

High Psychopathy Men with a History of Sexual Offending have Protective Factors too:

But are these Risk Relevant and can they Change in Treatment?

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Abstract

Objective: Psychopathy is a serious personality disorder reputed for resistance to correctional and forensic mental health treatment and synonymous with being high risk for different recidivism outcomes; it is not readily associated with an abundance of positive qualities or protective factors. Research has yet to examine the presence of protective factors as a function of psychopathy in correctional samples and the risk-relevance of protective factors for high psychopathy men. **Method:** The present study examined the association of psychopathy and protective factors to recidivism in a Canadian sample of 461 men who attended sexual offense specific treatment and followed up nearly 10 years post release. The Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003) and the Structured Assessment of Protective Factors (SAPROF; de Vogel et al., 2011) were rated from institutional files and recidivism data were obtained from official criminal records. **Results:** PCL-R scores were inversely related to SAPROF scores; however, even men scoring high on the PCL-R made significant pre-post changes on protective factors. PCL-R and SAPROF scores predicted sexual, violent, and general recidivism; treatment-related changes in protective factors, controlling for PCL-R score, were significantly associated with decreased violent recidivism. **Conclusions:** Protective factors can and do change with purposive change agents (e.g., correctional treatment), even among individuals with substantial psychopathic traits. The role and risk-relevance of protective factors in sexual violence risk assessment and management with high psychopathy clientele are discussed.

Key words: PCL-R, SAPROF, sexual offense treatment, change, recidivism

Public significance statement: The research demonstrates that protective factors can change pre-posttreatment in a sexual violence reduction program, and that protective factors can be increased therapeutically with high risk-high need men who have substantial psychopathic traits. Structured assessments of protective factors increment the prediction of recidivism beyond psychopathy and appear to mitigate risk for future recidivism with this client group in correctional settings.

High Psychopathy Men with a History of Sexual Offending have Protective Factors too:
But are these Risk Relevant and can they Change in Treatment?

Psychopathy is a serious personality disorder characterized by a constellation of problematic interpersonal (e.g., grandiose, deceitful, manipulative), affective (e.g., lack of remorse, callous, shallow emotions), and behavioral (e.g., parasitic, poor behavior controls, impulsivity, criminal versatility) features. Since its early conceptualization by Cleckley in the 1940s and formal operationalization and measurement by Hare via the Psychopathy Checklist-Revised (PCL-R; 1991, 2003), psychopathy has become a critical clinical forensic construct with important implications for criminal justice system decision making in terms of offender assessment, intervention, and management (Hare & Neumann, 2008). High scores on the PCL-R, indicating the presence of prominent psychopathic features, have been associated with increased risk for different recidivism outcomes, including future violence (Leistico et al., 2008; Yang et al., 2010), institutional behavioral problems (Guy et al., 2005; Olver et al., 2020), failure on conditional release (Hart et al., 1988), and lengthier criminal careers (Olver & Wong, 2015).

Early factor analytic research demonstrated that the PCL-R items can be structurally arranged into two factors: one that tapped the interpersonal and affective features of psychopathy (e.g., superficial, deceitful, callous, lack of remorse) termed Factor 1, and a second measuring the chronic antisocial lifestyle features (e.g., stimulation-seeking, poor behavior controls, impulsivity, irresponsibility) termed Factor 2 (Harpur et al., 1989). Although the two-factor model remains a supported and viable conceptualization of psychopathy, finer grained confirmatory factor analytic research has provided support for a correlated four-factor model, with the domains frequently termed facets (e.g., Neumann & Hare, 2008; Neumann et al., 2007; Olver, Neumann, et al., 2018). In the four-factor model, Factor 1 subsumes the Interpersonal (e.g., superficial, deceitful), and Affective (e.g., callousness, lack of remorse) facets, while Factor 2 subsumes the Lifestyle (e.g., impulsivity, stimulation-seeking) and Antisocial (e.g., poor behavior controls, criminal versatility) facets. The factor structure of the PCL-R has important forensic-clinical implications, given that Lifestyle and Antisocial facet scores

have demonstrated particularly strong predictive validity for criminal recidivism (Kennealy et al., 2010; Sewall & Olver, 2019), while the Interpersonal and Affective facets have demonstrated associations with treatment interfering behaviors and program noncompletion (Hobson et al., 2000; Olver & Wong, 2011).

Therapeutic Challenges with Psychopathic Clientele

The construct of psychopathy has also been long associated with therapeutic pessimism, initially documented by Cleckley (1941), and in subsequent reviews in the ensuing years (Suedfeld & Landon, 1978; Harris & Rice, 2006). In correctional and forensic treatment settings, psychopathy has been associated with decreased motivation (Ogloff et al., 1990), lower levels of improvement (Sewall & Olver, 2019), and high rates of attrition (Olver et al., 2011). Ogloff et al. (1990) found that PCL-R score was significantly inversely related to length of stay in a therapeutic community, and the results of meta-analysis have demonstrated PCL-R score and binary psychopathy diagnosis to be among the strongest predictors of correctional program noncompletion (Olver et al., 2011).

The pattern of findings reflects the myriad challenges that come with working with high psychopathy individuals in treatment settings (Olver, 2016; Polaschek, 2014; Wong, 2015). Interpersonally, high psychopathy persons can be abrasive, antagonistic and off-putting with their bravado and grandiosity (Hobson et al., 2000; Polaschek & Daly, 2013). They will often test the limits, push boundaries, and through their deceitful and manipulative practices, may even be able to create friction or divisions between staff members or encourage vulnerable staff to carry out personal favors and violate institutional rules (Hobson et al., 2000; Olver & Wong, 2011; Wong, 2015). High psychopathy persons can also be verbally abusive, threatening, and intimidating toward staff and co-patients; keeping people at a distance, while others walk on eggshells and avoid confrontation (Hobson et al., 2000; Polaschek & Daly, 2013). They may be disruptive in group, violate institutional rules, or fail to complete homework or follow through on recommended interventions (Hobson et al., 2000; Ogloff et al., 1990; Olver & Wong, 2011).

Psychopathy and Treatment Outcome

Although this provides a clinical context for why high psychopathy persons are difficult to work with, quality treatment outcome evaluations with this population have been infrequent. A meta-analysis of 42 psychopathy treatment studies (Salekin, 2002) gave some pause on notions of therapeutic pessimism, with 60% of studies demonstrating some form of therapeutic benefit. The literature, however, was characterized by a bewildering miscellany of interventions (e.g., psychoanalytic, CBT, therapeutic community, etc.), small sample sizes or case study designs, heterogeneous client populations, varied indicators of treatment progress (e.g., capacity for anxiety or guilt/remorse, institutional infractions, work behavior, release outcome), and in few instances, well established operationalizations of psychopathy (e.g., PCL scales). Updated reviews of the psychopathy treatment literature (e.g., Olver, 2016; Polaschek, 2014; Polaschek & Daly, 2013; Polaschek & Skeem, 2018; Reidy et al., 2013; Salekin et al., 2010) demonstrated that correctional and forensic treatment programs with high psychopathy clientele that had components of effective correctional treatment in terms of their intensity, treatment foci, and mode of delivery, yielded the greatest promise in terms of recidivism reduction.

What are these components? In the broader correctional literature, interventions subscribing to the principles of risk (i.e., treatment intensity matched to client risk level), need (i.e., dynamic risk factors, aka criminogenic needs, are prioritized for intervention), and responsivity (i.e., interventions are individualized within the context of cognitive behavioral methods of change), or RNR, are associated with decreases in different types of recidivism outcomes across client populations (Andrews & Bonta, 2010; Dowden & Andrews, 2000; Gannon et al., 2019; Hanson et al., 2009; Papalia et al., 2019). It logically follows that when the RNR principles are applied to interventions with high psychopathy clientele, in principle, they should have the potential to benefit from services; when services veer from RNR, the potential exists for a corresponding increase in negative correctional outcomes.

A classic but highly influential archival study by Rice et al. (1992) on a therapeutic community program delivered at a secure forensic mental health facility in Ontario, Canada, found that high psychopathy men attending the program had significantly higher rates of violent recidivism post release (77%) than similarly high psychopathy men who did not attend the program (55%); low psychopathy men, by contrast, demonstrated a treatment effect (35% vs. 20%). The program, however, did not have any elements of RNR—low risk and high risk men were intermixed; the men were unsupervised and left to confront each other on their issues in unstructured groups; they were locked in a small room, sometimes handcuffed together, up to 80 hours per week; there were no structured psychological interventions delivered by staff or prosocial role modeling; and patients were sometimes involuntarily administered hallucinogenic substances (by facility staff) to lessen defenses, prescribed by their group members. Therapeutic pessimism is influenced by evaluations such as these but should be tempered when the program components are not only therapeutically substandard, but frankly violate ethical and human rights.

A Two-Component Model for Risk-Reduction Treatment of Psychopathy

Wong (2015) and colleagues (Wong et al., 2012; Wong & Hare, 2005) have proposed an RNR based model of risk-reduction treatment for high psychopathy clientele in correctional and forensic mental health settings termed the Two-Component (2-C) Model. In the 2-C model, the interpersonal and affective features of psychopathy as assessed by Factor 1 is conceptualized as a responsivity issue to be managed in treatment (Component 1 or C-1, the interpersonal component), while the lifestyle and antisocial features of Factor 2 embody a set of risk and need issues to be targeted directly in treatment (Component 2 or C-2, the criminogenic component).

As a responsivity issue, C-1 involves managing and containing the characteristics of Factor 1 (e.g., superficiality, grandiosity, deceitfulness, manipulation, lack of remorse and empathy), rather than trying to treat it directly and fundamentally alter the character structure of psychopathy. Evidence for C-

1 comes from cross-sectional research demonstrating the long-term stability of Factor 1 traits over the lifespan (Harpur & Hare, 1994; Olver & Wong, 2015), as well as the lower predictive accuracy of Factor 1 for future violence and other recidivism outcomes (Yang et al., 2010). In other words, Factor 1 tends to have high stability and it has less risk relevance than the other features of psychopathy. Factor 1, and the callous-unemotional features measured by the Affective facet of the PCL-R in particular, however, has been associated with adverse therapeutic outcomes in correctional programs such as decreased treatment progress (Olver et al., 2013; Sewall & Olver, 2019), increased attrition (Daly, 2017; Olver & Wong, 2011), and weaker working alliances, particularly the therapeutic bond between client and therapist (DeSorcy et al., 2017); all of which underscore the responsivity relevance of Factor 1.

