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Predictive validity of the Structured Assessment of Protective Factors for violence risk
(SAPROF): A meta-analytic review

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Abstract

Objective: Risk assessment research has primarily focused on enumerating factors underlying risk for future misconduct (e.g., violence, sexual, general misconduct); however, relatively less is known about protective factors and how they can inform risk assessment. This is a notable gap because protective factors are associated with a lower likelihood of negative outcomes when compared to risk factors and can reduce their negative impact. The Structured Assessment of Protective Factors for violence risk (SAPROF) has become one of the most widely used instruments for assessing protective factors in adult risk evaluations. **Method:** This study used meta-analytic techniques to synthesize extant findings of the SAPROF's predictive validity, integrating data from 20 studies (154 total effect sizes, N of subjects = 3,182) wherein the SAPROF's ability to differentiate individuals who would abstain from future misconduct (any misconduct, violence, or sexual misconduct) from those who would go on to engage in misconduct was evaluated. **Results:** Results of three meta-analyses offered evidence supporting the adequate predictive validity of the SAPROF in assessing protective factors associated with abstinence from future (1) violence, (2) sexual misconduct, and (3) engaging in any form of misconduct. Comparisons of effect sizes suggested the SAPROF is similarly effective in predicting abstinence from any misconduct as it is in predicting abstinence from violence, whereas effect size comparisons indicated the instrument's superiority in estimating abstinence from violence over sexual misconduct. The SAPROF's total protective score (TPS) and final protection judgment (FPJ) rating emerged as robust predictors of abstinence from future misconduct; notable differences were observed across the SAPROF's three domains. **Conclusions:** Implications of these findings for the practice of risk assessment, including their support for the SAPROF's admissibility, are discussed, and suggestions for future research on the SAPROF are offered.

Keywords: Risk Assessment; Protective Factors; Violence; Sexual Violence; SAPROF

Public Significance Statement: Risk assessments maintain an influential role in the justice system, but the failure to examine both risk *and* protective factors can create implicitly biased evaluations, often with negative consequences to forensic populations and, simply put, are inherently less accurate. The Structured Assessment of Protective Factors for violence risk (SAPROF) has become one of the most widely used instruments for assessing protective factors in adult risk evaluations. Meta-analytic results, which describe the empirical summarization of the currently available peer-reviewed research, offer evidence supporting the SAPROF's predictive validity and admissibility with regard to both the *Daubert* and *Frye* standards.

Predictive validity of the Structured Assessment of Protective Factors for violence risk
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Every individual possesses a variety of biological and psychological characteristics that have the ability to make them either vulnerable to or protected against potential behavioral health issues (SAMHSA, 2019). Historically, the concept of risk refers to any factor that increases the likelihood of the development or maintenance of various problems (i.e., the probability that the effect of the risk will outweigh the benefit received) (Brown & Singh, 2014). In the context of forensic risk assessment, risk commonly refers to the likelihood for an individual to engage in future antisocial behavior or misconduct (Singh, 2012). Risk assessment protocols have been globally implemented in criminal justice settings to prioritize risk reduction strategies and to help prevent the continuation of serious crime before it occurs (Brown & Singh, 2014; Savage, 2014). Although knowledge of risk factors has increased greatly over the years, far less is known about factors that may buffer against the negative effects posed by the presence of such risk factors (de Vogel et al., 2011). That is, the field possesses a comparatively weaker understanding of protective factors.

Research indicates that protective factors should be conceptualized as separate from risk factors rather than viewing risk and protective factors as existing in the absence of one another; high levels of risk can be counterbalanced by protective factors (Cicchetti & Rogosch, 1997; Fraser et al., 1999; Rutter, 1987). Most risk assessment instruments emphasize risk factors and either partially or entirely disregard protective factors (de Vogel et al., 2011; Rogers, 2000). This poses a notable issue because risk-only assessments have the capacity to create implicitly biased evaluations, often with negative consequences to forensic populations and, simply put, are inherently less accurate (Rogers, 2000). Accordingly, the forensic evaluator would be well-

advised to consider, and thus assess, both risk and protective factors when reaching an opinion regarding an individual's risk for future misconduct.

The Structured Assessment of Protective Factors for violence risk (SAPROF; de Vogel et al., 2009) has become one of the most widely used instruments for evaluating protective factors in adult risk assessments (Abbiati et al., 2020). Designed within the framework of the Structured Professional Judgment (SPJ) approach, a method of assessing risk through the use of structured and empirically-based checklists of factors, the SAPROF is intended to be used in combination with other SPJ risk assessments tools (e.g., the Historical Clinical Risk Management-20, version 3 [HCR-20^{V3}], Douglas et al., 2013; Sexual Violence Risk-20, Version 2 [SVR-20 V2], Boer et al., 2018) to counterbalance the assessment of risk (de Vogel et al., 2011; de Vries Robbé et al., 2011; Douglas & Kropp, 2002; Webster et al., 1997). The SAPROF was intended for assessing adult males with a history of sexual violence and mental illness; however, the authors eventually chose to develop an instrument that had the ability to encompass and assess protective factors of both physically violent and sexually violent behavior (de Vogel et al., 2011; de Vries Robbé et al., 2011). To do this, the authors' own clinical experience with adults convicted of violent crimes was combined with findings in risk assessment literature, leading to the development of a 17-item checklist of protective factors. The SAPROF's 17 factors are organized within three domains: *Internal* (i.e., intelligence, secure attachment in childhood, empathy, coping, and self-control), *Motivational* (i.e., work, leisure activities, financial management, motivation for treatment, attitudes toward authority, life goals, and medication), and *External* (i.e., social network, intimate relationship, professional care, living circumstances, and external control) (de Vogel et al., 2009). The first two of these 17 factors are static (i.e., intelligence and secure attachment in childhood), and the remaining 15 factors are dynamic (i.e., changeable during

treatment). In using the SAPROF, evaluators assign ratings to each of the 17 factors (0 = not present and not protective, 1 = probably present and probably protective, 2 = clearly present and clearly protective) based on information drawn from multiple sources (e.g., record review, interview, observation). Ratings are then summed to obtain scores for each of the three domains. Evaluators can also calculate a SAPROF total protective score (TPS) by aggregating the three domain scores (range of 0-34), as well as assign a Final Protection Judgment rating (FPJ; 0 = low protection, 1 = moderate protection, 2 = high protection). The SAPROF can provide a positive approach to the assessment of risk by quantifying protective factors in this manner, leading to a more balanced risk assessment, more elaborated risk management strategies, and better risk communication (de Vogel et al., 2011).

