The Structured Assessment of Protective Factors for Violence Risk – Youth Version (SAPROF-YV): The Association Between Protective Factors and Aggression in Adolescents

by

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Abstract

The Structured Assessment of Protective Factors for Violence Risk – Youth Version (SAPROF-YV; de Vries Robbé et al., 2015) is a new measure of protective factors that is used with a risk-focused tool, such as the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), to provide a more balanced assessment of risk. The present study investigated the relationship between the SAPROF-YV and aggression in a sample of 69 adolescents. Using a retrospective study design, files were reviewed at an inpatient treatment facility and a probation office. Results indicated that the SAPROF-YV demonstrated good convergent and discriminant validity with the SAVRY. The SAPROF-YV was predictive of the absence of verbal and physical aggression; however, it did not add incrementally to SAVRY Risk factors. Finally, some evidence suggested the SAPROF-YV was more predictive for higher risk adolescents than lower risk adolescents. Implications for research and clinical applications are discussed.

Keywords: protective factors, aggression, adolescents, risk assessment

Dedication

To my parents, who have imparted a myriad of protective factors in my life. Especially, I dedicate this thesis in loving memory of my dad; thank you for teaching me to be curious, to value education, and to follow my dreams fiercely.

Acknowledgements

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List of Acronyms

AUC	Area Under the Curve
ICC	Intraclass Correlation Coefficient
ROC	Receiver Operating Characteristic
SAPROF	Structured Assessment of Protective Factors for Violence Risk
SAPROF-YV	Structured Assessment of Protective Factors for Violence Risk – Youth Version
SAVRY	Structured Assessment of Violence in Youth
SOS	Short-Term Assessment of Risk and Treatability Outcome Scale
SPJ	Structured Professional Judgement

Introduction

Adolescence is a period of rapid development and change (Kunnen, 2012). During this period it is common for adolescents to explore their identity and engage in a variety of new behaviours, with some individuals engaging in risky behavior such as offending. Although rates of adolescent involvement in both violent and non-violent offending have been decreasing in Canadian adolescents (Statistics Canada, 2013), offending behavior continues to be a concern for this population. In addition, despite many adolescents discontinuing offending after adolescence, some adolescents engage in persistent delinquent behaviour into adulthood (Moffitt, 2006; Monahan, Steinberg, Cauffman, & Mulvey, 2009), putting them at risk for a variety of adverse outcomes (Kelley, Schochet, & Landry, 2004).

In order to manage adolescent offenders, it is important to identify factors that contribute to their offending risk. Several adolescent risk assessment measures have been developed (for a review, see Viljoen, Gray, & Barone, 2016, and Vincent, Terry, & Maney, 2009), and are widely used in Canada (Hannah-Moffat, Maurutto, & Turnbull, 2009) and in many American states (Wachter, 2015). These tools often include risk factors such as peer delinquency and poor parental monitoring (Borum, Bartel, & Forth, 2006). However, several scholars have highlighted the overemphasis of risk factors and the lack of attention placed on protective factors (e.g., Hart, 2008; Rogers, 2000).

Protective factors are described as factors that decrease the likelihood of future violence (de Vogel, de Ruiter, Bouman, & de Vries Robbé, 2009; de Vries Robbé, de Vogel, Wever, Douglas, & Nijman, 2016; Dubow, Huesmann, Boxer, & Smith, 2016; see de Vries Robbé, 2014 for a review), and include individual, social, and environmental factors. For instance, support from parents, positive peer relationships, and interest in schoolwork are considered protective factors (de Vries Robbé, Geers, Stapel, Hilterman, & de Vogel, 2015). In addition, factors internal to the adolescent may be considered

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assets, and external or environmental factors may be considered resources (Fergus & Zimmerman, 2005). Some debate has focused on whether protective factors are merely the absence of a risk factor. A lack of a risk factor may be considered a negative protective factor; however, protective factors are typically rated based on their presence (de Ruiters & Nicholls, 2011; de Vries Robbé et al., 2016). Other researchers have considered whether protective factors exert main effects on an outcome or have a moderated buffering effect, where protective factors reduce an outcome for adolescents considered high risk (Lösel & Farrington, 2012), and whether protective factors exert cumulative effects (Andershed, Gibson, & Andershed, 2016).

Debate about the conceptualization of protective factors may relate to the dearth of literature on protective factors, relative to that of risk factors (Jolliffe, Farrington, Loeber, & Pardini, 2016). Indeed, a large body of research has focused on establishing common risk factors for violence, and many difference risk assessment tools have been developed to assess risk of violence and reoffending (e.g., general, sexual), and have subsequently been validated in a number of studies. Recently, researchers have highlighted the importance of the inclusion of protective factors in risk assessment to provide a balanced assessment of violence risk (de Vries Robbé, 2014; de Vries Robbé et al., 2015). The inclusion of protective factors within risk assessment may provide a more accurate prediction of violence risk, increase the focus on violence prevention (de Vries Robbé & de Vogel, 2012), and promote a positive perspective for both treatment providers and offenders (e.g., Seligman, 2002).

Existing Research on Measures of Protective Factors

Although the majority of risk assessment tools, particularly those for adult offenders, fail to incorporate protective factors, a few assessment tools for adolescents include protective factors (e.g., Structured Assessment of Violence Risk in Youth, Borum et al., 2006; Short-Term Assessment of Risk and Treatability: Adolescent Version, Viljoen et al., 2014; Youth Level of Service/Case Management Inventory, Second Edition, Hoge & Andrews, 2011). One of the most common of these tools is the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006). The SAVRY is a structured professional judgment (SPJ) tool that assesses the risk for violent behaviour in

adolescents. The SAVRY comprises 24 risk items that include Historical, Individual/Clinical, and Social/Contextual domains, and 6 Protective factors that are rated as present or absent. Previous research has demonstrated that the SAVRY has high interrater reliability (e.g., intraclass correlation coefficient [ICC] = .81, McEachran, 2001) and good predictive validity (Borum, Lodewijks, Bartel, & Forth, 2010; Hilterman, Nicholls, & van Nieuwenhuizen, 2014; Lodewijks, Doreleijers, de Ruiter, & Borum, 2008). In a meta-analysis on adolescent risk assessment tools, the SAVRY demonstrated mean weighted correlations of .32, .30, and .38 for general, violent, and non-violent offending, respectively (Olver, Stockdale, & Wormith, 2009).

The predictive validity of the SAVRY protective factors subscale has yielded some positive findings (e.g., Guy, 2008; Lodewijks et al., 2008; Lodewijks, de Ruiter, & Doreleijers, 2010). In a study of an Australian sample of remanded or sentenced adolescents (N = 213), results revealed large effect sizes for SAVRY protective factors (Shepherd, Luebbers, Ogloff, Fullam, & Dolan, 2014). Specifically, SAVRY Protective factors were predictive of general recidivism for the total sample, and for both males and females individually (AUC values of .76, .75, and .85, respectively). Similar results have been demonstrated within Dutch samples; Lodewijks and colleagues (2010) found that SAVRY Protective factors were a significant predictor of violent behaviour among adolescent offenders who were assessed pretrial, while in an institutional setting, or before release. Meta-analytic findings on SPJ violence risk assessment measures (Guy, 2008) demonstrated good predictive validity of SAVRY Protective factors, with a moderate weighted effect size for any antisocial behaviour (AUC = .68, k = 12) and a large weighted effect size for physical and sexual aggression (AUC = .73, k = 7).

Despite these positive results, other research findings suggest that the SAVRY Protective factors do not always significantly predict future violence in adolescents (e.g., Hilterman et al., 2014; Penney, Lee, & Moretti, 2010; Vincent et al., 2012). Hilterman et al. (2014) examined the predictive validity of the SAVRY Protective factors in a sample of Spanish adolescents. They found inadequate predictive validity for general recidivism (AUC = .51), and a small-moderate effect size for violent recidivism (AUC = .63). Similarly, Penney and colleagues (2010) examined SAVRY protective factors in relation to the frequency of recidivism in a Canadian sample. The results indicated that SAVRY

Protective factors were related to decreased self-reports of non-violent recidivism, but were unrelated to self-reports of violent recidivism. Moreover, SAVRY Protective factors were not significantly related to violent and non-violent recidivism as measured by official records. These inconsistent results suggest that the SAVRY Protective factors may have limited predictive validity in some contexts. As such, it may be necessary to include a more comprehensive measure of protective factors when assessing risk for violent behaviour in adolescents.