As a criminogenic issue per the risk and need principles, C-2 involves directly treating criminogenic needs associated with Factor 2 and developing replacement prosocial behavioral and living skills. Evidence for C-2 comes from the same cross-sectional research that shows age related declines in Factor 2 (Harpur & Hare, 1994; Olver & Wong, 2015) and the stronger predictive accuracy of Factor 2 for future violence and other recidivism outcomes, both in the institution (Olver et al., 2020) and community (Yang et al., 2010). As a set of risk and need issues, Factor 2 is both more dynamic and risk relevant; appropriate treatment entails high intensity coordinated programs, that are comprehensive and multimodal in nature, targeting criminogenic needs through cognitive behavioral interventions. If clientele can be retained in treatment, despite the challenges they bring interpersonally, emotionally, and behaviorally, arguably they may stand to benefit from interventions. Correctional programs broadly adhering to the RNR principles, consistent with the 2-C model, have demonstrated pre-post changes in risk to be associated with decreased recidivism after controlling for baseline psychopathy in sexual offense specific (Olver & Wong, 2009; Sewall & Olver, 2019) and general violence reduction (Olver et al., 2013) treatment programs. Elsewhere, others have found high psychopathy men to have lower rates of sexual or violent recidivism when appraised as having lowered their risk from treatment (Looman et al.,

2005), demonstrated positive treatment behavior (Langton et al., 2006), or with increased treatment dosage in the community (Skeem et al., 2002).

Protective Factors: A Risk Mitigating Agent for High Psychopathy Clientele?

Although recidivism may be managed or targeted directly by way of treating dynamic risk factors to reduce risk, the alternative side of the coin may be to increase protective factors, strengths, or resiliencies (de Vries Robbé et al., 2016). While closely aligned with risk factors, the two do not represent opposites of the same construct; the presence of a protective factor does not mean the absence of a risk factor but represents protection from risk factors in a given situation ultimately lowering the potential for a violent outcome (de Vries Robbé et al., 2016; de Vries Robbé, de Vogel, Douglas, & Nijman, 2015; Yoon et al., 2018). Moreover, protective factors tap into the strengths of the client and can have clinical value for strengthening therapeutic bonds and motivation to change by providing positive treatment goals, in addition to recidivism prevention (de Vries Robbé, de Vogel, Koster, & Bogaerts, 2015). The Structured Assessment of Protective Factors (SAPROF; de Vogel et al., 2009; 2011) is a formalized measure of protective factors, most of which are dynamic, to inform correctional planning and identify targets of change (de Vries Robbé et al., 2016). Research to date has demonstrated SAPROF scores to be associated with decreased recidivism in treated forensic mental health or correctional samples from The Netherlands (de Vries Robbé, de Vogel, Douglas, & Nijman, 2015; de Vries Robbé, de Vogel, Koster, & Bogaerts, 2016), Austria (Yoon et al., 2018), and Canada (Coupand & Olver, 2020); the latter investigation also found positive changes on protective factors to be associated with increased positive community outcomes (e.g., employment, housing). Research has yet to examine, however, how protective factors may intersect with psychopathy in treated violent or sexual offending samples, and to what extent the risk mitigating or strength promoting properties of protective factors may extend to high psychopathy forensic clientele.

Current Study and Rationale

There have been some significant strides in research and practice about what may “work” for high psychopathy men in correctional and forensic mental health settings, as well as the risk mitigating properties of protective factors, but there remain significant gaps. First, most research on protective factors have examined these measures at a single timepoint while very few investigations (Coupland & Olver, 2020; de Vries Robbé, de Vogel, Douglas, & Nijman, 2015) have examined protective factors measured at two or more timepoints, and thus, to what extent they are dynamic. Second, the psychopathy treatment literature remains underdeveloped, and there is a need for further research on additional treated samples and settings to extend previous findings. Finally, to our knowledge no research has examined the association of psychopathy with protective factors, and to what extent changes in protective factors are associated with changes in recidivism after accounting for individual differences in psychopathy.

The present study sought to address these gaps in the literature through examining structured ratings of protective factors from the SAPROF at pretreatment and posttreatment, and PCL-R measured psychopathy, in a large sample of treated men with a criminal history of sexual offending, followed up nearly 10 years post release in the community. The following hypotheses were proposed. First, we anticipated that psychopathy would be inversely associated with protective factor scores, demonstrating that more psychopathic individuals would have fewer protective factors. Second, we anticipated significant pretreatment-posttreatment changes on protective factors in the sample as a whole, and among high psychopathy men in particular. Third, we anticipated the callous and unemotional features of psychopathy (Affective facet) would be significantly negatively associated with changes in protective factors, controlling for other facets. Fourth, we anticipated that protective factor scores, assessed at baseline and at posttreatment, would significantly predict decreased recidivism. Finally, if pre-post changes in protective factors have risk relevance, this should be associated with

decreased recidivism; to the extent that high psychopathy men can and do change in risk and protection, such an association may also be observed controlling for psychopathy.

Method

The present investigation is an archival retrospective examination of psychopathy, protective factors, and posttreatment community recidivism that received ethical approval from the University of Saskatchewan Behavioural Research Ethics Board (Beh # 15-366) and operational approval from Correctional Service Canada (CSC).

Participants

Participants included 461 federally sentenced men who attended sexual offense treatment services over a 10-year catchment period (1998-2008) as part of their correctional plans through the CSC, Canada's federal correctional department. All men had a current or previous conviction for a sexually motivated offense and were serving sentences of a minimum 2-years duration with an average determinate sentence length of 4.9 years ($SD = 3.0$, $n = 386$). More than half (60.1%, 265/434) had a prior criminal charge or conviction for a sexual offense. Approximately equal proportions of the sample had committed sexual offenses exclusively against adults (45.9%, 199/434) or children (41.7%, 181/434), while a minority (12.4%, 54/434) had offended against both developmental groups. The men were 36.2 years of age ($SD = 11.8$, $n = 382$) on average at the time of sentencing for their index offense(s) and 40.4 years of age ($SD = 12.0$, $n = 432$) at release. The sample was roughly evenly divided between men who were White (48.0%, 223/465) and men who self-identified as Indigenous ancestry (42.3%, 198/465), with the remainder (9.5%, 44/465) other/unknown. Most of the sample had currently or previously been married or equivalent (62.1%, 261/420) with the remainder single/never married (37.9%, 159/420).

Sexual Offense Treatment Program

The men attended a verified sexual offense treatment program (SOTP) administered by the CSC through the National Sex Offender Program (NaSOP), or by extension, a parallel high intensity CSC-based

sexual offender program delivered at a maximum security correctional mental health facility, similar in form and content to the NaSOP high intensity stream. Most of the men had attended one of the high intensity treatment programs (8-9 months duration, $n = 319/431$), while the remainder attended prison-based moderate (4-5 months, $n = 41/431$) or low intensity (2 months, $n = 71/431$) streams. A common thread to the treatment programs is that these were cognitive behaviorally based, incorporating the RNR principles, and were overseen by a registered psychologist in their delivery. Treatment program facilitators came from different health professions such as social work, nursing, occupational and recreational therapy, and addictions; medication regimens were monitored by nursing staff and psychiatrists. Common treatment foci included sexual self-regulation and healthy sexuality, relationship and intimacy skills, emotional regulation and anger management, alternatives to aggression, and identifying and changing attitudes and cognitions supportive of sexual offending; these modules tended to be delivered in group format and were supplemented with individual therapy. Most institutions offered ancillary programs that augmented sexual offense treatment (e.g., substance abuse programming, educational and vocational upgrading), including cultural support and treatment services (e.g., Indigenous healing).

Materials

Psychopathy Checklist-Revised (PCL-R). The Psychopathy Checklist-Revised (PCL-R; Hare, 1991, 2003) is a 20-item symptom construct rating scale. Each item is scored on a 3-point rating scale from 0 (absent), 1 (possibly or partially present), to 2 (present). Taxometric research has demonstrated that PCL-R measured psychopathy is dimensional (Edens et al., 2006), with possible scores ranging from 0-40 representing the extent to which the assessee resembles a prototypical psychopathic individual. That said, cut scores ranging from 25 to 30 have been used to characterize psychopathy (Hare, 2003; Wong, 1988). Dating back to Wong (1984, 1988), it has been well established that file-based ratings can yield slightly conservative PCL-R scores for high scoring individuals (particularly on the interpersonal and

affective items) compared to ratings completed via file and interview. Accordingly, cut scores of 25 are commonly used to characterize a high level of psychopathy for file-based PCL-R research (Beggs & Grace, 2008; Harris et al., 1991, 2003; Hare et al., 2000; Langton et al., 2006; Sewall & Olver, 2019; Wong et al., 2012), which the present study employed. Importantly, comparable levels of interrater reliability have been found comparing PCL-R ratings via file only vs. file plus interview, and quality archival PCL-R ratings can be obtained, when the files are sufficiently detailed and comprehensive (Wong, 1984, 1988). Per the Cicchetti and Sparrow (1981) reliability guidelines (poor < .40, fair .40-.59, good .60-.74, excellent .75-1.0), excellent interrater agreement (intraclass correlation, one-way random effects model, single measure, absolute agreement, ICC_{A1}) was obtained for PCL-R ratings on 32 randomly selected independently double coded protocols: PCL-R total $ICC_{A1} = .84$. PCL-R scores for the entire sample had acceptable internal consistency (Cronbach's $\alpha = .82$).