Since development of the SAPROF, studies have demonstrated good interrater reliability, with intraclass correlation coefficients (ICC) of .85 for the TPS and between .57 and .91 for individual items (de Vries Robbé et al., 2011, 2013, 2015). Research has also found the SAPROF to possess good convergent and predictive validity (e.g., Neil et al., 2020) and incremental validity when combined with other risk assessment instruments (e.g., De Vries Robbé et al., 2013). Yet, other appraisals of the SAPROF's validity have produced mixed results. For instance, one study (Abbiati et al., 2016) evidenced only moderate predictive validity for sexually violent recidivism (area under the curve [AUC] = .70) and poor predictive validity for general recidivism (AUC = .64). A more recent study conducted by Abbiati and colleagues (2020) demonstrated a lack of internal validity among the SAPROF's items, leading the authors to suggest that the classic internal and external domains should be avoided and that the two static factors should be removed. As a third example, Abidin et al. (2013) found HCR-20^{V3} (Douglas et al., 2013) scores to account for the SAPROF's ability to differentiate between individuals who

were violent and those who were not violent, providing evidence against the SAPROF's incremental validity. Taken together, there appears to be assorted evidence of the SAPROF's predictive validity and there may be notable variability across the SAPROF's three domains.

Whereas it remains unclear whether risk assessment tools actually help to reduce future offending behavior (Viljoen et al., 2018), research has provided evidence suggesting protective factors can help prevent future misconduct (Ullrich & Coid, 2011). The SAPROF is one of the most widely used instruments for evaluating these protective factors (Abbiati et al., 2020) but, as summarized above, evaluations of this instrument's psychometric properties, particularly its predictive validity, have produced mixed findings. Accordingly, meta-analysis of these empirical results is warranted. Although originally developed to exclusively assess protective factors for violence risk, researchers have also examined the SAPROF's validity in the context of other types of misconduct, with these lines of inquiry also producing mixed findings. Thus, any meta-analysis of results pertaining to the SAPROF's predictive validity should study three outcomes: (1) abstinence from any (general) misconduct, (2) abstinence from violence, and (3) abstinence from sexual misconduct.

In addition to the value of analyzing the varied results from studies evaluating the predictive validity of the SAPROF, meta-analysis of this peer-reviewed research provides a thorough summarization of empirical findings. Such an undertaking is fundamental for any instrument used in forensic evaluation given the high standards for expert testimony and the serious implications stemming from erroneous conclusions or grounding estimates of risk on faulty – or biased – findings. Specifically, meta-analytic results offer empirical evidence to be used in determining whether a given instrument (e.g., the SAPROF) meets the *Daubert* standard of admissibility (*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 1993), which is the standard

used by most states and the United States federal government, and/or whether the instrument would withstand the scrutiny in a *Frye* jurisdiction (*Frye v. United States*, 1923).

The Present Study

Existing psychometric investigations of the SAPROF have provided varying degrees of support for this instrument's predictive validity; meta-analytic synthesis of results has the potential to summarize this evidence and calculate a more precise estimation of the SAPROF's predictive validity by providing a systematic compilation of the magnitude of differences in SAPROF scores between individuals who had or had not engaged in misconduct following their evaluation. Meta-analysis also allows for the influence of potential moderating variables on the SAPROF's predictive validity (e.g., type of misconduct) to be directly examined. Accordingly, this study used a meta-analytic approach to evaluate the SAPROF's predictive validity, synthesizing results from all published research examining this issue.

Method

Inclusion Criteria and Literature Search

For inclusion in the meta-analysis, a study had to (a) include the SAPROF, (b) analyze the SAPROF's ability to explain variability in abstinence from future misconduct (i.e., misconduct that occurred after SAPROF scoring or, when researchers used archival data [e.g., de Vries Robbé et al., 2011], misconduct that occurred subsequent to the span of time covered by the records used for SAPROF scoring), and (c) provide enough statistical information that an effect size statistic representing the difference in a given SAPROF score between those who did and did not engage in future misconduct could be derived. For the purposes of this meta-analysis, misconduct was defined as any act likely to result in disciplinary actions (e.g., physical violence, sexual violence, behavior in opposition to jail/prison/hospital rules, theft, use/possession/dealing

of illicit substances, vandalism or property destruction). To gather published studies for potential inclusion, an extensive database search was performed in late-2020 using *ProQuest* and *EBSCOhost* (including Medline).¹ To identify studies potentially reporting SAPROF data, database searches were performed to find articles that included either of the two following terms anywhere in their text: *SAPROF* or *Structured Assessment of Protective Factors*. Articles located through these searches were obtained and their reference lists screened for other potential sources. A second, identical search was conducted in mid-2021 to identify articles published between the time of the first search and data analysis; the second search produced one newly published study that was ultimately included in the meta-analysis.

Use of multiple databases and consideration of any article that included either search term anywhere in the text yielded a large number of articles for potential inclusion ($k = 555$); this deliberately overinclusive search strategy was employed to minimize the possibility of inadvertently omitting relevant sources. After removing duplicate articles (i.e., articles that appeared in both databases and/or were captured by both keyword searches), 246 articles were screened for eligibility and the full text of 62 articles were assessed. Of these 62 articles, 43 articles were eliminated for various reasons (specific reasons are outlined in the lower portion of Figure 1). This procedure yielded a total of 19 publications including 20 separate studies (154 effect sizes, total $N = 3,182$) for inclusion in the meta-analysis. Figure 1 summarizes the search process using Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA; Moher et al., 2009).

