analyses) were repeated with less stringent validity criteria, which allowed 79% to 89% of the entire sample to be used in the analyses. Results revealed that with regard to the predictive validity of the PPI–R over the entire follow-up period, the only detected difference from the main analyses was that the ME content scale was significantly associated with recidivism when the IR40 score < 45 inclusion criteria rule was implemented. There were no differences from the main analyses, however, when the entire sample was used, which is curious. In terms of the analyses based on the 6-month follow-up period, the difference was again in terms of the significance of the ME content scale, which was found to be significantly associated with recidivism in both instances (i.e., when the entire sample was used, and when the IR40 score < 45 inclusion criteria rule was implemented).

There were differences from the main analyses with regard to the association between psychopathy and type of the offense(s) as well. Specifically in addition to the main findings, there were a couple more significant final models (i.e., [1] when the entire sample was used, the models of the scale scores with regard to *violent* offenses, and the total score with respect to *other* offenses were significant; and [2] when the IR40 < 45 inclusion criteria was implemented, the final models for the factor and scale scores with regard to *violent* offenses, and the total score with regard to *other* offenses were significant). Further, the SCI factor score significantly predicted *violent* and *other* offenses based on the entire sample, as well as *violent* offenses, based on the IR40 < 45 inclusion criteria. Additionally, the total score was found to be a significant predictor of *other* offenses in both analyses (i.e., based on the entire sample, as well as when the IR40 < 45 inclusion criteria was implemented).

Finally, with regard to the gender moderation analyses where recidivism was of interest, a main effect for gender emerged in the presence of the PPI–R total score as a predictor in a model based on the entire sample. Such main effect was not detected in the main analyses. No other differences were detected in terms of the patterns of associations based on the entire sample or on a subsample where a score of 45 on the IR40 was used as a cut off.

Overall, even though there was sufficient statistical power, results revealed a few additional patterns of association between the PPI–R and recidivism or type of the offense(s), and therefore it is possible that significant associations were not detected simply due to the relatively small sample size. Thus, replication of this study is highly recommended in order to determine whether the present findings are generalizable outside of this sample.

4.6. Limitations

While this study answered some very important questions about PPI–R-assessed psychopathy, it is not free of limitations. First, even though power was adequate for most of the analyses, the sample size was overall relatively small. This was particularly relevant in terms of assessing gendered effects, as those analyses were underpowered by the reduction in sample size due to invalid/missing data, and therefore caution is warranted when interpreting the results. While an attempt to compensate for the loss in power was made by running supplemental analyses, the reduction in power might have stymied the detection of additional gender differences. Therefore, larger samples are recommended for future research, as they represent the associations between variables well, allowing the detection of any meaningful relationships that might exist, and thus should always be preferred.

In addition, the predictive validity of the PPI–R was evaluated in a correctional sample, rather than a non-criminal population (for which the PPI–R was originally designed). Given that correctional sites could benefit substantially from the use of a measure such as the PPI–R, evaluating its utility in such settings was deemed worthwhile. Nevertheless, it would be important to examine whether these findings would hold in non-correctional samples, thus, a replication with both, correctional and non-correctional samples is encouraged.

Further, individuals who were acutely psychotic at the time of recruitment or had a chart diagnosis of mental retardation were not included in the present study, which was deemed reasonable, as their ability to provide valid responses to the PPI–R would have been questionable. Yet, such individuals are often at a heightened risk for violence (see Robinson, Littrell, & Littrell, 1999; Rueve & Welton, 2008), and therefore it might be worth exploring whether the present findings would generalize to individuals suffering from psychotic symptoms or mental retardation.

Furthermore, as pointed out by Cooke et al. (2005), participants with psychopathic features "often lack insight into their adjustment problems" (p. 15) and are expected to under-report symptom severity. Therefore, the use of self-report measures to assess psychopathic features may not be optimal for correctional populations. Yet, validating the psychometric properties of a self-report measure of psychopathy was the very purpose of this study. To overcome issues associated with under-reporting of symptom severity a short semi-structured interview, severity professional judgments (i.e., CRNA ratings), and official criminal records were used to collect demographic and background information, indicators of recidivism risk, as well as offense and mental health history. Yet, the use of in-depth semi-structured interviews in addition to file information is strongly recommended. In particular, including another interview- or file-based measure of psychopathy could be useful not only in dealing with under-reporting of symptom severity, but also in terms of assessing the convergent validity of the PPI–R, which was not done in the current study due to limited resources. However, considering this is one of the first studies examining the research questions at hand, the use of less resource-intensive measures is justifiable.

Finally, recidivism data in this study was based solely on official records. Although this is a common practice in psychology research and in the risk assessment field in particular, it ultimately underestimates the true base rates of recidivism. This issue was further exacerbated by the fact that the official records that were collected reflected criminal involvement within the Province of British Columbia, rather than nation-wide criminal activity. The shortcomings associated with such an approach are intensified in terms of detecting violence perpetrated by females as they typically engage in violence in familial settings, and as a result, may be less likely to be reported and/or investigated by police (see Kreis, 2009; Kreis & Cooke, 2011; Logan, 2009; Nicholls & Petrila, 2005). Nevertheless, as previously stated, this is one of the first studies to examine the predictive validity of the PPI–R, as well as the moderating effects of gender on PPI–R-assessed psychopathy, and therefore this feature of the design was deemed justifiable. It is also worth pointing out that despite this limitation, several significant patterns of association were still detected in the present study. Even so, future research may benefit from improving the recidivism data collection procedures by incorporating nation-wide official criminal records, as well as unofficial sources such as self-report and collateral information.