Beyond the need for further research on protective factors, there is a need for more sophisticated analyses (e.g., Lösel & Farrington, 2012). First, there is a dearth of literature that examines whether protective factors add incrementally to risk factors in the prediction of recidivism. However, a few studies have found mixed findings, such as incremental validity for non-violent recidivism only (e.g., Dolan & Rennie, 2008). Research by Schmidt, Campbell, and Houlding (2011) found that SAVRY Protective scores did not add incrementally to SAVRY Risk total scores in the prediction of violent and non-violent recidivism. These findings are consistent with those of Hilterman et al. (2014) and Penney et al. (2010). This may be due to the limited number of items on the SAVRY that assess protective factors. Further, the dichotomous response format may facilitate a loss of information, as there is no option for a protective factor to fall somewhere between present and absent. These researchers also found that SAVRY Protective factors were not as predictive of (the absence of) non-violent recidivism in females (AUC = .58) when compared to males (AUC = .72), suggesting that SAVRY Protective factors may have more modest predictive validity with female adolescent populations (Schmidt et al., 2011). In contrast, findings from Lodewijks et al. (2010) suggest that SAVRY Protective factors add incrementally above and beyond the SAVRY dynamic factors (i.e., Individual/Clinical, Social/Contextual factors) in the prediction of violent behaviour, and capture unique variance in predicting violent recidivism.

Second, little research has examined whether risk level moderates the relationship between protective factors and recidivism. Researchers sometimes hypothesize that protective factors may have a stronger impact on high-risk offenders than low-risk offenders because low-risk offenders are less likely to reoffend, regardless of the presence or absence of protective factors. Using samples of violent adolescent offenders, Lodewijks

et al. (2010) found that SAVRY Protective factors functioned as a buffer against risk factors for both high and low risk adolescents. These mitigating effects occurred in all three of their high-risk samples, but only in the pretrial and post-release samples for the low-risk groups. That is, protective factors did not buffer risk factors for low-risk adolescents in the prediction of institutional violence. The authors suggest that this may be due to a lower base rate of reoffending within this low-risk sample. Evidently, there is a need for more research to investigate the relation between risk level and protective factors.

Structured Assessment of Protective Factors for Violence Risk – Youth Version

To address gaps in the literature and in the assessment of protective factors in violence risk assessment, de Vries Robbé and colleagues (2015) developed a new measure of protective factors: The Structured Assessment of Protective Factors for Violence Risk – Youth Version (SAPROF-YV; de Vries Robbé et al., 2015). The purpose of the SAPROF-YV is to predict and manage violent behaviour for the six months subsequent to the assessment. This measure is designed for concurrent use with a risk assessment measure, such as the SAVRY, to provide a comprehensive assessment of violence risk. The SAPROF-YV follows an SPJ model and comprises 16 protective factors with Resilience, Motivational, Relational, and External domains. The Resilience domain consists of individual internal factors that are related to resilience and social skills (i.e., Social Competence, Coping, Self-control, Perseverance). The Motivational domain is focused on the adolescent's motivation for active participation in his or her treatment (i.e., Future Orientation, Motivation for Treatment, Attitude Towards Agreements and Conditions, Medication, School/Work, Leisure Activities). Items on the Relational domain concern interpersonal relationships that are prosocial, warm, and supportive (i.e., Parents/Guardians, Peers, Other Supportive Relationships). Finally, the External domain focuses on support from external sources, such as the adolescent's environment or circumstances (i.e., Pedagogical Climate, Professional Care, Court Order). Each factor is rated on a three-point scale, based on information from files (e.g., psychiatric and psychological reports, treatment reports) and interviews if possible during the six-month period prior to assessment. All SAPROF-YV factors are putatively dynamic, with the goal

of bridging risk assessment with risk management by targeting protective factors during treatment. It is suggested that treatment focuses on increasing internal factors and decreasing external factors to maximize the adolescent's success post-treatment.

The authors created the SAPROF-YV due to the positive reception of an adult measure of protective factors: the Structured Assessment of Protective Factors for Violence Risk (SAPROF; de Vogel et al., 2009), and the request for the development of a similar too for adolescents. Although the SAPROF has been validated with adults (e.g., de Vries Robbé, de Vogel, & Douglas, 2013; de Vries Robbé, de Vogel, Wever, Douglas, & Nijman, 2016), it is not intended to assess adolescents. A recent study examining the adult version of the SAPROF in a sample of adolescent sexual offenders in Singapore (Zeng, Chu, & Lee, 2015) found that SAPROF scores did not show significant predictive validity for sexual or nonsexual desistence (AUCs = .48 and .62, respectively). Moreover, the SAPROF did not exhibit incremental validity above a measure of sexual risk, the Estimate of Risk of Adolescent Sexual Offense Recidivism (ERASOR; Worling & Curwen, 2000b) when controlling for time at risk (e.g., the time between the assessment and reoffending). The authors postulate that these findings may be due to low inter-rater reliability (ICC = .65) and the use of an adult measure of the SAPROF with adolescent (sexual) offenders. Similarly, Klein and colleagues (2015) found that SAPROF scores did not predict sexual recidivism, and neither SAPROF nor SAVRY Protective scores added incrementally to SAVRY Risk factors (Klein, Rettenberger, Yoon, Köhler, & Briken, 2015). These two studies focused on a sample of adolescent sexual offenders rather than samples of general offenders, and the results suggest that the SAPROF may not be an appropriate tool for adolescent sexual offenders. Moreover, these findings emphasize the need for an adolescent-specific assessment of protective factors.

The SAPROF-YV was developed based on information from a comprehensive literature review on protective factors for violence in adolescents and was guided by the researchers' previous experience with developing the SAPROF. The pilot version of the SAPROF-YV included 18 items with Personal, Life Domains, Social Relations, and External Support domains (de Vries Robbé, Geers, de Vogel, Hilterman, & Stapel, 2013). The measure was then revised as a result of research findings on the pilot version, and from corroborating feedback from clinical and research experts in the field. In addition, the

domains were renamed to more accurately represent the item content (i.e., Resilience, Motivational, Relational, and External). Four items were combined due to their overlap in content: Intimate Relationships was merged with Other Supportive Relationships and Intellectual Capacities was merged with School/Work. Further, some items were renamed (e.g., Social Skills was changed to Social Competence), and several items were moved between domains (e.g., Motivation for Treatment and Attitude Towards Agreements and Conditions were moved from External Support to Motivational). There are several items that are included on both the SAPROF and the SAPROF-YV, such as Coping, Self-control, Leisure Activities, Motivation for Treatment, Medication, and Professional Care; however, the SAPROF-YV contains adolescent-specific factors, including School/Work, Parents/Guardians, Peers, Pedagogical Climate (i.e., supervision), and Future Orientation. An example of an adult-specific item on the SAPROF that is not included on the SAPROF-YV is Financial Management.

Although the reliability and validity of the SAPROF-YV is undergoing investigation, studies have been conducted on the SAPROF-YV pilot version during the development of the tool (de Vries Robbé et al., 2015). Using a retrospective design, two pilot studies were conducted with samples of adolescents at a forensic psychiatric clinic. The first study (*N* = 76) had a predominately male sample (68%), and the second study's sample consisted of males only (*N* = 37). The pilot studies revealed high internal consistency (ICCs of .84 to .91), convergent validity with the SAVRY Protective factors (*r* = .63 and .89, respectively for the two studies), and discriminant validity with SAVRY Risk factors (*r* = -.59 and -.60, respectively). In addition, preliminary research with an adolescent forensic outpatient sample found large effect sizes for the prediction of violence over a six month follow up de Vries Robbé et al., in preparation). Validation studies are also currently underway in The Netherlands, the United Kingdom, and Canada.