¹ Only published studies were included in the meta-analysis; unpublished investigations (e.g., doctoral dissertations, MA theses, convention presentations) were excluded. Although some researchers have argued for inclusion of theses, dissertations, and convention presentations in meta-analyses to obtain a more representative sample of studies (Lipsey & Wilson, 2001), others have noted that unpublished articles are often of lower quality than articles published in peer-reviewed journals (Rosenthal, 1991; Rosenthal et al., 2001). Given the potential legal and clinical implications of this research, we opted for the more rigorous inclusion criterion

Calculation of Effect Sizes and Statistical Procedure

The vast majority of included studies evaluated the accuracy of SAPROF scores in predicting which study participants would versus would not abstain from future misconduct. Accordingly, the standardized difference score d was selected as our effect size statistic because it was the most straightforward method of representing the magnitude of difference in a given SAPROF score between groups based on this dichotomy (Rosenthal, 1991). Results of each statistical test used by researchers to analyze the difference in a given SAPROF score between study participants who did or did not abstain from future misconduct (e.g., F , t , comparison of means and standard deviations) were transformed into the standardized difference score d using procedures outlined by Lipsey and Wilson (2001). Several of the included studies reported results of receiver operating characteristic (ROC) curve analyses, in which case the formula for converting the resulting AUC value into the standardized difference score d presented by Ruscio (2008) was used. A single included study (Neil et al., 2020) reported relevant results as correlation coefficients, which were converted to d (see Lipsey & Wilson, 2001).

For multiple effect sizes across time-points within a single study using the same sample, a single effect size was selected for each conceptually distinct statistical analysis. Rather than including each outcome as a separate unit in our analyses, which introduces noteworthy issues (see Borenstein et al., 2009), we elected to select the effect size(s) from each study that represented group differences at the furthest time-point included in the study. For instance, effect sizes representing the TPS's ability to differentiate recidivists from non-recidivists at 1- and 2-year follow-ups were excluded in favor of including results obtained at a 3-year follow-up (de Vries Robbé et al., 2011). The rationale for this decision is twofold: (1) complications related to computing a combined effect size across time-points when the correlation between outcomes is

unknown² and (2) the ultimate objective of this meta-analysis being to evaluate the SAPROF's practical ability to predict sustained abstinence from misconduct (i.e., the goal of most risk evaluations is to estimate risk for future behavior rather than to estimate risk for a behavior occurring within a limited time period, thus predictive validity over the longest period possible is preferred). The studies to which this decision applied are noted in Table 1.

Similar to the issue above, meta-analyses that use multiple effect sizes (data points) from a single study violate the independence of observation assumptions of several inferential statistics (Glass et al., 1981; Lipsey & Wilson, 2001; Rosental, 1991). Thus, if a single study possessed multiple misconduct outcome variables, one of two procedures were carried out: (1) an effect size computed from analyses using an aggregate misconduct outcome variable (i.e., an aggregate of all other misconduct outcome variables included in the study) was selected for the main meta-analysis when included in a study (this was the case for Abbiati et al., 2018; Abidin et al., 2013; Coid et al., 2015; de Vries Robbé et al., 2011, 2013, 2016; de Vogel et al., 2019; Haines et al., 2017; Kashiwagi et al., 2018; Klein et al., 2015; Neil et al., 2020; Olver & Riemer, 2021; Turner et al., 2014; and Yoon et al., 2016). When no aggregate misconduct outcome variable was included in a study, (2) a weighted average effect size was computed composed of the effect sizes of the misconduct outcome variables within a given study (this was the case for

² Identification of a plausible range of correlations between outcomes within a study permits a robust strategy for combining effect sizes across time-points, but is rather impractical in the current study due to these correlations depending upon the stability of outcomes over each specified time period, the specific amount of time that elapsed between measurements, and other factors that would be difficult or impossible to extract for the available literature (Borenstein et al., 2009). The impact of variations in these ranges across studies on assigning relative weights to studies was also considered. Alternative strategies include treating outcomes as independent, which is blatantly untrue for our outcomes and would underestimate the variance, or computing an average outcome variance, which would likely overestimate the variance. Thus, using the effect size(s) from each study that represented group differences at the furthest time-point seemed to be the best option given these limitations and this study's objective (see second rationale).

Abbiati et al., 2016; Coupland & Olver, 2020; Oziel et al., 2020; Persson et al., 2017; and Zeng et al., 2015). The studies to which the latter applied are noted in Table 1.

Meta-analysis was conducted using the software JASP (see Viechtbauer, 2010). In addition to a combined effect size d and computation of 95% confidence intervals around these effect sizes, a combined Z was calculated for each effect size to extend the information obtained from d by taking into account sample size, which varied widely across studies. For all meta-analyses, a random-effects model was assumed, as the populations and thus the true means of each study were presumed to differ (Hedges & Olkin, 1985; Hedges & Vevea, 1998). An additional strength of the random-effects approach is increased confidence when generalizing inferences beyond the studies included in the meta-analysis (Field & Gillett, 2010). Of the currently available estimators, many often fail to detect high levels of heterogeneity in meta-analyses containing fewer than 10 effect sizes and most, if not all, have poor properties even with a high number of studies when the outcome event is relatively rare (e.g., criminal misconduct) or sample sizes are small (Langan et al., 2018). Accordingly, the current meta-analysis examined the results of two heterogeneity variance estimators known to perform well given our objectives, characteristics of the included studies, and the properties of study data. Specifically, restricted maximum likelihood (REML) and the Hunter-Schmidt method (Hunter & Schmidt, 2004) were used³. REML is a widely known and well-evidenced method for meta-analysis with dichotomous outcomes (Langan et al., 2018; Viechtbauer, 2005) and has been shown to be reasonably robust under normal and non-normal conditions (Kontopantelis & Reeves, 2012a, 2012b), and the Hunter-Schmidt method generally yields accurate estimates of population parameters across

³ Given the similarity between estimates produced by both methods (see Tables 2-5), only results from REML are reported in the text to improve readability. Additionally, follow-up analyses (e.g., comparison of mean effects) only used estimates obtained from REML for the necessary calculations.

myriad situations (see Field & Gillett, 2010). For both d and Z , a positive sign was assigned when individuals who abstained from future misconduct obtained greater SAPROF scores than individuals who engaged in future misconduct, and a negative sign was assigned when this relationship was reversed.