4.7. Future Research

It is important to reiterate that given this is one of the first studies to evaluate the predictive validity of PPI–R, and particularly so in a mixed sample, none of the questions addressed should be considered settled. For most of the research questions that were addressed, there were no pre-existing studies to serve as a direct basis of comparison in order to form conclusions regarding the stability and generalizablity of the current findings. Therefore, to determine whether these findings would apply to different samples or settings, direct replications of the current study, as well as further research with improved study designs to address the current limitations are strongly encouraged. Specifically, using a larger sample, breaking down offenses by category (i.e., against a person, property, drug offenses, traffic infractions, etc.), including various personality or behavioral correlates, and/or co-morbid diagnosis, incorporating additional psychopathy measures, expanding the recidivism data collection sources, including various contextual factors (i.e., motivation, relationship to the victim, etc.), among others, could be useful in terms of further exploring the psychometric properties of the PPI–R, as well as shedding some light on recidivism patterns.

The design and findings of this study raised a number of additional research questions that are worth examining. For instance, participants' confidentiality was assured while they were filling out the measures utilized in this study. This poses the question whether participants would have provided different responses if they were completing the measures as part of a routine intake screen at a secure facility, which is typically non-confidential in nature. Exploring this question would help determine whether there is a negative impact on the percent of valid profiles provided by participants as a function of limiting their confidentiality, which in turn might have practical implications for the implementation of assessment instruments such as the PPI–R. Namely, if lack of confidentiality leads to a high number of invalid profiles, it might be impractical to implement psychopathy measures such as the PPI-R in consideration of the time and financial resources they would require.

In addition, data on institutional infractions was not available, and therefore, not incorporated as an outcome in the present study. Yet, exploring the predictive utility of the PPI–R with regard to institutional infractions would be of utmost practical importance for secure facilities. Specifically, given the safety and security of the institution in such settings comes first, it may be beneficial to implement a measure such as the PPI–R, which in addition to assessing psychopathy (which as discussed is of relevance to treatment planning and management), could be useful in estimating whether an individual is at a high risk of engaging in institutional infractions.

Further, the incremental validity of a measure can have multiple dimensions and therefore can be assessed in many ways. This study examined the incremental predictive validity of the PPI–R relative to risk-relevant indices incorporated in general measures of personality traits, and relative to a risk/needs assessment instrument. As this approach is useful in addressing questions particularly pertinent to violence risk assessment, it seemed to fit well within the milieu of the current study. It is essential, however, to extend this line of research and evaluate the incremental validity of the PPI–R relative to theoretically, clinically, and legally relevant risk factors such as anxiety or nervousness (or lack thereof), child abuse history, treatment amenability, malingering, or feigning psychopathology and cognitive impairment.

Finally, establishing the reliability of a measure requires the evaluation of different reliability estimates (i.e., internal consistency, stability or test-retest reliability, interrater reliability, and parallel form reliability). This study examined the internal consistency of the PPI–R and while the internal consistency analyses employed here yielded satisfactory results, further exploring this question by utilizing IRT analyses is recommended, especially since the PPI–R is multidimensional. As already mentioned, in consideration of the sample size, carrying out IRT analyses in the current study was not possible. Further, while the interrater and parallel form reliability of the PPI–R could not be evaluated, given it is a self-report measure that has no alternative forms, evaluating its test-retest reliability is considered essential in order to determine its temporal stability, and to establish its overall reliability. Due to limited resources, however, assessing the test-retest reliability of the PPI–R was not feasible in this study, and is therefore highly recommended for future research.

4.8. Summary and Implications

In summary, this study has some important implications. First, it yielded support for the internal consistency of the PPI–R, thus furthering the existing literature on its reliability when used in a correctional sample. It addition, it is among the first to evaluate and to show support for the predictive validity of at least some of the PPI–R scores vis-à-vis recidivism. Nevertheless, this study found no support for the predictive utility of the PPI–R scores with regard to the type of offense(s), for the incremental validity of the PPI–R relative to general measures of personality in terms of predicting future violence or crimes, or for the moderating effects of gender on the PPI–R scores vis-à-vis recidivism. Even so, it is among the first studies to examine these questions, which in and of itself is an important contribution in terms of establishing the psychometric properties of the instrument. It also expanded the existing literature on psychopathy in women, and yielded support for the PPI–R score differences across gender, as well as the moderating effects of gender on the predictive utility of the SCI factor score with regard to *violent* offenses. Finally, this study has the potential to be of particular importance when it comes to treatment and management of offenders following release from custody, as it yielded support for the convergent validity of the PPI–R with the CRNA, as well as the predictive validity of the CRNA itself. Providing correctional officers with an additional tool that could help manage recidivism in general, would be highly beneficial, and constitutes perhaps the most important contribution of this study. All in all, it is my hope that it inspires further research into the issues addressed here, as they have empirical as well as clinical importance.

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