The Present Study

The present study was one of the first studies to assess the predictive validity of the SAPROF-YV. Specifically, this study used a file-based, retrospective study design to examine the relationship between SAPROF-YV protective factors and aggression in two diverse samples, including adolescents from an inpatient treatment sample and a

community offender sample. First, convergent and discriminant validity were examined. Specifically, positive associations between the SAPROF-YV and SAVRY Protective factors (e.g., $r \geq .50$; Cohen, 1988) would suggest convergent validity between the two measures, whereas negative associations between the SAPROF-YV and SAVRY *Risk* factors would indicate discriminant validity. Second, the predictive validity of the SAPROF-YV was examined for the prediction of the *absence* of aggression. Adolescents with greater protective factors were expected to engage in less aggressive behaviour than those with fewer protective factors. Third, this study examined the incremental predictive validity of the SAPROF-YV above SAVRY Risk factors and above SAVRY Protective factors. Finally, this study tested for a moderation effect of risk level on the relationship between protective factors and aggression (Lösel & Farrington, 2012). The existing literature suggests that SAVRY Protective factors may be moderated by risk (Lodewijks et al., 2010); thus, this relationship was examined with SAPROF-YV protective factors to determine if its predictive validity is moderated by SAVRY risk level.

Methods

This study adhered to the Risk Assessment Guidelines for the Evaluation of Efficacy (RAGEE) statement checklist purposed by Singh et al. (2015) in order to produce clear methodology and findings.

Sample

Data was collected at two sites: Maples Adolescent Treatment Centre ($n = 39$) and a youth probation office ($n = 30$). Both sites were located in the Greater Vancouver Area in British Columbia, Canada. Maples is an inpatient and an outpatient facility for adolescents aged 12 to 18 years with significant psychiatric, emotional, and/or behavioural issues. For the purposes of this study, only adolescents in the inpatient program were included from the Crossroads program (externalizing disorders and forensic cases) and the Dala program (internalizing disorders). A random sample of youth probation files was selected as part of a larger, ongoing study.

Sample characteristics. The sample consisted of 69 male and female adolescents aged 13 to 18 years ($M = 15.74$, S$D = 1.47$). Approximately half of the sample were male (59.42%; $n = 41$). With respect to ethnicity, 55.07% ($n = 38$) of the sample were Caucasian, 24.64% ($n = 17$) were Aboriginal, 8.70% ($n = 6$) were Asian, 5.80% ($n = 4$) were Hispanic, 5.80% ($n = 4$) were East Indian/Middle Eastern. Of the total sample, 56.52% ($n = 39$) were from the Maples sample[1], and 43.48% ($n = 30$) were from the Probation sample. Demographic information for the total sample, sample 1, and sample 2 are presented separately in Table 1.

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[1] At Maples. 26.09% ($n = 18$) of adolescents were from the Crossroads program, and 30.43% ($n = 21$) were from the Dala program. Adolescents from the Crossroads and Dala programs did not differ significantly with respect to gender, $\chi^2 (1) = .08$, $p = .11$, age, $t (37) = .37$, $p = .72$, length of treatment, $t (37) = -1.01$, $p = .32$, or length of follow up, $t (37) = -.03$, $p = .98$. Therefore, adolescents from Maples were considered as part of one sample (i.e., sample 1, Maples).

Adolescents from the two samples (i.e., Maples and Probation) did not differ significantly with respect to gender, χ^2 (1) = 2.46, p = .14, or age, t (67) = .17, p = .86. In addition, the two samples did not have significantly different SAPROF-YV total scores, t (67) = .09, p = .93, SAVRY Risk total scores, t (67) = -.55, p = .58, or SAVRY Protective scores, t (67) = -1.06, p = .30. The two samples also did not differ significantly on the SAPROF-YV Protection SPJ rating, χ^2 (4) = 8.27, p = .08, SAPROF-YV Risk SPJ rating, χ^2 (4) = 1.04, p = .90, or SAVRY Risk SPJ rating, χ^2 (2) = 1.10, p = .58. However, the two groups had significantly different lengths of follow up, t (67) = -16.09, p < .01. This was attributed to the use of a variable follow up time for sample 1 (i.e., Maples) and a fixed follow up period of six months for sample 2 (i.e., Probation). Variable follow up lengths for sample 1 were used because the follow up period was dependent on the adolescent's duration of stay at Maples, which ranged from 1.45 to 27.56 months (M = 4.35, SD = 4.92). Approximately half of the total sample had prior charges (49.28%; n = 34); adolescents in the Probation sample were significantly more likely than those in the Maples sample to have prior offenses, χ^2 (1) = 44.22, p < .01. Attrition did not occur as this was a retrospective file review study.

Table 1. Demographic Information for the Two Samples.

	Total Sample (n = 69)	Treatment Sample (n = 39)	Probation Sample (n = 30)		
	M (SD) / n (%)	M (SD) / n (%)	M (SD) / n (%)	t / χ2 (df)	p
Age	15.74 (1.47)	15.50 (1.15)	16.06 (1.78)	t (67) = .17	.86
Gender (Male)	41 (59.42)	20 (51.28)	21 (70.00)	χ^2 (1) = 2.46	.14
Ethnicity				χ^2 (4) = 4.06	.54
Caucasian	38 (55.07)	20 (51.28)	18 (60.00)	--	--
Aboriginal	17 (24.64)	9 (23.08)	8 (26.67)	--	--
Asian	6 (8.70)	5 (12.82)	1 (3.33)	--	--
Hispanic	4 (5.80)	3 (7.69)	1 (3.33)	--	--
East Indian	4 (5.80)	2 (5.13)	2 (6.67)	--	--
Prior offenses (Any)	34 (49.28)	8 (20.51)	28 (93.33)	χ^2 (1) = 44.22	< .01
Prior violent	25 (36.23)	7 (17.95)	19 (63.33)	t (1) = 19.22	< .01
Prior property	15 (21.74)	6 (15.38)	11 (36.67)	t (1) = 6.95	.01
Prior sexual	1 (1.45)	0.00 (0)	1 (3.33)	t (1) = 1.32	.25
Prior drug	0.00 (0)	0.00 (0)	2 (6.67)	t (1) = 3.34	.18

Note. Sample 1 = Maples; Sample 2 = Probation

Measures

The Structured Assessment of Protective Factors for Violence Risk – Youth Version (SAPROF-YV; de Vries Robbé et al., 2015). As described earlier, the SAPROF-YV is a 16-item SPJ measure of protective factors in adolescents with four subscales: Resilience, Motivational, Relational, and External. Each item is rated on the following scale: 0 (*hardly present*), 1 (*present to some extent*), or 2 (*clearly present*). In addition, raters may include positive and negative signs to indicate that a rating is slightly higher or lower, respectively. For instance, a rating of 1- may be given if the adolescent falls between a rating of 0 and 1, while a rating of 1+ may be given if the adolescent falls between a 1 and a 2 rating. Each item is rated based upon information during the past six months and the items are rated to predict violent behaviour for the subsequent six months.

After coding the SAPROF-YV and the SAVRY concurrently, the rater assigns a final Protection SPJ rating from the SAPROF-YV and a final Risk SPJ rating that considers both the SAPROF-YV and the SAVRY. Both the Protection and Risk judgment use the following ratings: low, low-moderate, moderate, moderate-high, and high. Total scores can be created by summing the scores on all of the items or by domain. The SAPROF-YV coding also includes the identification of up to three Key factors that provide the most protection and up to three Goal factors that should be addressed during treatment planning. In addition, raters engage in scenario planning to consider the contexts in which violence is likely to occur. Finally, a risk management plan is created to prevent future violence. For the purposes of the current study, only item coding, the final Protection rating, and the final Risk rating were included.

As this is a new measure, there is a dearth of literature on the reliability and validity of the SAPROF-YV. However, preliminary research using the SAPROF-YV pilot version revealed high internal consistency (ICCs of .84 to .91, respectively). The pilot version of the SAPROF-YV also demonstrated convergent validity with the SAVRY Protective factors (r = .63, .89) and discriminant validity with SAVRY Risk factors (r = -.59, -.60). In the present study, the SAPROF-YV total score demonstrated good internal consistency (α = .80). Preliminary research has also found that the SAPROF-YV predicted violent recidivism after a short follow up period (de Vries Robbé et al., in preparation).

Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006). The SAVRY is a risk assessment tool for adolescents aged 12 to 18 years that is composed of Historical, Social/Contextual, and Individual/Clinical factors. It comprises 24 risk items that are rated as (0) low, (1) moderate, or (2) high. Total scores are not use in clinical assessments, however total scores typically are used within research contexts. The total risk score is calculated by summing the risk factors, and high scores are indicative of increased risk factors.

In addition to the risk factors, the SAVRY includes six Protective factors: Prosocial Involvement, Strong Social Support, Strong Attachments and Bonds, Positive Attitude Towards Intervention and Authority, Strong Commitment to School, and Resilient Personality Traits. These items are rated dichotomously as present or absent. The SAVRY

Protective factors are scored by summing the six items. Finally, the rater assigns a SPJ rating for violence risk level (i.e., low, moderate, or high).

The SAVRY has demonstrated sound reliability and validity. For instance, the SPJ risk rating has attained good interrater reliability when rated by youth probation officers (ICC = .71), and the total risk (summed) score has attained excellent interrater reliability (ICC = .86; Vincent, Guy, Fusco, & Gershenson, 2012). Internal consistency has been high in number of studies as measured by Cronbach's alpha (α = .82 - .90; Borum et al., 2010). In addition, meta-analytic reviews have found large effect sizes for the SAVRY in the prediction of violence (Singh, Grann, & Fazel, 2011). In the present study, good internal consistency was found for the SAVRY Risk total score and the Individual/Clinical domain (αs = .84 and .82, respectively). Internal consistency was acceptable for the SAVRY Historical domain (α = .72), but was poor for the Social/Contextual domain (α = .19). The reliability for the Protective Total score approached the acceptable range (α = .68).

Outcome. The Short Term Assessment of Risk and Treatability Outcome Scale (SOS; Nicholls et al., 2007) was used to code aggression as the outcome variables. The SOS was derived from the Overt Aggression Scale (OAS; Yudofsky, Silver, Jackson, Endicott, & Williams, 1986). Outcome coding included the frequency of the following behaviours: verbal aggression (e.g., threats), physical aggression against others (e.g., pushing, kicking), and sexual aggression (e.g., sexually inappropriate behaviour or gestures). The SOS includes four levels of severity for each type of aggression. For instance, under physical aggression, a level one severity includes the following criteria: "makes threatening gestures, swings at people, grabs at clothing, throws objects dangerously" (Nicholls et al., 2007). A level four severity of physical aggression is described as "attacks others, uses weapons, resulting in severe physical injury (e.g., fracture, loss of teeth or consciousness, lacerations, internal injury)." The SOS has shown adequate interrater reliability for inpatient populations (ICC = .70; Braithwaite, Yanick, Crocker, & Reyes, 2010).

Procedure

Ethics approval was obtained through Simon Fraser University's Office of Research Ethics and the British Columbia Ministry of Children and Family Development (MCFD). This study used closed clinical files from previous residents/offenders; thus, no interactions took place between the researchers and the adolescents.

One trained graduate student completed the file coding. The graduate student rater (i.e., author of this thesis) attended a day-long SAVRY training workshop that was delivered by a graduate student who had received formal training on the SAVRY from a SAVRY author. As no trainings on the SAPROF-YV were available during the time frame of the study, the author was unable to attend a training workshop by the SAPROF-YV authors. Instead, the author obtained training through: (a) carefully reading the manual; (b) developing a training workshop on the SAPROF-YV, and delivering this training workshop to five undergraduate students; and (c) completing two independent practice cases for each measure, which were compared to gold standard ratings to ensure that adequate interrater reliability (i.e., within five points on the total scores) was achieved before data collection commenced.

Sample 1. At Maples, the files (n = 39) were selected based on the following inclusion criteria: (a) the file was from an inpatient program, (b) the adolescent's length of stay at Maples was 60 days or greater, (c) the file had a social and family history report, and (d) the file contained a psychological report. Inpatient files and the treatment duration criteria were used to ensure that the adolescents were at Maples during the follow-up period to allow for outcome coding (i.e., not discharged). The social and family history reports typically described a review of collateral information and interviews with caregivers. The psychological reports included comprehensive assessments typical for adolescent populations. These reports contained sufficient information for the assessment coding. Information was used from 2010 to the start date of coding (July 1, 2015). Therefore, information prior and subsequent to these dates was excluded. This was done due to these files being more comprehensive; the year 2010 was chosen as a cutoff because files prior to this were often lacking important documents such as psychological reports. The Dala program at Maples admits many adolescents each year; thus, files were

randomly selected from the Dala program for inclusion in the study. For files from the Crossroads program, all consecutive admissions were included if the file met the inclusion criteria. Crossroads has fewer adolescents admitted in their program, thus consecutive admissions were used to maximize the number of usable files. Demographic and background information were collected, including age, gender, race/ethnicity, education, history of foster care, history of mental health services, psychiatric diagnoses, suicide attempts, gang involvement, and prior offending behaviours.

Protective and risk factors on the SAPROF-YV and SAVRY were coded using file information that was collected within the first few weeks after admission, including psychological assessment reports and social and family history reports. The rater was kept blind to the outcomes by reviewing file information near admission/intake only (i.e., progress notes or file information subsequent to the psychological report date were not reviewed). In addition, during outcome coding the file numbers were reassigned random and new study identification numbers. The SOS was coded based on information following the date of the psychological report interview date for a period up to six months, as the SAPROF-YV is intended to predict violence in the subsequent six months. However, the follow up length was dependent on the adolescents' length of stay at the Maples, and some adolescents were discharged before six months. The mean length of follow-up was 2.63 months (SD = 1.14 months). The SOS was coded using progress notes recorded by treatment staff (e.g., nurses and clinicians).

Sample 2. A sample of youth probation files was randomly selected as part of a larger study's data collection. Youth probation files were included if they had a Presentence report on file that was completed within the first six months of the probation order. The Presentence reports were used because they contained sufficient information to code the assessment tools. The same demographic variables were coded as with sample 1. The SAPROF-YV and SAVRY were coded using Presentence reports and contact logs recorded by the adolescent's Probation Officer for the first six months post-intake. The rater was blind to the outcomes by reviewing file information during this six month period only. In contrast to sample 1, one trained undergraduate student reviewed official records (to code prior offenses) and completed the SOS coding at the probation office. This was done to ensure that the assessment rater was blind to the outcomes.

Coding of the SOS used contact logs and official records of recidivism during a fixed follow-up period of six months post-intake.

Analyses

Although the sample size was small for each independent sample, the samples differed somewhat in terms of characteristics and methodology. For instance, the two samples had different follow-up periods; sample 1 (i.e., Maples) used a variable follow-up and sample 2 (i.e., Probation) used a fixed follow-up period of six months. As such, the results were run separately for the two samples where possible, or sample site was added as a covariate. For instance, and as described below, the ROC analyses results were presented separately by sample due to significant differences in the follow-up lengths between the two groups. For logistic regression analyses, sample site (i.e., Maples or probation) was included as a covariate in the models, and the results were presented for the total sample only.

Convergent and discriminant validity. Convergent and discriminant validity analyses were conducted with the total sample only, as the two samples did not differ significantly with respect to mean total scores on the SAPROF-YV and SAVRY. Correlations were conducted examine the associations between the SAPROF-YV (i.e., total score, Protection SPJ rating, Risk SPJ rating) and the SAVRY (i.e., Protective total score, Risk total score, risk SPJ rating). Spearman's rho correlations were used for correlations with SPJ ratings, as this is appropriate for ordinal data. Pearson bivariate correlations were used for correlations between total scores, as this appropriate for continuous data that is normally distributed. Based on visual examination of the quantile-quantile plots and histograms, SAPROF-YV and SAVRY total scores were normally distributed. Further, skew values ranged from -.27 to 1.01 and kurtosis values ranged from -1.18 to .52, and values between -2 to 2 are considered indicative of normality (George & Mallery, 2010). Correlation coefficients of .10, .30, and .50 represent small, medium, and large effect sizes, respectively (Cohen, 1988).