Assessment of Publication Bias

Given the potential implications of the current meta-analyses, three strategies were employed to address issues of publication bias. A fail-safe N (FSN; Rosenthal, 1979, 1991) was computed for each combined Z . The FSN is an estimate of the number of unpublished studies averaging an effect size of zero (in this case, no difference in SAPROF scores between study participants who did and did not abstain from future misconduct) that would have to exist to render nonsignificant the probability level associated with an obtained effect size. The FSN also serves as an added estimate of the robustness of any observed group differences in SAPROF scores. In addition to calculating a FSN for each combined Z , funnel plot analyses and Egger's regression tests of funnel plot asymmetry were used to assess for publication bias (Egger et al., 1997). Egger's tests provide a particularly rigorous estimate of the reliability of results by assessing the degree to which effect sizes may be overestimated due to unpublished data with an overall effect size of zero. Finally, as Givens, Smith, and Tweedie (1997) noted, whereas Rosenthal's FSN provides an indication of the number of studies reporting statistically nonsignificant results that would have to exist for a particular effect to be reduced to nonsignificance, this statistic does not illuminate bias that may be present in the data actually used in the meta-analysis. Thus, Duval and Tweedie's (2000a, 2000b) trim-and-fill procedure based on calculations obtained using a publication bias estimator calculator (Natoli, 2020) and methods embedded within the JASP software (see Viechtbauer, 2010), which permitted the

calculation of average weighted effect-size estimates corrected for publication bias, was used. Correcting for publication bias changed the magnitude (but not the direction) of few effect sizes (see Tables 2-5).

Moderator Variables

An additional variable was extracted from the published studies to examine whether the predictive validity of the SAPROF differed when used to estimate abstinence from violence ($k = 16$) compared to estimating abstinence from sexual misconduct ($k = 6$). After conducting separate meta-analyses following the procedures enumerated above, Z-tests using random-effects weights (see Borenstein et al., 2009) were conducted to statistically compare the mean effects between these two outcomes across each of the five SAPROF variables (e.g., difference between combined effects with regard to the predictive validity of the SAPROF's TPS when used to estimate violence risk versus when used to estimate risk for sexual misconduct), as well as between any misconduct and each of these two outcomes.

Results

The literature review yielded a total of 19 publications for inclusion, including 20 separate studies (154 effect sizes) spanning approximately 10 years (2011-2021). These 20 studies included data from a total of 3,182 study participants with a mean age of 37.72 (standard deviation [SD] = 10.69). A total of 16 separate studies included abstinence from violence as an outcome variable ($n = 1,361$, μ age = 38.62, SD age = 10.65) and six separate studies included an abstinence from sexual misconduct outcome variable ($n = 2,836$, μ age = 38.63, SD age = 11.10). Most studies included only male participants ($k = 11$), and samples from studies including both sexes were predominantly composed of adult males ($k = 9$; percentage of female participants across these studies = 35.98%). Only a single sample was composed of more than 50% females

(de Vogel et al., 2019; females = 100%), a second sample was composed of 48% females (Haines et al., 2017; community services sample), and a third sample was composed of 38% females (Haines et al., 2017; inpatient sample). The remaining studies included no more than 21% females in any one sample. The percentage of females included in each study is reported in Table 1.

As Tables 2 and 3 summarize, individuals who abstained from any form of misconduct following their risk evaluation obtained significantly higher SAPROF scores, with results indicating the strongest predictor being the FPJ ($d = 0.803$, standard error [SE] = 0.128, FSN = 24535). Of the three SAPROF domains, the Motivational scale ($d = 0.618$, $SE = 0.075$, FSN = 35012) emerged as the strongest predictor of whether or not an individual would abstain from any form of misconduct, whereas the External domain scale ($d = 0.172$, $SE = 0.066$, FSN = 4697) was found to be the poorest, although still significant, predictor of abstinence from future misconduct. Significant tests of residual heterogeneity, which test the null hypothesis that all effect sizes are equal, indicated unexplained variance that suggested the SAPROF's predictability differed across studies. One possible explanation for this variability is differences in the outcome variables used by the included studies. Thus, two subsequent meta-analyses were conducted to investigate the SAPROF's predictive validity with regard to abstinence from violence and abstinence from sexual misconduct, separately.

Trends in the SAPROF's predictive validity similar to the first meta-analysis emerged when abstinence from violence was examined individually ($k = 16$; see Tables 4 and 5), whereas meta-analysis produced diverging results pertaining to the SAPROF's ability to predict an individual's abstinence from engaging in future sexual misconduct. Although fewer studies specifically analyzed abstinence from sexual misconduct ($k = 6$; see Tables 4 and 5), the large

number of study participants included in these studies allow for the meta-analytic results to be interpreted with fair confidence (with the exception of FJP [$k = 2$], which should be interpreted with caution). Regarding sexual misconduct, the SAPROF Internal domain scale ($d = 0.310$, $SE = 0.137$, $FSN = 1612$) emerged as the strongest predictor, performing better than the SAPROF TPS ($d = 0.277$, $SE = 0.103$, $FSN = 2004$), while the External domain scale ($d = 0.181$, $SE = 0.069$, $FSN = 753$) was again found to be the poorest estimate of abstinence.

Comparison of mean effects across outcomes indicated several significant differences (see Table 6). Estimated effects with respect to abstinence from sexual misconduct were significantly smaller than the estimated effects obtained when SAPROF ratings were used to differentiate individuals who engaged in any form of misconduct from those who abstained. Comparisons of mean effects between the outcomes of abstinence from any misconduct and abstinence from violence only revealed a single significant difference. Specifically, significantly larger estimated effects were found when the FPJ ($Z_{Diff}^* = -38.000$, $p < .001$) was used to predict abstinence from violence. Finally, except for the SAPROF External domain scale ($Z_{Diff}^* = 1.478$, $p = .139$), all estimated effects were found to be significantly larger when SAPROF ratings were used to predict abstinence from violence than when used to predict individuals' abstinence from sexual misconduct. Results of mean effects comparisons across the five SAPROF ratings within each outcome produced multiple significant differences and are reported in Table 7.