The Structured Assessment of Protective Factors. The Structured Assessment of Protective Factors (SAPROF; de Vogel et al., 2009; 2011) comprises 17 protective factors arranged into 2 static (intelligence, secure attachment) and 15 dynamic items. Each item is rated on a three-point scale of 0 (absent), 1 (partially present), and 2 (completely present). Although the SAPROF was developed as a structured professional judgment measure (i.e., examining the presence and pattern of items vs. a numeric score), the items can be summed to generate a total scoring ranging from 0 to 34; higher scores are positive and indicate the presence of a greater number of protective factors. The total score subsumes three domains: Internal (5 items: intelligence, secure attachment, empathy, coping, self-control), Motivational (7 items: work, leisure, finances, treatment motivation, attitudes toward authority, life goals, medication), and External (5 items: social network, intimate relationship, professional care, living circumstances, external control). The SAPROF is intended to be used in conjunction with a risk-assessment tool, given that risk and protective factor measures can complement each other for risk assessment, intervention planning, and case management (Coupland & Olver, 2020;

de Vogel et al., 2011; de Vries Robbé, de Vogel, Douglas, & Nijman, 2015; de Vries Robbé, de Vogel, Koster, & Bogaerts, 2015). As with the PCL-R, quality ratings on the SAPROF can be generated from comprehensive file information, with several validation studies being archival and retrospective in nature (Coupland & Olver, 2020; de Vries Robbé, de Vogel, Douglas, & Nijman, 2015; de Vries Robbé, de Vogel, Koster, & Bogaerts, 2015; Yoon et al., 2018). In the present sample, good to excellent interrater agreement (ICC one-way random effects model, single measure, absolute agreement) was obtained for SAPROF ratings on 32 randomly selected independently double coded protocols: SAPROF total (pre) $ICC_{A1} = .71$, (post) $ICC_{A1} = .76$, (change) $ICC_{A1} = .70$. SAPROF scores for the entire sample had acceptable internal consistency (Cronbach's α): pre = .82, post = .83.

Recidivism. Recidivism was captured through officially recorded charges and convictions on the men's criminal records as maintained by the Royal Canadian Mounted Police (RCMP) nationwide electronic database, the Canadian Police Information Centre (CPIC). CPIC provides national coverage and thus will document formal criminal sanctions processed in any region of the country (i.e., if an individual absconds and reoffends out of province, this will still be tracked by CPIC). CPIC has its limitations however, for instance, it can only document officially recorded criminal activity and thus cannot account for undetected offending, and its jurisdiction is limited to Canada and cannot track crimes committed internationally (i.e., unless this information is reported to the RCMP). The recidivism data were based on new offenses accrued following release from custody to the community. Sexual recidivism was defined as any new sexually motivated offense occurring post release (e.g., sexual assault, sexual interference), including noncontact sexual offenses (e.g., child pornography). Offenses that were adjudicated as nonsexual (e.g., nonsexual assault) including serious violations resulting in a new sentence (e.g., attempted sexual offenses) that were determined to be clearly sexually motivated were coded as sexual recidivism (per Hanson et al., 2015). Violent recidivism included any offense against the person (e.g., robbery, assault, homicide), including sexual offenses. General recidivism included new offenses for any

category of crime. Recidivism was coded in a binary manner (yes did recidivate, no did not recidivate) for each category. The dates of new criminal charges and convictions were coded to permit survival analysis; follow-up times were adjusted for periods of time served on remand or pretrial custody when this information was available to increase the accuracy of estimates for time at risk in the community.

Procedure

The sample was identified from an electronic database generated from a broader investigation examining sexual violence risk, change, and treatment outcome (see Olver, Mundt et al., 2018). The SAPROF and PCL-R were rated for the present study's purposes from the men's files; no interviews were conducted. The men's files were accessed through the Offender Management System (OMS) by security cleared CSC personnel and documents were stored electronically in separate pretreatment and posttreatment folders for each case; the personnel accessing the files and extracting the documents had no direct involvement in coding the study's measures. All men had attended sexual offense treatment programming and had detailed written documentation about their treatment behavior and progress, most typically in the form of an intake treatment summary, interim report, and final treatment progress report. In addition, psychological assessment reports, casework notes, psychiatric discharge summaries, correctional plans, criminal profile reports, and other major decision documents were accessed as available.

Pretreatment information included all information from the point of admission for the current sentence up to the time of the intake treatment summary completed shortly following admission to the sexual offense treatment program; these sources captured during this timeframe were used to complete PCL-R and pretreatment SAPROF ratings. The posttreatment information consisted of interim and final treatment progress evaluations and other pertinent documents completed at program end and prior to release to the community; these information sources were used to complete SAPROF posttreatment ratings only. The catchment period timeframe in which the ratings were completed while

the men were in custody thus enabled ruling out reverse causation, that is, SAPROF posttreatment scores would not reflect a loss of protective factors due to recidivism, but rather, to what extent they changed during the pretreatment-posttreatment interval, and ultimately, prior to community release. All SAPROF and PCL-R ratings were completed blind to recidivism outcome.

A team of seven senior undergraduate psychology students, which included the second author, were trained on the PCL-R and SAPROF (which included completing ratings on redacted practice cases), by the principal investigator (PI), a registered psychologist with over 20 years of clinical and research experience in forensic assessment and treatment with correctional populations. The student raters had completed coursework in correctional psychology and had either completed, or were in the process of completing, their honors degrees. The research assistants (RAs) co-coded the first five files and then independently double coded 32 cases to examine interrater reliability—20 cases were initially selected at random and designated for IRR coding, and during the data collection process additional cases were selected at random periodically ($n = 12$) for IRR coding to prevent rater drift. Fidelity checks and consultation on case ratings were also provided by the second author, and a refresher training was provided to RAs by the PI approximately one year into the project. The second author entered all PCL-R and SAPROF data into a spreadsheet, and these were cross checked by the PI for accuracy. Recidivism data were collected independently via CPIC by project personnel not involved in rating the PCL-R or SAPROF; these were a trained graduate student, the Acting Director of Research at the facility, and the project PI.

Data Analytic Plan

Several analyses were conducted to examine the associations between psychopathy and protective factors, and the relation between dynamic treatment-relevant changes in protective factors to recidivism after accounting for individual differences in levels of psychopathy. Analyses were

conducted using SPSS for Windows version 25.0, except for Harrell's C (time dependent ROC, explained below), which was conducted using the "Survival" package (Therneau, 2020) in R version 4.0.0.

First, to examine to what extent protective factors are present in high psychopathy men, bivariate comparisons on the protective factors measures were made between high and low psychopathy groups using a PCL-R total cut score of 25, as well as examination of pre-post differences in change within the psychopathy subgroups. Cohen's *d* was used to examine the magnitude of change scores in which values of .20, .50, and .80 correspond to small, medium, and large effects, respectively (Cohen, 1992). The three treatment streams of program intensity were also compared on PCL-R and SAPROF scores through a one-way MANOVA with Tukey-beta post-hoc comparisons (reported in supplemental results).

Second, Pearson correlations were computed between SAPROF pretreatment and posttreatment scores with PCL-R total and facet scores. Inverse correlations between the SAPROF and PCL-R domains would demonstrate high levels of psychopathy to be associated with low levels of protection. Examination of these associations at the subscale and facet level would permit inferences about whether certain features of the syndrome may be differentially associated with different nuances of protection. Correlation magnitudes between two continuous variables were interpreted using the conventions outlined by Cohen (1992) of $r = .10$ (small), $r = .30$ (medium), and $r = .50$ (large). Third, to examine the association between psychopathy and changes in protective factors, Pearson correlations were computed between SAPROF pre-post change scores with PCL-R total and facet scores. Inverse associations would indicate that higher levels of psychopathy to be associated with fewer treatment-relevant gains on protective factors. To extend previous work identifying certain features of psychopathy (e.g., Affective facet) to have negative implications for treatment progress, a series of multiple regression analyses were conducted in which the four PCL-R facets were entered

simultaneously to examine their unique associations (i.e., controlling for all other facets) with changes on SAPROF total and subscale scores (reported in supplemental results).

Fourth, to investigate to what extent the PCL-R predicts increased recidivism, and the SAPROF (and positive changes therein) predicts decreased recidivism, the predictive validity of these measures for binary sexual, violent, and general recidivism were examined via Harrell's C, generated from Cox regression survival analyses. Harrell's C is a prediction metric, analogous to the area under the curve (AUC) statistic, that examines the prediction of an outcome (e.g., recidivism) over time, and thus accounts for individual differences in length of follow-up. Harrell's C values range from 0 to 1.0 and represent the probability that, given two cases, the individual with the more deviant score would reoffend sooner. With values of .50 representing chance level prediction, C values follow the same interpretive convention as AUCs in which values of .56, .64, and .71 represent small, medium, and large effects, respectively (Rice & Harris, 2005). C values are significant when 95% CIs do not overlap with .50. Given that the magnitudes of pre-post change scores are highly influenced by the magnitude of the pretreatment score, residualized change scores were examined in these bivariate prediction analyses (i.e., regressing change score on pretreatment score and retaining the residual) thus, controlling for pretreatment score.

The fifth set of analyses featured a stringent test of the predictive properties of treatment relevant changes in protective factors, controlling for psychopathy. Cox regression survival analyses were conducted for the three recidivism outcomes entering PCL-R total score, followed by pretreatment SAPROF score, and the respective change score. The three sets of covariates would examine: a) to what extent high levels of psychopathy continued to predict outcome at posttreatment and after controlling for protective factors, b) whether protective factors predicted lower rates of recidivism, irrespective of psychopathy, and c) to what degree positive pre-post measured changes in protective factors were associated with decreases in recidivism, controlling for pretreatment score and individual differences in

psychopathy. The regressions are explicitly structured in this manner to investigate the magnitude of possible change associations with decreased recidivism over time, post release. The broader implications are that pre-post gains in protective factors may have significant risk-relevant implications, even among men who are high in psychopathy. Cox regression generates a hazard ratio (e^B) representing the percent change in hazard of an outcome (e.g., recidivism), per 1-unit change in the predictor, controlling for other covariates. Hazard ratios above 1.0 represent a positive association between the predictor and criterion, values below 1.0 represent an inverse association.

The final set of analyses examined the intersection of protective factors and psychopathy in their association with recidivism, both observed directly (via survival analysis) and estimated on the basis of PCL-R and SAPROF scores (via logistic regression). The purpose of these analyses was to aid interpretation of the Cox regressions that had used continuous covariates, to illustrate the risk reduction that could occur with increasing levels of protective factors and how this varied as a function of different levels of psychopathy. The associations examined are additive effects (as opposed to interactions), in which one model predictor uniquely adds to or increments another model predictor in the prediction of an outcome. The analyses featured posttreatment SAPROF scores, given that they are the most proximal measure of protection at post release and have incorporated change information. Total scores were employed as the most representative measurement of each set of constructs.