Predictive validity. Predictive validity analyses were conducted by sample due to the significant difference in follow-up length between the two samples. Spearman's rho correlations were conducted to examine associations between the SAPROF-YV and SAVRY and the SOS variables. The SOS has a four-point ordinal-type rating scale (i.e., relating to the severity of the aggressive behaviour). Each of the aggression variables were examined individually in the analyses. For the purpose of this study, severity levels of 1 and 2 were collapsed to form a "minor" aggression category, and severity levels of 3 and 4 were collapsed to form a "major" aggression category for each of type of aggression. Some research with the SOS has used severity levels of 2 to 4 to create a "severe" aggression category (e.g., Viljoen, 2014). Other studies have collapsed all severity levels to look at the presence of any aggression (e.g., Desmarias, Nicholls, Wilson, & Brink, 2012); however, Rogers (2000) cautions against collapsing violent behaviour across severity, and Lösel and Farrington (2012) suggest that protective factors may have different effects across severity level. The present study included a severity of 2 within the minor category to allow for a more stringent classification of "severe" or major aggression. Based on visual inspection of quantile-quantile plots and histograms, the SOS variables did not have normal distributions. As such, Spearman's rho was selected, as it is a non-parametric approach which is appropriate for ordinal data and data which does not have normal distributions (Hollander, Wolfe, & Chicken, 2013).

Further, Receiver Operating Characteristic analyses (ROC; Hanley & McNiel, 1982) were used to determine the accuracy of the SAPROF-YV in discriminating between adolescents who engaged in aggressive behaviour and those who did not (i.e., aggressors and non-aggressors). Specifically, the area under the curve (AUC) represents the probability that a randomly selected non-aggressor will have a higher score on the SAPROF-YV than a randomly selected aggressor. An AUC value of 1.00 denotes perfect prediction, whereas a value of .50 denotes chance-level prediction (Rice and Harris, 2005). AUC values of .556, .639, and .714 are indicative of small, moderate, and large effect sizes, respectively (Rice & Harris, 2005). In the present study, the AUC value represents the association between SAPROF-YV total scores and the *absence* of aggression. Scores obtained from the SOS were dichotomized into a variable indicating either the presence or absence of each aggression variables (i.e., minor verbal, major verbal, minor physical, major physical, minor sexual, and major sexual). ROC analyses

were conducted using both the SPJ ratings and the total scores. As the two samples differed with respect to follow-up length, AUC analyses were conducted for each sample separately.

Incremental validity. Hierarchical logistic regression analyses were conducted to examine the incremental predictive validity of SAPROF-YV total scores above SAVRY Risk total scores, as well as above SAVRY Protective scores (Hunsley & Meyers, 2003). Multicollinearity was evaluated using the variance inflation factor (VIF) for the predictor variables (i.e., SAPROF-YV, SAVRY Protective, and SAVRY Risk total scores). VIF values were less than 10, and ranged from 2.41 to 4.84, indicating that this assumption was not violated (Cohen, Cohen, West, & Aiken, 2003). In the first set of analyses, block 1 included the SAVRY Risk total score. Due to the significant differences between groups for follow up length and for offense history, sample site (i.e., Maples or Probation) was entered as a covariate. Block 2 included the SAPROF-YV total score. As sample site was controlled for, incremental regression analyses were conducted with the total sample. In the second set of analyses, SAVRY Protective total scores were entered in block 1, and SAPROF-YV total scores were entered in block 2. Again, sample site was entered as a covariate. Separate analyses were conducted for each of aggression variable.

Moderation analyses. Hierarchical logistic regression analyses were conducted to test the potential moderating effects of risk factors (Baron & Kenny, 1986). Due to low power to detect a significant interaction effect for an alpha level of .05 (see Limitations section), alpha was set to .10 for moderation analyses. Prior to these analyses, all continuous predictor variables (e.g., SAPROF-YV scores and SAVRY Risk total scores) were mean-centered to reduce multicollinearity. The SAPROF-YV Protection Total score and SAVRY Risk Total score were entered simultaneously in step 1. As sample site was entered in this step as a covariate, moderation analyses were conducted for the total sample. The interaction between the SAPROF-YV and SAVRY variables was entered in step 2. Separate analyses were conducted for each aggression variable.

Results

Descriptive Statistics

Means and standard deviations for SAPROF-YV and SAVRY scores are presented in Table 2. For the total sample, SAPROF-YV total scores ranged from 3 to 27 (M = 13.51, SD = 5.83). On the SAVRY, total risk scores ranged from 1 to 35 (M = 17.03, SD = 8.41), while total Protective scores on the SAVRY ranged from 0 to 6 (M = 1.80, SD = 1.63). Notably, adolescents in the two samples did not differ significantly on the total and subscale scores on the SAVRY, or on the total score and the majority of subscale scores on the SAPROF-YV. However, adolescents in sample 2 (i.e., Probation) had significantly higher scores on the External domain of the SAPROF-YV.

Table 2.   Descriptive Statistics for SAPROF-YV and SAVRY scores.

	Total Sample (n = 69)	Sample 1 (n = 39)	Sample 2 (n = 30)		
	M (SD)	*M (SD)*	*M (SD)*	*t*(df)	*p*
SAPROF-YV					
Total	13.51 (5.83)	13.56 (5.23)	13.43 (6.62)	$t(67)$ = .09	.31
Resilience	2.43 (2.21)	2.54 (1.93)	2.30 (2.56)	$t(67)$ = .44	.11
Motivational	5.05 (3.14)	5.45 (3.15)	3.78 (2.94)	$t(67)$ = 1.41	.41
Relational	1.88 (1.32)	1.87 (1.28)	1.90 (1.40)	$t(67)$ = -.09	.86
External	4.32 (1.05)	3.97 (.87)	4.77 (1.10)	$t(67)$ = -.53	.01
SAVRY					
Risk total	17.03 (8.41)	16.54 (8.43)	17.67 (8.49)	$t(67)$ = -.55	.83
Protective	1.80 (1.63)	1.62 (1.35)	2.03 (1.94)	$t(67)$ = -1.06	.09
Historical	6.16 (4.08)	5.97 (4.23)	6.40 (3.93)	$t(67)$ = -.43	.93
Social/Contextual	4.04 (1.88)	4.08 (1.75)	4.00 (2.07)	$t(67)$ = .17	.52
Individual/Clinical	6.83 (4.35)	6.49 (5.48)	7.27 (4.07)	$t(67)$ = -.74	.37

Note. Sample 1 = Maples; Sample 2 = Probation

Frequencies of aggression. The two samples differed significantly for the majority of the aggression variables, excluding major physical aggression (see Table 3). In sample 1, the most frequent type of aggression was verbal aggression (minor: 71.79%, major: 33.33%). In addition, the highest number of aggression incidents was evident for

minor verbal aggression, with a maximum of 43 incidents ($M = 8.64$, $SD = 11.89$). Approximately a quarter of adolescents engaged in physical aggression (28.21%). Sexual aggression had the lowest base rates (minor: 20.51% major: 2.56%). Major sexual aggression was excluded from further analyses due to the low base rate.

In sample 2, minor verbal aggression (20.00%) and major physical aggression (10.00%) were most common. Overall, incidents of aggression were less frequent in sample 2 than in sample 2; for instance, minor verbal aggression and major physical aggression both had a maximum of five incidents. Base rates of major verbal aggression, minor physical aggression, and sexual aggression were less than 10% (i.e., only one adolescent). As such, these variables were excluded for subsequent analyses for sample 2.

Table 3.   Base Rates of Aggression.

| Aggression | Base Rate of Aggression % (n) | | | χ^2(df) | p |
	Total Sample	Sample 1	Sample 2		
Verbal					
Minor	47.28 (34)	71.79 (28)	20.00 (6)	$\chi^2(1) = 8.20$	< .01
Major	20.29 (14)	33.33 (13)	3.33 (1)	$\chi^2(1) = 9.44$	< .01
Physical					
Minor	17.39 (12)	28.21 (11)	3.33 (1)	$\chi^2(1) = 7.30$	< .01
Major	20.29 (14)	28.21 (11)	10.00 (3)	$\chi^2(1) = 3.08$	.06
Sexual					
Minor	13.04 (9)	20.51 (8)	3.33 (1)	$\chi^2(1) = 4.41$	.04
Major	1.45 (1)	2.56 (1)	0.00 (0)	--	--

Note. Sample 1 = Maples; Sample 2 = Probation

Frequencies of protective factors. Frequencies of the SAPROF-YV and SAVRY protective factors were examined to determine which items were prevalent or lacking in the two samples (see Table 4). On the SAPROF-YV, ratings of 1 (*present to some extent*) and 2 (*clearly present*) were collapsed together to determine which protective factors were broadly present. Within the Resilience domain, Perseverance was the most common factor, while only approximately a quarter of adolescents had Coping factor present. Protective factors in the Motivational domain were more common. For instance, approximately 70% of adolescents had ratings of present for Future Orientation,

Motivation for Treatment, and Attitude Toward Agreements and Conditions. Less common factors included School/Work and Leisure Activities. For the Relational domain, support from Parents/Guardians was prevalent, whereas Peers was present for few adolescents. Finally, on the External domain all adolescents were given a rating of present for Pedagogical Climate and Professional Care.