Discussion

Meta-analysis offered evidence supporting the predictive validity of the SAPROF. As would be expected, results indicated that significantly higher SAPROF scores are obtained for individuals who abstain from misconduct compared to individuals who would go on to engage in future misconduct. Particularly large effect sizes emerged for the SAPROF's TPS ($d = .721$) and

the FPJ ($d = .803$), with the Motivational domain scale ($d = .618$) being the strongest predictor among the three SAPROF domains. Two subsequent meta-analyses were then conducted to investigate the SAPROF's predictive validity regarding abstinence from violence and sexual misconduct, separately. Meta-analytic results support the predictive validity of the SAPROF for both outcomes, but effect size comparisons indicated the instrument's superiority in estimating abstinence from violence. Interestingly, comparisons of effect sizes suggested the SAPROF is similarly effective in predicting abstinence from any (general) misconduct as it is in predicting abstinence from violence.

The FPJ emerged as the strongest predictor of abstinence across all three types of misconduct, although results pertaining to its validity in predicting abstinence from sexual misconduct should be considered with caution as they were based on only two studies. The SAPROF's TPS was also found to be a robust predictor of abstinence from any misconduct and of abstinence from violence, but to be a relatively weaker predictor of abstinence from sexual misconduct. Small to moderate effect sizes ($ds = .277 - .650$) emerged for the Internal and Motivational domain scales across the three outcomes, whereas the External domain scale generally produced significantly smaller effect sizes ($ds = .170 - .215$). Of the three domains, the Motivational domain was found to be a significantly stronger predictor of abstinence from any misconduct and violence while the Internal domain was found to be the strongest predictor of abstinence from sexual misconduct (although effect size differences did not reach a level of significance at $p < .05$).

Limitations, Future Research, and Implications

A primary limitation of the present investigation was the modest number of studies available for inclusion in the meta-analyses, most notably the lack of studies assessing the FPJ's

predictive validity for abstinence from sexual misconduct. That said, the 20 studies included in these meta-analyses involved more than 3,000 independent study participants and yielded a sizable number of usable effect sizes. Future research scrutinizing the SAPROF's psychometric properties is warranted, not only to increase the available data regarding this issue, but to include more diverse samples. Likewise, another key limitation of the current meta-analyses, and of the body of SAPROF research in general, is the relative lack of studies involving non-male participants. Currently, only a single study included a sample that was predominantly non-male (females; de Vogel et al., 2019). Although the SAPROF was originally intended for adult males, this is an alarming statistic. The number of incarcerated adult women has increased over 700% in the United States since 1980 (The Sentencing Project, 2020), and transexual, non-binary, and gender diverse adults are incarcerated at more than twice the rate of other adults (National Center for Transgender Equality, 2018). Therefore, future research must evaluate the psychometric properties of the SAPROF (i.e., reliability, validity, and clinical utility) within these populations.

Despite these limitations, the current findings have notable implications. Risk assessments have primarily focused on factors underlying risk for future misconduct, a biased strategy that often has negative consequences (de Vogel et al., 2011; Rogers, 2000). Elevated levels of risk can be counterbalanced by protective factors (Cicchetti & Rogosch, 1997; Fraser et al., 1999; Rutter, 1987), highlighting the necessity for risk assessments to examine both protective factors and risk factors. The current meta-analyses indicated the SAPROF is a valid tool for assessing protective factors in the context of general, violent, and sexual misconduct behaviors. Inclusion of the SAPROF in risk assessments would allow for a more balanced evaluation, more elaborated risk management strategies, and better risk communication (de Vogel et al., 2011; de Vries Robbé et al., 2016). Secondly, findings that the Motivational domain

scale possesses the strongest predictive validity among the SAPROF's three domains implies that one's motivations to abstain from future misconduct are particularly important. As such, evaluators may find it advantageous to place greater weight on an individual's motivations, relative to the weight placed on external factors, when generating an opinion regarding an individual's level of risk – especially if future research can determine a standardized strategy for assigning weights to these domains. Taken a step further, interventions aimed at strengthening these motivations may also prove beneficial, a postulation supported by research demonstrating that internal motivational factors are associated with greater long-term behavior change (DiClemente et al., 1999; Stanley et al., 2012).

Regarding sexual misconduct, the primary protective factor(s) associated with abstaining from sexual offenses appears to differ from those associated with abstaining from general and violent misconduct. Toates and colleagues (2017) proposed an incentive-motivation and hierarchical control framework for sexual violence through which it is suggested that both biological factors and the inability for inhibition to control excitation contribute to the enactment and recurrence of sexual violence. The present results revealing the SAPROF's Internal domain scale to be a particularly strong predictor support this proposition, advocating for the importance of assessing internal factors (e.g., empathy, coping, and self-control) when assessing risk for future perpetration of sexual misconduct. To this end, the SAPROF's superiority in predicting abstinence from violence over abstinence from sexual misconduct evidenced by the current meta-analyses adds to the empirical justification for developing a sexual offending version of the SAPROF. These meta-analytic results regarding the SAPROF's capacity to predict abstinence from future sexual misconduct may prove informative in the development of the forthcoming

SAPROF - Sexual Offending version, particularly findings suggesting the relative importance of internal factors over motivational and external factors.

Finally, considering a dedicated meta-analysis of research pertaining to the SAPROF's predictive validity had not been previously conducted, the implications of this study on the instrument's admissibility regarding both the *Daubert* (*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 1993) and *Frye* (*Frye v. United States*, 1923) standards are prominent. These meta-analyses provided support for the predictive validity of the SAPROF by empirically summarizing results from the current body of research, the findings of which offer empirical evidence for its validity and should facilitate the widespread acceptance of the SAPROF within the scientific community.