Kaplan-Meier survival analyses were first conducted to examine observed trajectories of the three recidivism outcomes among groups of men who scored high vs. low on the PCL-R (using the 25-point cut score) and high vs. low on the SAPROF at posttreatment (i.e., total score at or above the mean vs. below). Although variance is lost by dichotomizing predictors, risk reduction would be illustrated by the magnitude of difference in recidivism trajectories between high psychopathy groups scoring high vs. low (i.e., above vs. below the mean) on posttreatment protective factors. Second, logistic regression was conducted examining the associations of PCL-R total and posttreatment SAPROF scores to fixed 5-year

recidivism outcome. The logistic regression coefficient for each predictor (B_1) represents the percent change in odds of recidivism per 1-unit change in the predictor, while the constant (B_0) is the log odds of the recidivism base rate when the predictor equals 0. The logistic function, $\frac{e^{B_0+B_1 \times \text{Score}}}{(1+e^{B_0+B_1 \times \text{Score}})}$, (Tabachnick & Fidell, 2007) then incorporates information from single or multi-predictor models to estimate rates of recidivism associated with specific SAPROF and PCL-R score combinations over a defined follow-up.

Results

Sample Description and Overview

Descriptive statistics for the PCL-R and protective factors measures (pre, post, change) are summarized in Table 1 for the aggregate sample and stratified by PCL-R psychopathy group. Approximately one in five men (18%, 83/461) had a PCL-R cut score of 25 or higher placing them in the high psychopathy range, with their mean PCL-R score of 28 being nearly double that of the low psychopathy group. The mean PCL-R score and representation of psychopathy in the sample as a whole is consistent with North American adult male correctional samples (Hare, 2003). The aggregate sample and the low psychopathy group had very comparable mean baseline SAPROF total scores ($M = 12.5$, $SD = 6.0$) to other adult male sexual offending samples in The Netherlands ($M = 12.25$, $SD = 5.91$, $n = 83$) in a forensic inpatient setting (de Vries Robbé, de Vogel, Koster, & Bogaerts, 2015), and the Austrian Prison System ($M = 12.95$, $SD = 4.11$, $N = 450$) (Yoon et al. 2018).

Significant pre-post differences on SAPROF total and subscale scores were observed for the aggregate sample ($d = .38-.74$) and each of the psychopathy subgroups (PCL-R ≥ 25 $d = .50-.94$; PCL-R < 25 $d = .38-.72$), with the exception of the External subscale for the high psychopathy subgroup ($d = .17$, ns); most effects ranged from the upper end of small to moderate in magnitude. Although high psychopathy men registered fewer protective factors on almost all measures at baseline and posttreatment than the low psychopathy group, there were no significant differences in the magnitude of change across these domains between the groups. The results of a one-way MANOVA with Tukey-

beta post-hoc multiple comparisons also demonstrated significant differences on PCL-R and SAPROF scores as a function of treatment intensity with higher levels of psychopathy, fewer protective factors, and increasing change observed as program intensity increased (see supplemental Table S1).

Psychopathy and Protective Factor Associations

PCL-R correlations with the protective factor measures are presented in Table 2. In all, high psychopathy men tended to have significantly fewer protective factors. Specifically, PCL-R total scores had moderate to large inverse correlations with SAPROF pre and post Internal, Motivation, and total scores. This pattern of significant inverse correlations was also observed for the Antisocial, Lifestyle, and Affective facets with these two SAPROF subscales and total score. The External subscale of the SAPROF (post only) had smaller in magnitude but significant associations with these three PCL-R facets as well as the total score. The Interpersonal facet had the smallest in magnitude and least frequently significant associations with scores on the protective factor measures. The correlations presented in Table 2 also illustrate the Affective facet to have the most consistent pattern of significant inverse associations with change scores on the SAPROF; this pattern was reaffirmed in multiple regression analyses (see supplemental Table S2). Controlling for the other PCL-R facets, Affective facet scores significantly incrementally predicted decreased pre-post changes in protective factor scores for the SAPROF total and its Internal and External subscales, but not for the Motivation subscale; none of the other PCL-R facets uniquely predicted decreased protective factor change.

Predictive Validity of PCL-R and SAPROF Scores for Recidivism

The sample was followed up a mean 9.6 years ($SD = 2.8$) post release, during which, the base rate for sexual recidivism was 16.8% (71/422), violent recidivism 33.9% (143/422), and general (any) recidivism 53.6% (226/422). Table 3 presents the results of predictive validity analyses of PCL-R and SAPROF scores with the three recidivism outcomes (Harrell's C). First, the PCL-R total, Lifestyle, and Antisocial facet scores significantly predicted each outcome, with C magnitudes being broadly moderate

in magnitude for the prediction of sexual recidivism, and for the total score and Lifestyle facet in the prediction of violent and general recidivism; Antisocial facet scores had large associations with these two outcomes. Second, the protective factors measures were significantly inversely associated with each of the three recidivism outcomes. SAPROF pre and post scores had moderate C magnitudes with sexual, violent, and general recidivism. Further, the Internal and Motivation subscales, pre and posttreatment scores, had significant small to moderate predictive associations with sexual and general recidivism, and broadly moderate in magnitude associations with future violence in general. The External subscale pre and post scores had significant small in magnitude associations with the three recidivism criteria. Finally, positive changes on the SAPROF total score, as well as its three subscales (controlling for pretreatment score) representing improvement in protective factors, were significantly associated with decreased violent recidivism. Positive pre-post changes in the Internal domain were significantly associated with decreased sexual and general recidivism; however, positive changes in the other SAPROF domains were not significantly associated with reductions in these recidivism criteria.

Psychopathy, Protective Factor Change, and Recidivism

The next set of analyses examined associations between pre-post changes in SAPROF scores with possible reductions in each of the three recidivism outcomes over time, after adding a more stringent control of PCL-R total score, through Cox regression survival analysis (Table 4). The structuring of the regression models was intended to evaluate to what extent protective factors measured at posttreatment taking into account change, significantly improved upon pretreatment assessments and captured risk relevant change. The analyses would demonstrate to what extent positive growth in protective factors predict reductions in future reoffending after controlling for individual levels of psychopathy. As with the bivariate analyses, the strongest change score associations occurred in relation to reductions in violent recidivism. Specifically, PCL-R and SAPROF pretreatment scores uniquely predicted future violence, while change scores for the SAPROF total (Model 1) and Internal subscale

(Model 2) significantly predicted decreased violence; Motivational (Model 3) and External (Model 4) change score associations did not attain significance. The results broadly support the risk relevance of pre-post change on the SAPROF, at least in terms of risk for violent recidivism. For instance, per Model 1, the hazard ratio would be interpreted as an estimated 5% decrease in the hazard of future violence in the community, for every 1-point increase in SAPROF change score, controlling for pretreatment score and PCL-R score. None of the SAPROF total or subscale change score associations with sexual or violent recidivism attained significance in the Cox regression models after controlling for pretreatment score and the PCL-R. Of note, for all Cox regression models, when posttreatment SAPROF were substituted for pretreatment score this significantly uniquely predicted decreases in all recidivism outcomes, with few exceptions, controlling for PCL-R total score (see supplemental Table S3).

Trajectories of Recidivism as a Function of Psychopathy and Posttreatment Protective Factors

The final set of analyses examined the intersection of psychopathy and protective factors and their association with the three recidivism outcomes; specifically, to what extent risk appears to be reduced by protective factors assessed at posttreatment among high PCL-R scoring men. Do high psychopathy men who also have several protective factors have lower rates of recidivism than similarly high psychopathy men with few protective factors?

Figure 1 reports the results of Kaplan-Meier survival analysis examining trajectories of recidivism among four psychopathy protective factors groups: 1) high psychopathy (PCL-R 25+, $M = 27.4$, $SD = 2.5$) high protection (SAPROF posttreatment total score above the mean, i.e., 15+, $M = 18.6$, $SD = 3.3$) ($n = 22$); 2) high psychopathy ($M = 28.7$, $SD = 2.8$) low protection (SAPROF < 15, $M = 9.6$, $SD = 3.3$) ($n = 49$); 3) low psychopathy (PCL-R < 25, $M = 14.7$, $SD = 5.3$) high protection ($M = 19.4$, $SD = 3.5$) ($n = 236$); and 4) low psychopathy ($M = 18.3$, $SD = 2.5$) low protection ($M = 10.1$, $SD = 3.3$) ($n = 115$).¹ Figure 1A presents

¹ A one-way MANOVA with Tukey beta post-hoc comparisons demonstrated no significant differences in PCL-R score for the high psychopathy subgroups or SAPROF score between the low protection subgroups or for the high

the trajectories of sexual recidivism for the four groups; the only significant differences that emerged were lower rates of sexual recidivism for the low psychopathy high protection group relative to both low protection groups (high psychopathy, Log rank χ^2 [1, $n = 285$] = 5.44, $p = .020$; low psychopathy, Log rank χ^2 [1, $n = 351$] = 4.71, $p = .030$). For violent recidivism (Figure 1B), the high psychopathy low protection group had significantly faster and higher rates of violent recidivism than each of the high psychopathy high protection (Log rank χ^2 [1, $n = 71$] = 8.83, $p = .003$), low psychopathy low protection (Log rank χ^2 [1, $n = 164$] = 8.84, $p = .003$), and low psychopathy high protection (Log rank χ^2 [1, $n = 285$] = 45.46, $p < .001$) groups. The low psychopathy low protection group also had higher rates of violent recidivism than the low psychopathy high protection group (Log rank χ^2 [1, $n = 351$] = 16.01, $p < .001$). The high psychopathy high protection group did not have significantly different rates of violent recidivism than either low psychopathy groups. Finally, for general recidivism (Figure 1C), the high psychopathy low protection group had significantly faster and higher rates of general recidivism than low psychopathy low protection (Log rank χ^2 [1, $n = 164$] = 4.29, $p = .038$), and low psychopathy high protection (Log rank χ^2 [1, $n = 285$] = 22.54, $p < .001$) groups; the high psychopathy high protection group was not significantly different (Log rank χ^2 [1, $n = 71$] = 3.14, $p = .076$). The low psychopathy low protection group also had higher rates of general recidivism than the low psychopathy high protection group (Log rank χ^2 [1, $n = 351$] = 9.41, $p = .002$). Again, the high psychopathy high protection group did not have significantly different rates of general recidivism than either low psychopathy group.