On the SAVRY, half the sample received a rating of present for Strong Social Support. Approximately a third of the sample received a rating of present for Strong Attachments and Bonds, and even more adolescents had Prosocial Involvement. However, few adolescents were rated as present for Positive Attitude Toward Intervention and Authority and Resilient Personality Traits. Strong Commitment to School was largely absent in this sample.

More adolescents in sample 2 had ratings of present for Court Order on the SAPROF-YV, and for Prosocial Involvement on the SAVRY. The difference between the two samples approached significance for Motivation for Treatment (SAPROF-YV) and Resilient Personality Traits (SAVRY), with more individuals receiving a present rating in sample 2. In addition, more adolescents in sample 1 had a rating of present for Medication (SAPROF-YV).

Table 4. **Protective Factors Rated as Present for the SAPROF-YV and SAVRY.**

	Total Sample	Sample 1	Sample 2	χ^2(df)	p
SAPROF-YV Items	% (n)				
Social Competence	47.83 (33)	56.41 (22)	36.67 (11)	χ^2 (1) = 2.65	.15
Coping	26.09 (18)	25.64 (10)	26.67 (8)	χ^2 (1) = .01	.12
Self-Control	50.72 (35)	58.97 (23)	40.00 (12)	χ^2 (1) = 2.44	.12
Perseverance	66.67 (46)	66.67 (26)	66.67 (20)	--	--
Future Orientation	69.57 (48)	69.23 (27)	70.00 (21)	χ^2 (1) = .01	.95
Motivation for Treatment	68.12 (47)	61.54 (24)	80.00 (24)	χ^2 (1) = 2.98	.08
Attitude Toward Agreements & Conditions	72.46 (50)	76.92 (3)	66.67 (20)	χ^2 (1) = .89	.34
Medication	47.83 (33)	92.31 (36)	20.00 (6)	χ^2 (1) = 2.90	.09
School/Work	53.62 (37)	56.41 (22)	50.00 (15)	χ^2 (1) = .28	.60
Leisure Activities	43.48 (30)	41.03 (16)	46.67 (14)	χ^2 (1) = .22	.64
Parents/Guardians	65.22 (45)	61.54 (24)	70.00 (21)	χ^2 (1) = .54	.46
Peers	27.54 (19)	30.77 (12)	23.33 (7)	χ^2 (1) = .47	.49
Other Supportive Relationships	47.83 (33)	48.72 (19)	46.67 (14)	χ^2 (1) = .03	.87
Pedagogical Climate	92.75 (64)	82.05 (32)	83.33 (25)	χ^2 (1) = 7.01	.51
Professional Care	100.00 (69)	100.00 (39)	100.00 (30)	--	--
Court Order	52.17 (36)	15.38 (6)	100.00 (30)	χ^2 (1) = 48.65	< .01
SAVRY Protective Factor					
Prosocial Involvement	40.58 (28)	28.21 (11)	56.67 (17)	χ^2 (1) = 5.70	.02
Strong Social Support	50.72 (35)	48.72 (19)	53.33 (16)	χ^2 (1) = .15	.70
Strong Attachments & Bonds	34.78 (24)	35.90 (14)	33.33 (10)	χ^2 (1) = .05	.83
Positive Attitude Toward Intervention & Authority	24.64 (17)	28.21 (11)	20.00 (6)	χ^2 (1) = .62	.43
Strong Commitment to School	8.70 (6)	7.69 (3)	10.00 (3)	χ^2 (1) = .11	.74
Resilient Personality Traits	20.29 (14)	12.82 (5)	30.00 (9)	χ^2 (1) = 3.09	.08

Note. 43.48% had a rating of N/A for medication. Sample 1 = Maples; Sample 2 = Probation.

Frequencies of SPJ ratings. Almost half of the total sample were rated as low risk on the SAVRY, while approximately a quarter of adolescents were rated as

moderate or high risk for violence (see Table 5). On the SAPROF-YV, the majority of adolescents were within the moderate category for the protection SPJ rating (i.e., low-moderate, moderate, moderate-high), particularly within the low-moderate category (i.e., 37.68% of the total sample). In Table 5, SAPROF-YV ratings of low-moderate, moderate, and moderate-high were collapsed into a single moderate category. Few adolescents were rated as low or high protection. With respect to the SAPROF-YV Risk SPJ rating which considers both the SAPROF-YV and the SAVRY, more adolescents were rated within the moderate category, with fewer adolescents rated as high risk for violence compared to ratings on the SAVRY only.

Table 5.   Frequencies of SAVRY and SAPROF-YV SPJ Ratings.

| | Distributions of SPJ ratings % (*n*) | | | | | | | | |
| | Total Sample | | | Sample 1 | | | Sample 2 | | |
Rating	Low	Mod	High	Low	Mod	High	Low	Mod	High
SAPROF-YV Protection	7.25 (5)	79.71 (55)	13.04 (9)	5.13 (2)	87.18 (34)	7.69 (3)	10.00 (3)	70.00 (21)	20.00 (6)
SAVRY Risk	46.38 (32)	24.64 (17)	28.99 (20)	51.28 (20)	20.51 (8)	28.21 (11)	40.00 (12)	30.00 (9)	30.00 (9)
SAPROF-YV Risk	43.48 (30)	53.62 (37)	2.90 (2)	46.15 (18)	51.28 (20)	2.56 (1)	40.00 (12)	56.67 (14)	3.33 (1)

Note. Sample 1 = Maples; Sample 2 = Probation.

Research Question 1: What are the Associations Between the SAPROF-YV and the SAVRY?

As the patterns of correlations were similar across samples, the results are presented for the total sample (analyses for the separate samples are available on request). A large positive correlation was found between the SAPROF-YV total score and SAVRY Protective score ($r = .75$, $p < .01$). A large negative correlation was found between the SAPROF-YV total score and SAVRY Risk total score ($r = -.77$, $p < .01$). In addition, large correlations were observed between all the SAPROF-YV and SAVRY scores and SPJ ratings. All correlation coefficients are presented in Table 6.

Table 6.   Correlations between SAVRY and SAPROF-YV scores.

	SAVRY			SAPROF-YV		
	1. SAVRY Risk Total	2. SAVRY Risk SPJ	3. SAVRY Protective Total	4. SAPROF-YV Total	5. SAPROF-YV Protection SPJ	6. SAPROF-YV Risk SPJ
1.	-	.80*	-.66*	-.77*	-.78*	.80*
2.		-	-.54*	-.62*	-.64*	.80*
3.			-	.75*	.78*	-.71*
4.				-	.93*	-.80*
5.					-	-.83*
6.						-

Note. * = $p < .01$

Research Question 2: Does the SAPROF-YV Demonstrate Good Predictive Validity?

Base rates of major verbal aggression, minor physical aggression, and minor/major sexual aggression were low in sample 2 (less than two individuals, or less than 10%). The base rate of major sexual aggression was also low in sample 1. As such, predictive validity analyses excluded these outcome variables because these analyses would be examining one to two individuals who engaged in the outcome only. Similarly, other studies of protective factors have excluded variables from analyses with base rates less than 3.5% (e.g., de Vries Robbé et al., in preparation).

Correlation coefficients between the SAPROF-YV and SAVRY and the SOS variables are presented in Table 7, and AUC values with 95% confidence intervals are presented in Tables 8 to 10.