Conclusion

Comprehensive and efficacious risk assessment should involve the evaluation of both risk and protective factors. The current meta-analyses demonstrated the adequate predictive validity of the SAPROF in assessing protective factors associated with abstinence from engaging in any form of misconduct, as well as abstinence from future violence and sexual misconduct, independently. Combined with the SAPROF's standardized procedures for application (de Vogel et al., 2009), accepted reliability and known potential error rate (de Vogel et al., 2009), and growing acceptance within the field (Abbiati et al., 2020), these meta-analytic results, which describe the empirical summarization of the currently available peer-reviewed research, offer evidence supporting the instrument's admissibility with regard to both the *Daubert* (*Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 1993) and *Frye* (*Frye v. United States*, 1923) standards. Continued research is needed before these claims can be generalized to women and gender-diverse adults, but current results are promising. In conclusion, the SAPROF is opined to be a

valid measure of protective factors with respect to violence, sexual misconduct, and general future misconduct.

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Table 1
Studies evaluating the predictive validity of the SAPROF

Study	N	% Female	Violent or Sexual	Outcome Description	SAPROF Score				
					Int.	Mot.	Ext.	TPS	FPJ
Abbiati et al. (2016)*	94	0%		General Recidivism	0.249 (0.052)	0.701 (0.055)	-0.106 (0.052)	0.506 (0.053)	0.701 (0.055)
				Sexual/Violent Recidivism	0.544 (0.092)	0.999 (0.095)	-0.106 (0.089)	0.741 (0.092)	0.469 (0.090)
				Any	0.507 (0.081)	0.999 (0.088)	0.106 (0.079)	0.701 (0.084)	0.507 (0.081)
Abbiati et al. (2018)	52	0%	Violent	Misconduct	0.661 (0.169)	1.406 (0.184)	0.214 (0.166)	1.190 (0.179)	0.742 (0.170)
				Physically Violent					
				Misconduct					
Abidin et al. (2013)	98	6%	Violent	Harm to Others				1.448 (0.099)	
Coid et al. (2015)	387	11.10%	Violent	Violence				0.910 (0.023)	
Coupland & Olver (2020) †*	155	0%	Violent	General Community	0.999 (0.042)	1.045 (0.042)	0.432 (0.039)	0.999 (0.042)	
				Recidivism					
				Violent Community	0.742 (0.029)	0.867 (0.029)	0.358 (0.027)	0.783 (0.029)	
				Recidivism					
de Vries Robbé et al. (2011) †	105	0%		Any Institutional Recidivism	0.286 (0.028)	0.249 (0.028)	0.178 (0.028)	0.286 (0.028)	
				Predictive validity of non-violent recidivism after 3-year discharge				0.952 (0.066)	
				Recidivism for violent offense (Long term; M = 11 yrs.)				0.867 (0.025)	
de Vries Robbé et al. (2013) †	188	0%	Violent	Recidivism for violent offense (Long term; M = 11 yrs.)				0.867 (0.025)	
de Vries Robbé et al. (2016)	185	21%	Violent	Violent incidents during treatment (one assessment)	0.824 (0.050)	0.824 (0.050)	0.071 (0.048)	0.999 (0.051)	
de Vogel et al. (2019) †	71	100%	Violent	All recidivism after discharge (11.8 years)	0.096 (0.063)	0.347 (0.064)	-0.064 (0.063)	0.225 (0.063)	
				Violent recidivism after discharge (11.8 years)	-0.131 (0.094)	0.425 (0.095)	-0.315 (0.095)	0.129 (0.094)	

Haines et al. (2017) Community services	105	48%	Violent	Violence (physical aggression) in 6 months following assessment	-0.214 (0.060)	0.286 (0.060)	0.358 (0.117)	0.249 (0.060)	
Haines et al. (2017) General inpatient	43	38%	Violent	Violence (physical aggression) in 6 months following assessment	0.701 (0.121)	0.701 (0.121)	0.358 (0.117)	0.358 (0.117)	
Kashiwagi et al. (2018) [†]	95	12.6%	Violent	The predictive ability of the SAPROF for future violence (12 months)	1.184 (0.079)	1.091 (0.078)	0.710 (0.074)	1.273 (0.080)	1.266 (0.080)
Klein et al. (2015)	71	0%	Violent	Absence of general recidivism	0.661 (0.088)	0.469 (0.086)	0.000 (0.085)	0.583 (0.087)	0.358 (0.085)
				Absence of violent recidivism	0.661 (0.059)	0.359 (0.057)	0.106 (0.056)	0.545 (0.058)	0.507 (0.058)
				Absence of sexual recidivism	0.661 (0.119)	0.432 (0.118)	0.000 (0.116)	0.545 (0.118)	0.469 (0.118)
				Any type of violence	0.676 (0.011)	0.723 (0.011)	0.408 (0.012)	0.926 (0.009)	1.186 (0.007)
Neil et al. (2020)	75	0%	Sexual	Sexual Violence	0.324 (0.013)	0.262 (0.013)	0.303 (0.013)	0.408 (0.012)	0.516 (0.012)
				Verbal Violence	0.387 (0.013)	0.473 (0.012)	0.516 (0.012)	0.606 (0.011)	0.797 (0.010)
				Physical Violence	0.583 (0.011)	0.516 (0.012)	0.451 (0.012)	0.747 (0.010)	0.899 (0.009)
				Disruptive Behavior	0.583 (0.011)	0.052 (0.011)	0.516 (0.012)	0.822 (0.010)	1.218 (0.007)
				General Recidivism	0.395 (0.010)	0.358 (0.010)	0.249 (0.010)	0.432 (0.010)	
Olver & Riemer (2021) [†]	422	0%	Violent	Violent Recidivism	0.583 (0.011)	0.545 (0.011)	0.395 (0.011)	0.661 (0.011)	
				Sexual Recidivism	0.545 (0.017)	0.395 (0.017)	0.322 (0.017)	0.545 (0.017)	
Oziel et al. (2020)*	32	14%		Institutional Misconduct	1.735 (0.186)	1.295 (0.165)	0.178 (0.139)	1.593 (0.178)	1.406 (0.169)
	50			Disposition Breaches	0.661 (0.129)	0.507 (0.128)	0.432 (0.127)	0.867 (0.133)	0.432 (0.127)