Logistic regression modelling was further used to estimate fixed 5-year rates of each recidivism outcome as a function of PCL-R and SAPROF posttreatment score. Both measures incrementally predicted violent (B_0 [constant] = -0.622, B_1 [PCL-R] = .054, $p = .011$, B_1 [SAPROF] = -.108, $p < .001$) and general recidivism (B_0 [constant] = -0.652, B_1 [PCL-R] = .075, $p < .001$, B_1 [SAPROF] = -.061, $p = .004$); only

protection subgroups; for the two low psychopathy subgroups, the low psychopathy high protection subgroup had significantly lower PCL-R scores than the low psychopathy low protection subgroup.

SAPROF scores uniquely predicted 5-year sexual recidivism (B_0 [constant] = -1.884, B_1 (PCL-R) = .049, $p = .077$, B_1 [SAPROF] = -.081, $p = .011$). The results of the regression would indicate that each 1-point increase in SAPROF score at posttreatment (controlling for PCL-R score) would be associated with a 10% decrease in the odds of future violence, 8% decrease in the odds of a new sexual offense, and a 6% decrease in the odds of any future reoffending within 5 years of release. Applications of the logistic function (see supplemental Figure S1) demonstrated shallower trajectories of recidivism estimated for each outcome per standard deviation increment in SAPROF score, even as PCL-R score increased.

Discussion

Psychopathy is a clinical syndrome reputed for its poor response to psychological treatment and its association with a series of adverse criminal justice and correctional correlates. It tends not to be readily associated with redeeming personal and psychological qualities, such as strengths and protective factors, that could mitigate risk and improve the potential for successful reintegration. Drawing on a large Canadian sample of men treated for sexual offending, the present study is an initial look at profiles of structured ratings of protective factors as a function of PCL-R measured psychopathy and their associations with post release outcomes.

Profiles of Protective Factors among High Psychopathy Men

The first set of study findings fulfill conventional wisdom regarding psychopathy in correctional settings and high risk-high need clientele in general; men with high PCL-R scores tended to have fewer protective factors at pretreatment and posttreatment, as well as across the individual SAPROF domains. This seemed to be most pronounced in the internal and motivational domains measured by the SAPROF (accounting for much of the observed association with the total score), which makes sense clinically and conceptually. High psychopathy men are more likely to struggle with forming secure attachments, developing empathy, and prosocial coping (per the Internal domain), and to exhibit problems in work, leisure, and finances, motivation for treatment, and attitudes toward authority (per the Motivational

domain). The findings are consistent with existing research on the construct. The External domain had small in magnitude associations with the PCL-R that tended only to be significant for posttreatment ratings. Given that external controls are intended to become increasingly less restrictive upon the individual's release to the community and as the reintegration process unfolds, a weaker association is not unexpected. The community relevance of these factors (e.g., living arrangements, social and intimate relations), underscores the importance of establishing and strengthening coping skills conducive to successful community functioning throughout the therapeutic and reintegration process.

Psychopathy and Protective Factor Change

Dimensional PCL-R scores tended to yield weak associations with pre-post changes in protective factors overall and in specific protective domains, with some important exceptions. This is an important null finding, as it indicates that men with high levels of psychopathic traits can and do make changes in protection-relevant domains as would perhaps more typically be expected from men with fewer such traits. A high PCL-R score did not automatically equate to a lack of improvement; although high psychopathy men tended to have fewer protective factors at baseline and at the end of treatment, this did not extend to the amount of protective factor change that was observed during the two time points. This is consistent with findings elsewhere on independent samples demonstrating PCL-R total scores to not be significantly associated with pre-post changes in risk in violence reduction (Olver et al., 2013) and sexual offense specific (Sewall & Olver, 2019) programs.

The Affective facet was the lone component of the PCL-R that in correlational and regression analyses had significant inverse associations with positive changes in protective factors. The callous and unemotional features of psychopathy have demonstrated a number of negative therapeutic correlates as noted previously, and the present study offers up a new relevant one—the Affective facet is not only associated with decreased therapeutic progress in terms of risk reduction, but also fewer positive pre-post changes in protective factors. The results are consistent with Wong's (2015) (see also Wong & Hare,

2005; Wong et al., 2012) 2-C model that conceptualizes Factor 1, including the callous unemotional features, to be a responsivity issue to be managed in treatment and Factor 2, a set of risk and need issues to be targeted directly in treatment. The practice implications for managing Factor 1 (per C-1) specifically entail preventing, addressing, and containing treatment interfering behaviors so that treatment integrity can be maintained and high psychopathy clientele can be retained in treatment. Relevant examples would include focusing on task and goal components of the therapeutic alliance (i.e., emphasizing how treatment serves the client's own interests), staff training and supervision, managing countertransference reactions, practicing clear boundaries, staff communication and mutual support, documenting client-staff interactions, using motivational interviewing strategies and so forth (Olver, 2016; Wong, 2015).

The positive association between Antisocial facet scores and changes in protective factors that emerged in regression analyses controlling for all other facets may on the surface appear counterintuitive; however, we believe the finding makes sense and is consistent with theory, research, and practice. Results from recidivism prediction research (e.g., Olver, 2016; Olver et al., 2020; Olver et al., 2011; Polaskchek, 2014; Wong, 2015; Yang et al., 2010), including the present study's findings on a new sample of PCL-R scores, has demonstrated the Antisocial facet to be the strongest and most consistent predictor of recidivism and it has the greatest risk relevance. Individuals scoring high on it have a serious criminal history as well as latent propensity for rule violating behavior, and it stands to reason that the highest scoring individuals will be the highest risk and need, and also present with the greatest potential for improvement in terms of risk reduction. By extension, this should also entail the most room for improvement in protective factors. The practice implications of these findings would be directly targeting these areas per the risk and need principles and C-2 of the 2-C model.

Psychopathy, Protective Factors, and Risk Reduction

Consistent with extant findings, PCL-R scores predicted all three recidivism outcomes, particularly future violence, with the strongest and most consistent predictive associations found for the Antisocial facet, followed by the Lifestyle facet of Factor 2, while the Interpersonal and Affective facets of Factor 1 demonstrated small in magnitude and non-significant associations with all recidivism criteria. The results underscore the risk relevance of Factor 2 and the responsivity relevance of Factor 1. Bivariate prediction analyses further demonstrated SAPROF scores to be inversely associated with each of the recidivism criteria, that is, higher levels of protective factors to be associated with decreased recidivism, consistent with extant findings on forensic inpatient samples (de Vries Robbé, de Vogel, Douglas, & Nijman, 2015) and treated violent offender correctional samples (Coupland & Olver, 2020). Moreover, positive changes in protective factors as measured by aggregate scores, and the Internal domain in particular, were particularly associated with decreased violent recidivism.

This naturally begs the question as to what extent the risk mitigating properties of protective factors extend to correctional clientele with high levels of psychopathic traits. Do protective factors mitigate risk even among high PCL-R scoring men? Do positive changes in protective factors similarly indicate some form of risk reduction even after accounting for individual differences in levels of psychopathy? A stringent test of these questions was conducted through Cox regression survival analyses examining the incremental prediction of recidivism by PCL-R and SAPROF baseline and change scores. PCL-R scores uniquely predicted all outcomes; that is, high PCL-R scores continue to have risk-relevance even when individuals have psychological characteristics that either offset risk or correlate meaningfully with the same outcome. SAPROF scores, however, also incremented the prediction of each outcome in the opposite direction; that is, increasing levels of protection predicted lower rates of all three recidivism outcomes over time, irrespective of psychopathy. Finally, positive changes in protective factors (i.e., SAPROF total and Internal domain) were significantly associated with decreases in general violent recidivism after controlling for individual differences in level of psychopathy and baseline

protection score. In other words, individuals with high PCL-R scores can improve meaningfully from pre to posttreatment in protective factors, and such changes appeared to have risk relevance. The shallower recidivism trajectories for high psychopathy men who also scored high in protection at posttreatment, as demonstrated through survival analysis, further supports this conclusion.

We anticipate the strongest change-outcome associations occurred for violent recidivism for at least two reasons. For one, the SAPROF is not a sexual offense specific measure of either risk or protection, and so the changes occurring therein will likely have some relevance to sexual recidivism as an outcome, insomuch as the men completed a sexual offense specific program that targeted reducing this outcome; however, it would seem violent recidivism as a broader criterion encompassing all interpersonally harmful behavior may be better predicted by a general protective factors tool. Second, the broad range of criminogenic treatment foci (e.g., anger management, interpersonal relationships) and skills and strategies engendered from such a program can have risk relevance for other recidivism outcomes, particularly general violence. Taken together, this may account for why changes in protective factors had stronger associations with violent recidivism, rather than sexual or general recidivism.

These findings are also consistent with the practice implications of C-2 from Wong's (2015) 2-C model. Specifically, that targeting criminogenic (i.e., risk-relevant) domains, per the risk and need principles, can amount to reductions in risk by way of bolstering protective factors, even among high psychopathy clientele. It also means that an individual with a high PCL-R score can have personal and psychological characteristics that are areas of strength, dynamic in nature, and that can demonstrate growth or improvement. Finally, it is important to be cognizant of the reality that correctional systems worldwide have been treating, releasing, and managing psychopathic individuals since antiquity as part of routine practice. The label "psychopath" is a troubling moniker, but extant research suggests that these are high risk, high need individuals with a unique set of responsivity features who are not untreatable (Polaschek, 2014), and for whom appropriate correctional services can assist with reducing

recidivism and aiding reintegration (e.g., Langton et al., 2006; Looman et al., 2005; Olver et al., 2013; Sewall & Olver, 2019; Skeem et al., 2002).

Strengths, Limitations, and Future Directions

The present study has several important strengths, specifically, that it featured a large sample of men who attended evidence informed sexual violence reduction treatment, with a lengthy duration of community follow-up, comprehensive outcome data retrieved from a national database, and quality ratings completed on the PCL-R and SAPROF from detailed information sources, blind to recidivism outcome. This study to our knowledge is the first not only to examine the association between protective factors and PCL-R measured psychopathy, but specifically, the risk-relevance of treatment-related changes in protective factors and their associations to recidivism as a function of psychopathy.