Sample 1. For sample 1 (i.e., Maples), SAVRY Risk total scores and SPJ ratings predicted minor/major verbal aggression and major physical aggression in both the correlational analyses of SOS outcome ratings, and AUC analyses of dichotomous ratings of the presence/absence of aggression. Effect sizes were large (i.e., $r > .50$, Cohen, 1988; AUC > .71, Rice & Harris, 2005), with the exception of a moderate effect size for physical aggression (i.e., $r > .30$, Cohen, 1988; AUC > .64; Rice & Harris, 2005). Correlations

between SAVRY Protective scores and the other outcomes (i.e., major verbal, minor/major physical, and minor sexual aggression) fell in the small range, and AUC values were in the moderate range for minor and major physical aggression, and minor sexual aggression.

SAPROF-YV total scores and SPJ ratings significantly predicted minor verbal aggression with large effect sizes in both correlational and ROC analyses. In addition, moderate effect sizes were found for both minor and major physical aggression, and minor sexual aggression (in AUC analyses). However, AUC values for major verbal and physical aggression did not reach significance using alpha level of .05 (i.e., *p*-values ranged from .05 to .11).

Sample 2. Due to low base rates, sample 2 (i.e., Probation) predictive validity analyses examined minor verbal aggression and major physical aggression only. The SAVRY Risk total score was a significant predictor of minor verbal aggression in both analyses (i.e., large AUC). Large effect sizes were also found for the SAVRY Risk total score and physical aggression, and the SAVRY Risk SPJ rating and minor verbal aggression, while the SAVRY Protective score had a moderate AUC value for minor verbal aggression.

The SAPROF-YV Protection SPJ rating had a moderate AUC value for predicting major physical aggression. The SAPROF-YV Protection SPJ rating also had a small correlation with minor verbal aggression. No AUC values in sample 2 reached significance.

Table 7.   Spearman's Rho Correlations Between the SAVRY, SAPROF-YV, and SOS Variables.

	Sample 1						Sample 2					
	SAPROF-YV			SAVRY			SAPROF-YV			SAVRY		
	Total	Protection SPJ	Risk SPJ	Total	Protection	Risk SPJ	Total	Protection SPJ	Risk SPJ	Total	Protection	Risk SPJ
Verbal Minor	-.59**	-.59**	.63**	.74**	-.55**	.73**	-.22	-.26	.19	.33**	.05	.26
Verbal Major	-.29	-.27	.30	.56**	-.26	.56**	--	--	--	--	--	--
Physical Minor	-.24	-.20	.26	.26	-.29	.29	--	--	--	--	--	--
Physical Major	-.27	-.30	.23	.41*	-.22	.43**	-.10	-.17	.06	.23	-.06	.04
Sexual Minor	-.27	-.20	.23	.23	-.25	.33*	--	--	--	--	--	--
Sexual Major	--	--	--	--	--	--	--	--	--	--	--	--

Note. * = $p < .05$, ** = $p < .01$; Sample 1 = Maples; Sample 2 = Probation; Correlations are not presented for minor sexual aggression for both samples due to low base rates (i.e., < 10%). Major verbal aggression and minor physical aggression are not presented for sample 2 due to low bases rates (i.e., < 10%).

Table 8. ROC Analyses for Verbal Aggression.

	Sample 1				Sample 2			
	Minor		Major		Minor		Major	
	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI
SAVRY								
Risk Total	.91*** (.05)	.81 - 1.00	.72 (.11)	.50 - .93	.85*** (.06)	.73 - .97	--	--
Risk SPJ	.84** (.06)	.72 - .96	.68 (.12)	.44 - .91	.82** (.08)	.67 - .97	--	--
Protective Total	.73* (.09)	.55 - .91	.46 (.10)	.26 - .66	.66 (.09)	.49 - .83	--	--
SAPROF-YV								
Total	.82** (.08)	.68 - .97	.65 (.10)	.26-.67	.69 (.08)	.53 - .86	--	--
Protection SPJ	.82** (.08)	.65 - .98	.67 (.10)	.48 - .87	.68 (.08)	.52 - .85	--	--
Risk SPJ	.80** (.07)	.67 - .94	.63 (.12)	.39 - .86	.68 (.10)	.49 - .87	--	--

Note. $*p < .05$, $**p < .01$, $***p < .001$. Sample 1 = Maples; Sample 2 = Probation. AUC = area under the curve; SE = standard error; 95% CI = 95% confidence interval. AUC values for major verbal aggression are not presented for sample 2 due to a low base rate (i.e., < two individuals, or less than 10%).

Table 9.   **ROC Analyses for Physical Aggression.**

	Sample 1				Sample 2			
	Minor		Major		Minor		Major	
	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI
SAVRY								
Risk Total	.66*** (.10)	.81 - 1.00	.85*** (.06)	.73 - .97	--	--	.71 (.16)	.40 - 1.00
Risk SPJ	.66** (.11)	.72 - .96	.82** (.08)	.67 - .97	--	--	.54 (.18)	.19 - .88
Protective Total	.66* (.09)	.55 - .91	.66 (.09)	.49 - .83	--	--	.56 (.20)	.17 - .94
SAPROF-YV								
Total	.64** (.09)	.68 - .97	.69 (.08)	.53 - .86	--	--	.60 (.18)	.24 - .96
Protection SPJ	.63** (.09)	.65 - .98	.68 (.08)	.52 - .85	--	--	.65 (.19)	.28 - 1.00
Risk SPJ	.65** (.10)	.67 - .94	.68 (.10)	.49 - .87	--	--	.56 (.20)	.16 - .96

Note. *p < .05, **p < .01, ***p < .001. Sample 1 = Maples; Sample 2 = Probation. AUC = area under the curve; SE = standard error; 95% CI = 95% confidence interval. AUC values for minor physical aggression are not presented for sample 2 due to a low bases rate (i.e., less than two individuals, or less than 10%).

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Table 10.   ROC Analyses for Sexual Aggression.

	Sample 1				Sample 2			
	Minor		Major		Minor		Major	
	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI	AUC (SE)	95% CI
SAVRY								
Risk Total	.66 (.10)	.47 - .86	--	--	--	--	--	--
Risk SPJ	.72 (.11)	.51 - .94	--	--	--	--	--	--
Protective Total	.66 (.10)	.46 - .87	--	--	--	--	--	--
SAPROF-YV								
Total	.68 (.09)	.51 - .85	--	--	--	--	--	--
Protection SPJ	.62 (.10)	.42 - .81	--	--	--	--	--	--
Risk SPJ	.65 (.13)	.40 - .89	--	--	--	--	--	--

Note. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$. Sample 1 = Maples; Sample 2 = Probation. AUC = area under the curve; SE = standard error; 95% CI = 95% confidence interval. AUC values for major sexual aggression are not presented for sample 1 or sample 2 due to low bases rates (i.e., less than two individuals, or less than 10%).

Research Question 3: Does the SAPROF-YV Have Incremental Predictive Validity Above SAVRY Risk or Protective Factors?

In the hierarchical logistic regression analyses, the SAPROF-YV total scores were not a significant predictor of any type of aggression, above and beyond SAVRY Risk total score and sample site (i.e., inpatient treatment vs. community offender sample). The SAVRY Risk total score was significant in the models for verbal aggression only (see Table 11).

However, the SAPROF-YV total score significantly predicted minor verbal aggression above and beyond the SAVRY Protective score and sample site. The SAPROF-YV did not add unique variance to the prediction of any other aggression outcome variable. The SAVRY Protective score was not a significant predictor of any type of aggression in these models (see Table 12).