Persson et al. (2017)*	193	13%	Violent	Actual Violence				0.999 (0.052)	0.783 (0.051)
				Threatened Violence				0.910 (0.037)	0.783 (0.036)
				Any recidivism				0.469 (0.024)	
								0.358 (0.033)	
Turner et al. (2014)	229	0%	Violent	Violent recidivism				0.071 (0.045)	
			Sexual	Sexual recidivism					
Yoon et al. (2016)	467	0%	Sexual	General recidivism	0.249 (0.010)	0.545 (0.010)	0.142 (0.010)	0.432 (0.010)	
				Violent (including sexual) recidivism	0.249 (0.013)	0.469 (0.013)	0.142 (0.013)	0.395 (0.013)	
				Sexual recidivism	0.142 (0.029)	0.178 (0.029)	0.071 (0.029)	0.106 (0.029)	
				Nonsexual violent recidivism	0.286 (0.016)	0.622 (0.016)	0.142 (0.016)	0.469 (0.016)	
				Nonsexual Desistence	0.286 (0.053)	0.469 (0.054)	0.071 (0.053)	0.432 (0.054)	
				Sexual Desistence	-0.178 (0.154)	0.036 (0.154)	0.071 (0.154)	-0.071 (0.154)	
Zeng et al (2015)*	97	0%	Sexual						

Note. Magnitude of difference on a given SAPROF scale between individuals who did versus did not abstain from future misconduct are reported as the standardized difference score d , with p values in parentheses underneath. In interpreting ds , a positive effect size indicates that those individuals who abstained from future misconduct obtained higher scores on the given SAPROF scale; a negative effect size indicates that those individuals who did not abstain from (i.e., engaged in) future misconduct obtained higher scores on the given SAPROF scale. SAPROF scales are as follows: Int. = Internal domain scale; Mot. = Motivational domain scale; Ext. = External domain scale; TPS = Total protective score; FPJ = Final protection judgment rating. Notable decisions regarding inclusion/exclusion include the following: An “any misconduct” variable was created for Abbiati et al. (2016) because the reported “sexual/violent recidivism” variable could not be separated and the reported “general recidivism” variable pertained to any non-violent offenses. Coupland and Olver’s (2020) “any institutional recidivism” variable was selected over the “serious institutional recidivism” variable because the former included both serious and minor misconduct; the “any institutional recidivism” and “general community recidivism” variables were combined to create an “any misconduct” variable. To remain consistent with the other included studies, only the “physical violence” (opposed to “verbal violence”; Neil et al., 2020) and “actual violence” (opposed to “threatened violence”; Persson et al., 2017) variables were included in the violence meta-analysis. Yoon et al. (2016) reported a “violent (including sexual) recidivism” variable and a “nonsexual violent recidivism” variable; only the latter was included in the violence meta-analysis because the objective of the follow-up meta-analyses were to differentiate violence and sexual misconduct.

*A weighted average effect size for “any misconduct” was computed composed of the effect sizes of the study’s available non-overlapping misconduct outcome variables (e.g., Coupland and Olver’s (2020) “violent community recidivism” variable was subsumed under the “general community recidivism” variable, so the effect size for “any misconduct” was computed using only the “general community recidivism” and “any institutional recidivism” variables).

†Effect sizes reported are those representing group differences at the furthest time-point included in the study due to the study reporting multiple effect sizes across time-points within the single study using the same sample. The specific time-points selected are as follows: Prerelease (Coupland & Olver, 2020); 3 years after discharge (de Vries Robbé et al., 2011); long-term follow-up ($\mu = 11.1$ years; de Vries Robbé et al., 2013); long-term follow-up ($\mu = 11.8$ years; de Vogel et al., 2019); 12 months (Kashiwagi et al., 2018); post-treatment (Olver & Riemer, 2021).

Table 2

Magnitude of difference in SAPROF scores between individuals who did versus did not abstain from any future misconduct: Estimates using REML

Score	Number of effect sizes	<i>n</i>	Combined effect size <i>d</i> (<i>SE</i>)	95% CI	Combined <i>Z</i>	<i>p</i>	Fail-safe <i>N</i>	Egger's Test <i>z</i>	Corrected for publication bias
TPS	20	3182	0.721 (.081)	0.563, 0.879	8.944	< .001	93156	0.748 (<i>p</i> = .454)	NA
FPJ	7	630	0.803 (.128)	0.551, 1.055	6.256	< .001	24535	-0.811 (<i>p</i> = .417)	NA
Internal	14	1982	0.524 (.108)	0.313, 0.735	4.857	< .001	23091	0.904 (<i>p</i> = .366)	NA
Motivational	14	1982	0.618 (.075)	0.472, 0.764	8.289	< .001	35012	0.308 (<i>p</i> = .758)	NA
External	14	1980	0.172 (.066)	0.044, 0.301	2.627	.009	4697	-1.064 (<i>p</i> = .288)	NA

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

Table 3

Magnitude of difference in SAPROF scores between individuals who did versus did not abstain from any future misconduct: Estimates using the Hunter-Schmidt method

Score	Number of effect sizes	<i>n</i>	Combined effect size <i>d</i> (<i>SE</i>)	95% CI	Combined <i>Z</i>	<i>p</i>	Fail-safe <i>N</i>	Egger's Test <i>z</i>	Corrected for publication bias
TPS	20	3182	0.720 (.072)	0.609, 0.830	12.747	< .001	93156	1.103 (<i>p</i> = .270)	NA
FPJ	7	630	0.808 (.073)	0.666, 0.950	11.132	< .001	24535	-2.056 (<i>p</i> = .040)	NA
Internal	14	1982	0.518 (.058)	0.405, 0.632	8.979	< .001	23091	1.662 (<i>p</i> = .097)	0.47 (0.35, 0.58)
Motivational	14	1982	0.617 (.047)	0.525, 0.708	13.190	< .001	35012	0.617 (<i>p</i> = .537)	NA
External	14	1980	0.180 (.036)	0.109, 0.251	4.977	< .001	4697	-1.630 (<i>p</i> = .103)	0.20 (0.13, 0.27)