That said, there are important limitations, perhaps the most noteworthy of which is that there was no untreated control group to examine changes in protective factors over time without treatment or the release outcomes of untreated persons as a function of similar levels of psychopathy. The study is thus not a controlled treatment outcome evaluation but is rather a correlational design; it is possible that factors other than the treatment program could have contributed to changes in protective factors and impacted release outcomes of high psychopathy men. Given that changes on the protective factors were rated directly from treatment files and the changes therein were based on appraisals of progress from treatment reports, arguably it is reasonable to infer that the pre-post changes could be at least partly attributed to treatment. Moreover, the study design, with baseline ratings of psychopathy, pre-post ratings of protective factors, and outcome measures of recidivism enabled the execution of analyses with stringent statistical controls to examine the associations of psychopathy, protective factors and change to important post release outcomes. Finally, the present study was a retrospective archival investigation, dependent on the quality and clarity of institutional files, lacking the additional clinical depth afforded by an interview, and the field validity of a face-to-face prospective design.

The findings have implications for research and practice. Further research needs to replicate and extend these findings to other samples in real-world field settings, employing controlled prospective designs in treatment cohorts. Such a design not only affords greater ecological validity, but also a greater confidence in, and understanding of, some of the possible mechanisms driving change to inform correctional policy and clinical practice. Further research should also examine the interface between protective factors and risk change. For instance, to what extent do protective factors increment the prediction of recidivism beyond established risk measures? Moreover, to what extent do changes in protective factors increment changes in risk factors in the prediction of recidivism; do they capture the same phenomena, or are they different sides of the same coin? Coupland and Olver (2020) found, in a treated general violent offender sample, that changes in protective factors incrementally predicted community violent recidivism, controlling for ratings of violence risk and change, suggesting there to be shared risk variance in the changes captured by measures of protection and risk.

There are also practice implications. First, the results suggest that a measure of protective factors can increment appraisals of risk afforded by the PCL-R. The PCL-R is not a risk measure (Hare, 2003) and in clinical forensic assessments contexts, it has been recommended that the tool be accompanied with measures of dynamic risk and other relevant domains of psychological functioning (Olver et al., 2020). With this in mind, the present study findings show that the level of risk posed by a high PCL-R scoring individual who also has a number of protective factors or resiliencies will not be the same as an individual with similar traits of psychopathy without the protective factors to offset this. Our use of logistic regression modelling provides an illustrative application of this. Further, our findings encourage assessing risk-relevant positive qualities in clientele that may otherwise be overshadowed by the terrible things they have done; reconceptualizing high psychopathy persons as also having positive attributes or at least capable of bolstering these with established interventions, supports, and resources.

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Table 1

Descriptive Statistics for PCL-R and SAPROF Measures Stratified by Psychopathy Group

Measure	N	Pretreatment		Posttreatment		Change		d
		M	SD	M	SD	M	SD	
Aggregate sample								
PCL-R								
Interpersonal	460	2.7	1.9	-	-	-	-	-
Affective	460	4.2	2.0	-	-	-	-	-
Lifestyle	458	4.7	2.2	-	-	-	-	-
Antisocial	454	4.7	2.6	-	-	-	-	-
Total	461	18.2	6.7	-	-	-	-	-
SAPROF								
Internal	461	2.5	1.9	4.1	2.2	1.6	1.4	.74
Motivational	461	4.9	3.0	6.1	3.1	1.2	2.4	.39
External	459	4.5	2.5	5.3	2.0	0.86	2.1	.38
Total	461	11.9	5.8	15.5	5.8	3.6	4.3	.62
PCL-R < 25								
PCL-R								
Interpersonal	377	2.1	1.6	-	-	-	-	-
Affective	377	3.6	1.8	-	-	-	-	-
Lifestyle	375	4.2	2.0	-	-	-	-	-
Antisocial	372	4.1	2.4	-	-	-	-	-
Total	378	16.0	5.1	-	-	-	-	-
SAPROF								
Internal	378	2.7 ^a	2.0	4.3 ^a	2.3	1.6	1.4	.72
Motivational	378	5.3 ^a	3.0	6.5 ^a	3.0	1.1	2.4	.38
External	376	4.5	2.5	5.4 ^a	2.0	0.97	2.1	.42
Total	378	12.5 ^a	6.0	16.2 ^a	5.6	3.7	4.3	.63
PCL-R ≥ 25								
PCL-R								
Interpersonal	83	5.0	1.7	-	-	-	-	-
Affective	83	6.5	1.1	-	-	-	-	-
Lifestyle	83	6.9	1.7	-	-	-	-	-
Antisocial	82	7.2	1.7	-	-	-	-	-
Total	83	28.3	2.7	-	-	-	-	-
SAPROF								
Internal	83	1.8	1.2	3.2	1.7	1.5	1.5	.94
Motivational	83	3.0	2.1	4.3	2.9	1.3	2.3	.50
External	83	4.4	2.2	4.8	2.0	0.35	2.0	.17 ^{ns}
Total	83	9.2	4.0	12.3	5.3	3.1	4.1	.63

Note: SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised. ^a PCL-R < 25 group significantly higher than PCL-R ≥ 25 group. *d* values for pre-post change are all $p < .001$ except for ^{ns} $p = .116$.

Table 2

Correlation Matrix of PCL-R and SAPROF Scores

SAPROF measure	PCL-R score				
	Interpersonal	Affective	Lifestyle	Antisocial	Total
Internal (pre)	-.04	-.33***	-.34***	-.35***	-.36***
Internal (post)	-.06	-.37***	-.33***	-.31***	-.35***
Internal (change)	-.04	-.16**	-.09	-.03	-.09
Motivational (pre)	-.12*	-.28***	-.43***	-.40***	-.48***
Motivational (post)	-.18**	-.35***	-.41***	-.40***	-.49***
Motivational (change)	-.07	-.09	.02	.00	-.01
External (pre)	.09	.00	-.11	-.23***	-.12*
External (post)	-.01	-.15**	-.17**	-.19**	-.23***
External (change)	-.10	-.15**	-.04	.06	-.09
Total (pre)	-.04	-.28***	-.47***	-.49***	-.45***
Total (post)	-.12*	-.38***	-.43***	-.43***	-.44***
Total (change)	-.10	-.12*	.06	.10	.03

Note: *** $p \leq .001$, ** $p \leq .01$, * $p < .05$. SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

Table 3

SAPROF and PCL-R Associations (Harrell's C) with Sexual, Violent, and General Recidivism

Measure	Sexual recidivism		Violent recidivism		General recidivism	
	<i>C</i>	[95%CI]	<i>C</i>	[95%CI]	<i>C</i>	[95%CI]
SAPROF						
Internal (pre)	.64***	[.58, .69]	.63***	[.59, .68]	.60***	[.56, .63]
Internal (post)	.65***	[.59, .70]	.66***	[.62, .71]	.61***	[.57, .64]
Internal (change)	.58*	[.52, .65]	.61***	[.56, .65]	.56*	[.52, .60]
Motivational (pre)	.63***	[.57, .69]	.67***	[.62, .71]	.63***	[.59, .67]
Motivational (post)	.61**	[.55, .67]	.65***	[.60, .69]	.60***	[.56, .64]
Motivational (change)	.53	[.46, .60]	.56*	[.51, .61]	.53	[.50, .57]
External (pre)	.57*	[.50, .63]	.60***	[.56, .65]	.56***	[.52, .60]
External (post)	.59**	[.52, .65]	.61***	[.56, .69]	.57***	[.53, .60]
External (change)	.56	[.49, .63]	.55*	[.51, .61]	.54	[.50, .57]
Total (pre)	.65***	[.60, .70]	.68***	[.63, .72]	.63***	[.59, .67]
Total (post)	.65***	[.59, .71]	.68***	[.64, .73]	.62***	[.58, .66]
Total (change)	.56	[.49, .63]	.58**	[.53, .62]	.55*	[.51, .59]
PCL-R						
Interpersonal	.52	[.45, .59]	.51	[.46, .56]	.51	[.47, .55]
Affective	.52	[.46, .59]	.55	[.50, .60]	.53	[.49, .57]
Lifestyle	.66***	[.60, .72]	.67***	[.63, .71]	.64***	[.60, .67]
Antisocial	.68***	[.62, .73]	.74***	[.70, .77]	.71***	[.67, .74]
Total	.64***	[.58, .69]	.66***	[.62, .71]	.63***	[.59, .67]

Note: *** $p \leq .001$, ** $p \leq .01$, * $p < .05$. $N = 422$, except for SAPROF External subscale results, $N = 420$. Change score associations with recidivism criteria employ residual change scores, controlling for pretreatment score. *C* = Harrell's *C* (time dependent ROCs). SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

Table 4

Cox Regression Survival Analyses: Associations between Changes in Protective Factors and Recidivism Controlling for PCL-R Score

Regression model (1-4)	Sexual recidivism				Violent recidivism				General recidivism			
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B [95%CI]</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B [95%CI]</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B [95%CI]</i>
Model 1												
PCL-R total	.042	.020	.036	1.043 [1.003, 1.085]	.056	.014	<.001	1.058 [1.029, 1.088]	.045	.011	<.001	1.046 [1.024, 1.069]
SAPROF total pre	-.087	.026	.001	0.916 [0.872, 0.964]	-.108	.018	<.001	0.898 [0.866, 0.931]	-.068	.014	<.001	0.935 [0.909, 0.961]
SAPROF total change	-.042	.031	.168	0.958 [0.902, 1.018]	-.054	.021	.010	0.948 [0.909, 0.987]	-.024	.017	.165	0.977 [0.945, 1.010]
Model 2												
PCL-R total	.047	.019	.015	1.048 [1.009, 1.089]	.069	.014	<.001	1.072 [1.043, 1.101]	.053	.011	<.001	1.054 [1.032, 1.076]
Internal pre	-.283	.082	.001	0.753 [0.642, 0.884]	-.253	.056	<.001	0.777 [0.695, 0.867]	-.157	.042	<.001	0.855 [0.787, 0.928]
Internal change	-.130	.084	.123	0.878 [0.744, 1.036]	-.199	.058	.001	0.820 [0.732, 0.918]	-.086	.048	.071	0.918 [0.836, 1.007]
Model 3												
PCL-R total	.046	.020	.023	1.048 [1.006, 1.090]	.057	.015	<.001	1.058 [1.029, 1.089]	.044	.011	<.001	1.045 [1.022, 1.069]
Motivational pre	-.116	.053	.028	0.890 [0.802, 0.988]	-.170	.038	<.001	0.844 [0.783, 0.910]	-.121	.029	<.001	0.886 [0.836, 0.938]
Motivational change	-.037	.052	.485	0.964 [0.870, 1.068]	-.067	.036	.063	0.935 [0.871, 1.004]	-.026	.029	.368	0.974 [0.921, 1.031]
Model 4												
PCL-R total	.062	.018	.001	1.064 [1.026, 1.103]	.078	.013	<.001	1.081 [1.053, 1.110]	.061	.010	<.001	1.063 [1.042, 1.085]
External pre	-.146	.068	.032	0.864 [0.756, 0.987]	-.184	.047	<.001	0.832 [0.759, 0.913]	-.097	.037	.009	0.908 [0.844, 0.976]
External change	-.098	.074	.189	0.907 [0.784, 1.049]	.077	.051	.133	0.926 [0.837, 1.024]	-.034	.041	.412	0.967 [0.891, 1.048]