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

Table 4

Magnitude of difference in SAPROF scores between individuals who did versus did not abstain from any future violence or sexual misconduct: Estimates using REML

Score	Number of effect sizes	<i>n</i>	Combined effect size <i>d</i> (SE)	95% CI	Combined <i>Z</i>	<i>p</i>	Fail-safe <i>N</i>	Egger's Test <i>z</i>	Corrected for publication bias
Violence									
TPS	16	2836	0.744 (.093)	0.562, 0.927	7.989	< .001	49993	0.796 (<i>p</i> = .426)	NA
FPJ	5	486	0.841 (.127)	0.593, 1.090	6.634	< .001	7278	-0.067 (<i>p</i> = .947)	0.98 (0.72, 1.23)
Internal	11	1741	0.533 (.124)	0.291, 0.776	4.312	< .001	14087	0.133 (<i>p</i> = .894)	0.43 (0.18, 0.68)
Motivational	11	1741	0.650 (.096)	0.462, 0.838	6.770	< .001	17594	1.281 (<i>p</i> = .200)	NA
External	11	1739	0.215 (.092)	0.035, 0.395	2.340	.019	4562	-1.342 (<i>p</i> = .180)	NA
Sexual Misconduct									
TPS	6	1361	0.277 (.103)	0.075, 0.479	2.682	.007	2004	-0.660 (<i>p</i> = .510)	NA
FPJ	2	146	0.516 (.012)	0.493, 0.539	43.658	< .001	831	NA	NA
Internal	5	1132	0.310 (.137)	0.042, 0.578	2.267	.023	1612	-0.602 (<i>p</i> = .547)	NA
Motivational	5	1132	0.277 (.057)	0.166, 0.388	4.885	< .001	1044	-0.467 (<i>p</i> = .641)	NA
External	5	1130	0.181 (.069)	0.046, 0.316	2.621	.009	753	-1.568 (<i>p</i> = .117)	NA

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

Table 5

Magnitude of difference in SAPROF scores between individuals who did versus did not abstain from any future violence or sexual misconduct: Estimates using the Hunter-Schmidt method

Score	Number of effect sizes	<i>n</i>	Combined effect size <i>d</i> (SE)	95% CI	Combined <i>Z</i>	<i>p</i>	Fail-safe <i>N</i>	Egger's Test <i>z</i>	Corrected for publication bias
Violence									
TPS	16	2836	0.735 (.044)	0.649, 0.821	16.809	< .001	49993	1.364 (<i>p</i> = .173)	NA
FPJ	5	486	0.838 (.043)	0.753, 0.923	19.364	< .001	7278	-0.034 (<i>p</i> = .973)	NA
Internal	11	1741	0.531 (.055)	0.423, 0.639	9.618	< .001	14087	0.156 (<i>p</i> = .876)	0.43 (0.31, 0.54)
Motivational	11	1741	0.626 (.038)	0.551, 0.700	16.425	< .001	17594	1.670 (<i>p</i> = .095)	NA
External	11	1739	0.235 (.045)	0.146, 0.324	5.166	< .001	4562	-2.686 (<i>p</i> = .007)	NA
Sexual Misconduct									
TPS	6	1361	0.285 (.064)	0.160, 0.411	4.448	< .001	2004	-1.106 (<i>p</i> = .269)	NA
FPJ	2	146	0.516 (.012)	0.493, 0.539	43.658	< .001	831	NA	NA
Internal	5	1132	0.328 (.068)	0.196, 0.460	4.858	< .001	1612	-0.950 (<i>p</i> = .342)	NA
Motivational	5	1132	0.280 (.040)	0.201, 0.360	6.922	< .001	1044	-0.540 (<i>p</i> = .589)	NA
External	5	1130	0.205 (.043)	0.121, 0.288	4.790	< .001	753	-2.309 (<i>p</i> = .021)	0.24 (0.16, 0.32)

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

Table 6
Comparison of combined effect sizes across outcomes

Score	Violent versus Sexual		Any versus Violent		Any versus Sexual	
	Z_{Diff}^*	2-tailed p -value for Z	Z_{Diff}^*	2-tailed p -value for Z	Z_{Diff}^*	2-tailed p -value for Z
TPS	-46.700	< .001	1.917	.055	-20.182	< .001
FPJ	2.826	.005	-38.000	< .001	2.474	.013
Internal	-17.154	< .001	0.563	.574	-7.379	< .001
Motivational	9.564	< .001	1.524	.128	18.944	< .001
External	1.478	.139	1.654	.098	3.000	.003

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

Table 7
Comparison of combined effect sizes across scores within outcomes

Score	Outcome	FPJ		Internal		Motivational		External	
		Z_{Diff}^*	(p)	Z_{Diff}^*	(p)	Z_{Diff}^*	(p)	Z_{Diff}^*	(p)
TPS	Any	1.745	(.081)	-7.296	(< .001)	17.167	(< .001)	36.600	(< .001)
	Violence	2.853	(.004)	-6.806	(< .001)	-31.333	(< .001)	529.000	(< .001)
	Sexual	-2.626	(.009)	0.971	(.332)	0.000	(1.00)	2.824	(.005)
FPJ	Any			13.950	(< .001)	3.491	(< .001)	10.177	(< .001)
	Violence			102.667	(< .001)	6.161	(< .001)	17.886	(< .001)
	Sexual			-1.648	(.099)	-5.311	(< .001)	-5.877	(< .001)
Internal	Any					-2.848	(.004)	8.381	(< .001)
	Violence					-4.179	(< .001)	9.938	(< .001)
	Sexual					0.413	(.680)	1.897	(.059)
Motivational	Any							49.556	(< .001)
	Violence							9.938	(< .001)
	Sexual							-8.000	(< .001)

Note. TPS = Total protective score; FPJ = Final protection judgment rating.

PRISMA Flow Diagram

Figure 1. Summary of article screening and selection procedure.