Note: significant *p*-values for model predictors in bold font. Models 1-3, *N* = 422; Model 4, *N* = 420. SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

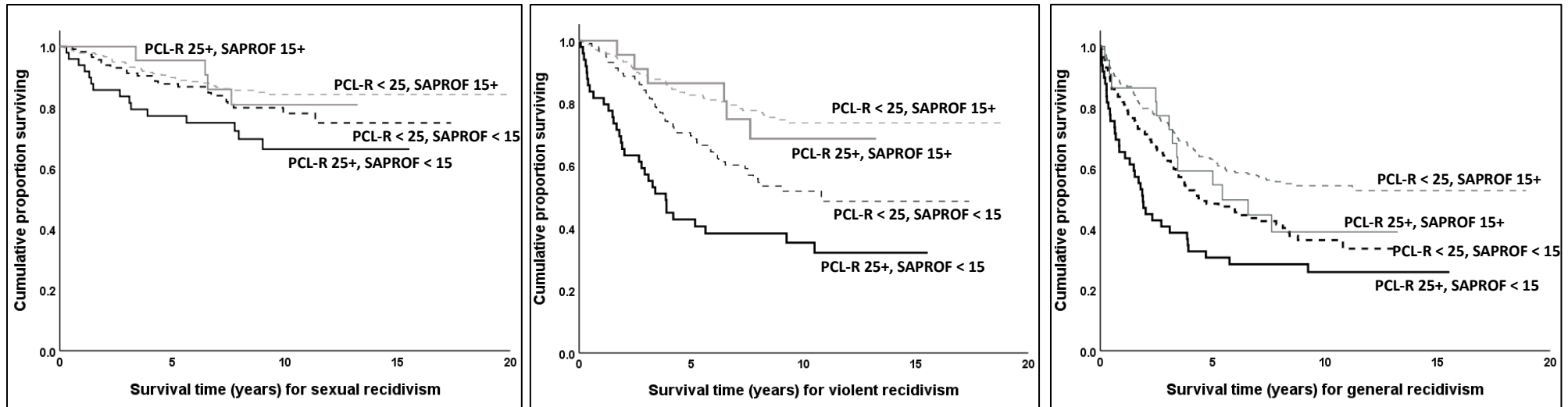


Figure 1: Trajectories of Recidivism as a Function of Levels of Psychopathy and Protective Factors ($N = 422$). Kaplan-Meier survival analyses examining observed rates of sexual (Figure 1A, left side), violent (Figure 1B, middle) and general (Figure 1C, right side) recidivism over the total follow-up period as a function of PCL-R (<25 vs. 25+) and posttreatment SAPROF total score (above vs. below mean) categories. In each figure, individuals scoring on high on psychopathy, but also high on protective factors at posttreatment, have lower rates of violent and general recidivism over time compared to high psychopathy men scoring below the mean on protective factors. Figure 1A: PCL-R < 25 SAPROF 15+ group survival curve (sexual recidivism) is significantly different from PCL-R 25+ SAPROF < 15 and PCL-R < 25 SAPROF < 15 groups. Figure 1B: PCL-R 25+ SAPROF < 15 group survival curve (violent recidivism) is significantly different from each of the three remaining groups, and PCL-R < 25 SAPROF < 15 group is significantly different from the PCL-R < 25 SAPROF 15+ group. Figure 1C: PCL-R 25+ SAPROF < 15 group survival curve (general recidivism) is significantly different from the PCL-R < 25 SAPROF < 15 and PCL-R < 25 SAPROF 15+ groups; the curves for these latter two groups are also significantly different.

Appendix Statement on Data Transparency

The recidivism data presented in this manuscript have been used as criterion variables for sexual violence risk assessment predictor measures (not examined in the current manuscript) published in the following manuscripts. None of these manuscripts examined psychopathy or protective factor scores, the core predictor variables for the present manuscript. Sowden and Olver (2017; published) and MS 2 and 3 (Olver, Nicholaichuk, Kingston, & Wong, 2014, 2020; published) each examined the discrimination properties of sexual violence risk and change score information for sexual, violent, and general recidivism in two independent samples, comprising the current study sample. Olver, Mundt, Thornton, Beggs Christofferson, Kingston, Sowden, Nicholaichuk, Gordon, and Wong (2018; published) examined calibration applications of sexual violence risk and change score information in a large combined sample (comprised of four nonoverlapping samples, including the latter two samples). Olver, Beggs Christofferson, Nicholaichuk, and Wong (2020; published) examined how the discrimination and calibration properties of sexual violence risk and change score information vary as a function of increasing age (using the four aforementioned samples), and specifically, to what extent static and dynamic normative risk information can be applied to older correctional populations with a history of sexual offenses. A further manuscript was concurrently under review employing a sample that has partial overlap with the present sample ($n = 123/461$ or 26.7%) examining the interrelations of psychopathy, working alliance, and treatment-related changes on a dynamic risk assessment measure, and their unique predictive associations with recidivism.

Supplemental Results, Tables, and Figure

Program Intensity, Psychopathy, and Protective Factors

In principle, men referred to moderate and high intensity streams of sexual offense treatment programming should have higher levels of psychopathy and have fewer protective factors than the men referred to a low intensity stream per the risk and need principles (i.e., as they would be higher risk and need, which also implies lower levels of protection). Further, men in more intensive streams should generate greater change on protective factors than men in lesser intensive streams, given that they have more room to change and are receiving a greater dosage of services.

The results of a one-way MANOVA with Tukey-beta post-hoc multiple comparisons demonstrated significant differences on PCL-R and SAPROF scores as a function of treatment intensity (Supplemental Table S1). Men in the low intensity stream had significantly lower PCL-R total and factor scores than men in the moderate and high streams; the high intensity stream also had significantly higher antisocial facet scores (and hence, higher risk) than men in the moderate stream. Further, the high intensity group had significantly lower pretreatment SAPROF scores (all components) and lower posttreatment SAPROF Internal, External, and total scores than either the moderate or low intensity streams. The moderate intensity stream also had lower pre and post SAPROF Internal and total scores and lower pretreatment Motivation scores than the low intensity stream. By contrast, men in the low intensity stream registered significantly fewer changes in the SAPROF Motivational and total scores than both the moderate and high intensity streams, as well as the External domains compared to the high intensity stream.

Supplemental Table S1

MANOVA with Post-hoc Multiple Comparisons of SAPROF and PCL-R Scores by Sexual Offense Treatment

Program Stream Intensity Level (Low, Moderate, High)

Measure	Low	Moderate	High	F	Partial η^2
	M (SD)	M (SD)	M (SD)		
SAPROF					
Internal (pre)	4.3 (2.1)	2.9 (1.7) ^a	2.0 (1.6) ^{a,b}	51.55	.199
Internal (post)	5.7 (2.3)	4.6 (2.0) ^a	3.6 (2.0) ^{a,b}	21.31	.130
Internal (change)	1.4(1.4)	1.7 (1.4)	1.6 (1.4)	0.55 ^{ns}	.003
Motivational (pre)	7.4 (2.4)	5.8 (2.7) ^a	4.2 (2.8) ^{a,b}	40.73	.164
Motivational (post)	7.3 (2.7)	6.5 (3.3)	5.8 (3.1) ^a	7.38	.034
Motivational (change)	-0.14 (2.0) ^{b,c}	0.78 (2.0)	1.5 (2.5)	15.58	.070
External (pre)	6.2 (2.4)	5.4 (2.6)	4.0 (2.2) ^{a,b}	30.03	.126
External (post)	6.2 (1.9)	5.9 (1.8)	5.1 (1.9) ^{a,b}	11.63	.053
External (change)	0.04 (1.9) ^c	0.53 (2.3)	1.1 (2.1)	7.87	.036
Total (pre)	17.8 (5.4)	13.9 (5.5) ^a	10.3 (4.9) ^{a,b}	68.73	.248
Total (post)	19.1 (5.5)	17.0 (5.4) ^a	14.5 (5.5) ^{a,b}	22.41	.097
Total (change)	1.3 (4.2) ^{b,c}	3.1 (3.4)	4.2 (4.2)	14.72	.066
PCL-R					
Interpersonal	1.8 (1.3) ^{b,c}	3.3 (2.2)	2.8 (2.0)	9.31	.043
Affective	3.3 (2.0) ^{b,c}	4.1 (2.2)	4.4 (2.0)	9.29	.043
Lifestyle	3.3 (2.2) ^{b,c}	4.8 (1.9)	5.1 (2.1)	21.70	.094
Antisocial	2.5 (2.3) ^{b,c}	4.4 (2.3) ^c	5.3 (2.4)	43.75	.174
Total	12.3 (5.5) ^{b,c}	18.6 (6.3)	19.6 (6.3)	40.92	.164

Note: Listwise N = 419. All MANOVA F tests significant at $p \leq .001$ except for ns = non-significant. Tukey beta post-hoc multiple comparisons: ^a = significantly lower than low intensity stream, ^b = significantly lower than moderate intensity stream, ^c = significantly lower than high intensity stream. SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

PCL-R Facet Associations with Changes in Protective Factor Scores

Multiple regression was conducted regressing each SAPROF change score on the four PCL-R facets entered simultaneously as predictors (supplemental Table S2). Controlling for the other PCL-R facets, Affective facet scores significantly incrementally predicted decreased pre-posttreatment changes in protective factor scores for the SAPROF total and its Internal and External subscales, but not for the Motivation subscale. For instance, each one-point increase in Affective score is associated with an approximate half-point decrease ($B = -.417$) in SAPROF change score. Unique associations between the Affective facet and changes in the SAPROF Motivation subscale were in the expected direction and largest of all the facet associations, but not significant. In all, increases in Affective facet traits were associated with decreased growth in protective factors from pre to posttreatment controlling for the other facets; none of the other facets had this association. An opposite exception was that higher Antisocial facet scores were uniquely associated with improvements in protective factors.

Supplemental Table S2

Multiple Regression: PCL-R Facet Associations with Changes in Protective Factor Scores

Protective factors regression model	<i>B</i>	<i>SE</i>	β	<i>p</i>
Model 1				
SAPROF Total change				
Interpersonal	-.087	.120	-.040	.471
Affective	-.382	.121	-.183	.002
Lifestyle	.090	.107	.046	.405
Antisocial	.258	.091	.156	.005
Constant	3.791	.555		
Overall regression model	$R = .22, R^2 = .05, F(4, 448) = 5.76, p < .001$			
Model 2				
SAPROF Internal change				
Interpersonal	.067	.040	.093	.092
Affective	-.144	.040	-.210	< .001
Lifestyle	-.023	.036	-.036	.516
Antisocial	.019	.030	.035	.526
Constant	2.006	.184		
Overall regression model	$R = .18, R^2 = .03, F(4, 448) = 3.80, p = .005$			
Model 3				
SAPROF Motivational change				
Interpersonal	-.068	.069	-.054	.324
Affective	-.094	.069	-.079	.174
Lifestyle	.122	.062	.109	.049
Antisocial	.108	.052	.115	.039
Constant	0.674	.318		
Overall regression model	$R = .19, R^2 = .04, F(4, 448) = 4.14, p = .003$			
Model 4				
SAPROF External change				
Interpersonal	-.123	.061	-.112	.043
Affective	-.124	.061	-.118	.043
Lifestyle	-.015	.054	-.015	.783
Antisocial	.136	.046	.164	.003
Constant	1.151	.279		
Overall regression model	$R = .22, R^2 = .05, F(4, 446) = 5.53, p < .001$			
Model 5				
PF List change				
Interpersonal	.056	.447	.034	.572
Affective	-.261	.099	-.165	.010
Lifestyle	.001	.102	.001	.987
Antisocial	.105	.088	.083	.161
Constant	2.878	.447		
Overall regression model	$R = .14, R^2 = .02, F(4, 400) = 2.05, p = .087$			

Note: SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

Incremental Predictive Validity of PCL-R and SAPROF Posttreatment Scores for Recidivism

Extending the Cox regression incremental validity analyses from Table 4 in the main document—PCL-R total score, pretreatment SAPROF score, and SAPROF change score—structured in a manner to illustrate change associations with recidivism over time controlling for psychopathy and baseline score. Supplemental Table S3 presents the results of Cox regression survival analyses simply entering posttreatment SAPROF score (as the most proximal score) in place of pretreatment and change scores, controlling for psychopathy. As seen here, posttreatment SAPROF total and subscale scores significantly incremented the prediction of each recidivism outcome in 11 out of 12 regressions; the lone exception was Motivational post score ($p = .077$). The strongest associations were with respect to violent recidivism, where hazard ratio magnitudes indicated a range from 8.3% to 20.3% decrease in the hazard of future violence per 1-unit increase in SAPROF score (total or subscale score) at posttreatment, controlling for PCL-R total score.

Supplemental Table S3

Cox Regression Survival Analyses: Incremental Predictive Validity of PCL-R and SAPROF Posttreatment Scores for Recidivism

Regression model (1-4)	Sexual recidivism				Violent recidivism				General recidivism			
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B</i> [95%CI]	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B</i> [95%CI]	<i>B</i>	<i>SE</i>	<i>p</i>	<i>e^B</i> [95%CI]
Model 1												
PCL-R total	.045	.020	.024	1.046 [1.006, 1.087]	.060	.014	<.001	1.062 [1.033, 1.092]	.050	.011	<.001	1.051 [1.029, 1.074]
SAPROF total post	-.072	.023	.002	0.931 [0.889, 0.974]	-.087	.016	<.001	0.917 [0.888, 0.946]	-.052	.013	<.001	0.949 [0.925, 0.973]
Model 2												
PCL-R total	.050	.019	.015	1.051 [1.012, 1.092]	.070	.014	<.001	1.073 [1.044, 1.102]	.055	.011	<.001	1.056 [1.034, 1.078]
Internal post	-.212	.060	.001	0.719 [0.719, 0.910]	-.227	.042	<.001	0.797 [0.734, 0.866]	-.127	.033	<.001	0.881 [0.826, 0.940]
Model 3												
PCL-R total	.055	.019	.005	1.056 [1.017, 1.097]	.067	.014	<.001	1.069 [1.041, 1.099]	.055	.011	<.001	1.056 [1.034, 1.078]
Motivational post	-.077	.043	.077	0.926 [0.850, 1.008]	-.116	.031	<.001	0.891 [0.839, 0.946]	-.073	.024	.003	0.929 [0.886, 0.975]
Model 4												
PCL-R total	.061	.018	.001	1.063 [1.026, 1.102]	.077	.013	<.001	1.080 [1.053, 1.108]	.061	.010	<.001	1.063 [1.042, 1.085]
External post	-.128	.064	.046	0.880 [0.776, 0.998]	-.143	.044	.001	0.866 [0.795, 0.945]	-.075	.035	.032	0.928 [0.866, 0.994]

Note: significant p-values for model predictors in bold font. Models 1-3, *N* = 422; Model 4, *N* = 420. SAPROF = Structured Assessment of Protective Factors; PCL-R = Psychopathy Checklist-Revised.

Psychopathy and Protective Factor Risk Mitigation: Applications of Logistic Regression

Applying the logistic function (see figure note for values), supplemental Figure S1 presents the estimated rates of recidivism at all possible PCL-R scores as a function of posttreatment SAPROF scores of 10 (i.e., 1 SD below the mean), 15 (\approx mean SAPROF score), and 21 (i.e., 1 SD above the mean) employing the logistic function. Of note, the Hosmer Lemeshow (H-L) goodness of fit test was not significant for the sexual or general recidivism models, however, it was significant for the violent recidivism model, suggesting that the combination of PCL-R and SAPOF posttreatment scores in the prediction of 5-year violence diverges from a logistic distribution in the prediction of this outcome. (NB: The H-L test was not significant for the pretreatment SAPROF and PCL-R combination, but posttreatment is employed here as a more informative and proximal measure.) As seen in these figures, shallower trajectories of violent and general recidivism were estimated with each standard deviation increment in SAPROF score. Although higher psychopathy scores clearly continued to predict increased recidivism, the outcomes were notably improved (i.e., recidivism rates are lower) when protective factors are increasingly present.

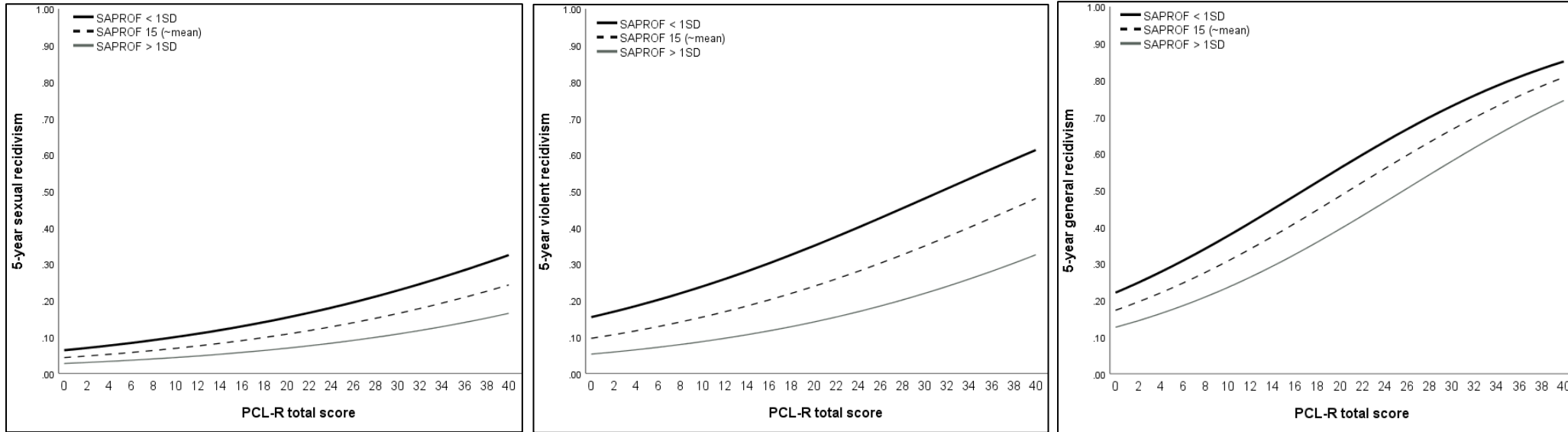


Figure S1: Recidivism Estimates as a Function of PCL-R and SAPROF score ($N = 407$): Logistic regression generated estimates of 5-year sexual (Figure 2A, left side) violent (Figure 2B, middle) and general (Figure 2C, right side) recidivism as a function of PCL-R and posttreatment SAPROF total score. In each figure, estimated increases in each recidivism outcome associated with PCL-R score become progressively shallower with successive increments in SAPROF total score. Sexual recidivism model: B_0 (constant) = -1.884, B_1 (PCL-R) = .049, $p = .077$, B_1 (SAPROF) = -.081, $p = .011$; Violent recidivism model: B_0 (constant) = -0.622, B_1 (PCL-R) = .054, $p = .011$, B_1 (SAPROF) = -.108, $p < .001$; General recidivism model: B_0 (constant) = -0.652, B_1 (PCL-R) = .075, $p < .001$, B_1 (SAPROF) = -.061, $p = .004$.