Table 11. **Hierarchical Logistic Regression Analyses for the Incremental Validity of the SAPROF-YV Total Score Above SAVRY Risk Total Scores.**

	B	SE	Wald	df	p	OR	95% CI
Verbal Minor							
Block 1							
SAVRY RIsk	.20	.06	12.09	1	<.01	1.22	1.09 - 1.36
Sample	3.70	.93	15.84	1	<.01	30.30	6.53 - 248.77
Model	X^2 = 38.30, p < .01. Cox & Snell R^2 = .43, Nagelkerke R^2 = .57						
Block 2							
SAPROF-YV	-.04	.10	.22	1	.64	.96	.80 - 1.15
Model	X^2 = 38.52, p < .01. Cox & Snell R^2 = .43, Nagelkerke R^2 = .57						
Verbal Major							
Block 1							
SAVRY Risk	.20	.06	10.31	1	<.01	1.22	1.08 - 1.38
Sample	3.64	1.24	8.65	1	<.01	38.09	3.37 - 430.73
Model	X^2 = 27.81, p < .01. Cox & Snell R^2 = .33, Nagelkerke R^2 = .52						
Block 2							
SAPROF-YV	.06	.12	.21	1	.64	1.06	.83 - 1.34
Model	X^2 = 28.03, p < .01. Cox & Snell R^2 = .33, Nagelkerke R^2 = .53						
Physical Minor							
Block 1							
SAVRY Risk	.07	.04	2.89	1	.09	1.08	.99 - 1.17
Sample	2.60	1.10	5.62	1	.02	13.52	1.57 - 116.31
Model	X^2 = 11.67 , p < .01. Cox & Snell R^2 = .16, Nagelkerke R^2 = .26						
Block 2							
SAPROF-YV	-.06	.10	.33	1	.56	.95	.78 - 1.15
Model	X^2 = 12.00, p = .01. Cox & Snell R^2 = .16, Nagelkerke R^2 = .27						
Physical Major							
Block 1							
SAVRY Risk	.11	.04	6.10	1	.01	1.11	1.02 - 1.21
Sample	1.52	.75	4.07	1	.04	4.56	1.05 - 19.91
Model	X^2 = 10.79 , p = .01. Cox & Snell R^2 = .15, Nagelkerke R^2 = .23						
Block 2							
SAPROF-YV	-.02	.10	.02	1	.87	.98	.82 - 1.19
Model	X^2 = 10.82, p = .01. Cox & Snell R^2 = .15, Nagelkerke R^2 = .23						

	B	SE	Wald	df	p	OR	95% CI
Sexual Minor							
Block 1							
SAVRY Risk	.09	.05	3.20	1	.07	1.09	.99 - 1.19
Sample	2.19	1.11	3.86	1	.05	8.93	1.01 - 79.27
Model	$X^2 = 8.57$, $p = .01$. Cox & Snell $R^2 = .12$, Nagelkerke $R^2 = .22$						
Block 2							
SAPROF-YV	-.13	.12	1.24	1	.27	.88	.70 - 1.10
Model	$X^2 = 9.87$, $p = .02$. Cox & Snell $R^2 = .13$, Nagelkerke $R^2 = .25$						

Note. B = unstandardized regression coefficient; SE = standard error; OR = odds ratio; 95% CI = 95% confidence interval.

Table 12. **Hierarchical Logistic Regression Analyses for the Incremental Validity of the SAPROF-YV Total Score Above SAVRY Protective Total Scores.**

	B	SE	Wald	df	p	OR	95% CI
Verbal Minor							
Block 1							
SAVRY Protective	-.38	.21	3.27	1	.07	.69	.45 - 1.03
Sample	2.36	.61	15.16	1	< .01	10.56	3.22 - 34.60
Model	X^2 = 22.93, p < .01. Cox & Snell R^2 = .28, Nagelkerke R^2 = .38						
Block 2							
SAPROF-YV	-.39	.13	8.96	1	< .01	.67	.52 - .87
Model	X^2 = 35.07, p < .01. Cox & Snell R^2 =.40, Nagelkerke R^2 = .53						
Verbal Major							
Block 1							
SAVRY Protective	-.52	.29	3.17	1	.08	.60	.34 - 1.05
Sample	2.72	1.09	6.21	1	.01	15.14	1.79 - 128.20
Model	X^2 = 15.02, p < .01. Cox & Snell R^2 = .20, Nagelkerke R^2 = .31						
Block 2							
SAPROF-YV	-.16	.11	2.06	1	.15	.85	.68 - 1.06
Model	X^2 = 17.17, p < .01. Cox & Snell R^2 = .22, Nagelkerke R^2 = .35						
Physical Minor							
Block 1							
SAVRY Protective	-.47	.30	2.48	1	.12	.63	.35 - 1.12
Sample	2.44	1.09	5.01	1	.03	11.49	1.35 - 97.48
Model	X^2 = 11.55, p < .01. Cox & Snell R^2 = .15, Nagelkerke R^2 = .26						
Block 2							
SAPROF-YV	-.05	.11	.22	1	.64	.95	.76 - 1.18
	X^2 = 11.77, p = .01. Cox & Snell R^2 = .16, Nagelkerke R^2 = .26						
Physical Major							
Block 1							
SAVRY Protective	-.28	.24	1.40	1	.24	.76	.48 - 1.20
Sample	1.22	.71	2.92	1	.09	3.38	.84 - 13.64
Model	X^2 = 5.27, p = .07. Cox & Snell R^2 = .07, Nagelkerke R^2 = .11						
Block 2							
SAPROF-YV	-.17	.11	2.48	1	.12	.85	.69 - 1.04
Model	X^2 = 7.83, p = .05. Cox & Snell R^2 = .11, Nagelkerke R^2 = .17						

	B	SE	Wald	df	p	OR	95% CI
Sexual Minor							
Block 1							
SAVRY Protective	-.40	.32	1.58	1	.21	.67	.35 - 1.25
Sample	1.99	1.10	3.25	1	.07	7.27	.84 - 62.88
Model	$X^2 = 6.94$, $p = .03$. Cox & Snell $R^2 = .10$, Nagelkerke $R^2 = .18$						
Block 2							
SAPROF-YV	-.20	.13	2.42	1	.12	.82	.64 - 1.05
Model	$X^2 = 9.50$, $p = .02$. Cox & Snell $R^2 = .13$, Nagelkerke $R^2 = .24$						

Note. B = unstandardized regression coefficient; SE = standard error; OR = odds ratio; 95% CI = 95% confidence interval.

Research Question 4: Is the Relationship Between Protective Factors and Aggression Moderated by Risk Level?

Risk level did not significantly moderate the relationship between SAPROF-YV total scores and minor verbal aggression (Exp (b) = 1.01, 95% CI [.99, 1.04], Wald χ^2 (1) = .94, p = .33; Model χ^2 (1) = 39.42, $p < .01$; Δ Cox and Snell R^2 = .008; Δ Nagelkerke R^2 = .011), minor physical aggression (Exp (b) = 1.01, 95% CI [.99, 1.03], Wald χ^2 (1) = .48, p = .49; Model χ^2 (1) = 12.52, p = .01; Δ Cox and Snell R^2 = .006; Δ Nagelkerke R^2 = .010) or minor sexual aggression (Exp (b) = 1.01, 95% CI [.98, 1.03], Wald χ^2 (1) = .12, p = .73; Model χ^2 (1) = 9.99, p = .04; Δ Cox and Snell R^2 = .002; Δ Nagelkerke R^2 = .003).

However, when the alpha was set at $p < .10$ (due to limited power; see Limitations section), risk level did significantly moderate the relationship between SAPROF-YV total scores and major verbal aggression (Exp (b) = 1.04, 95% CI [.99, 1.08], Wald χ^2 (1) = 2.70, p = .10; Model χ^2 (1) = 31.91, $p < .01$; Δ Cox and Snell R^2 = .036; Δ Nagelkerke R^2 = .058), as well as for major physical aggression (Exp (b) = 1.03, 95% CI [1.00, 1.06], Wald χ^2 (1) = 3.21, p = .07; Model χ^2 (1) = 15.29, $p < .01$; Δ Cox and Snell R^2 = .054; Δ Nagelkerke R^2 = .085). Unstandardized regression coefficients were plotted to specify the direction of these interactions, using the equation: Logit(y) = constant β + SAVRY Risk total score β + SAPROF-YV total score β + interaction β. When adolescents were rated as low risk on the SAVRY, the probability of aggression did not differ as a function of SAVRY

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Risk total Scores. However, when adolescents had more risk factors, the probability of aggression was decreased for adolescents with greater SAPROF-YV Protective factors compared to adolescents with fewer SAPROF-YV Protective factors. In other words, the presence of protective factors appeared to have a greater influence for high-risk adolescents versus low-risk adolescents (see Figures 1 and 2).
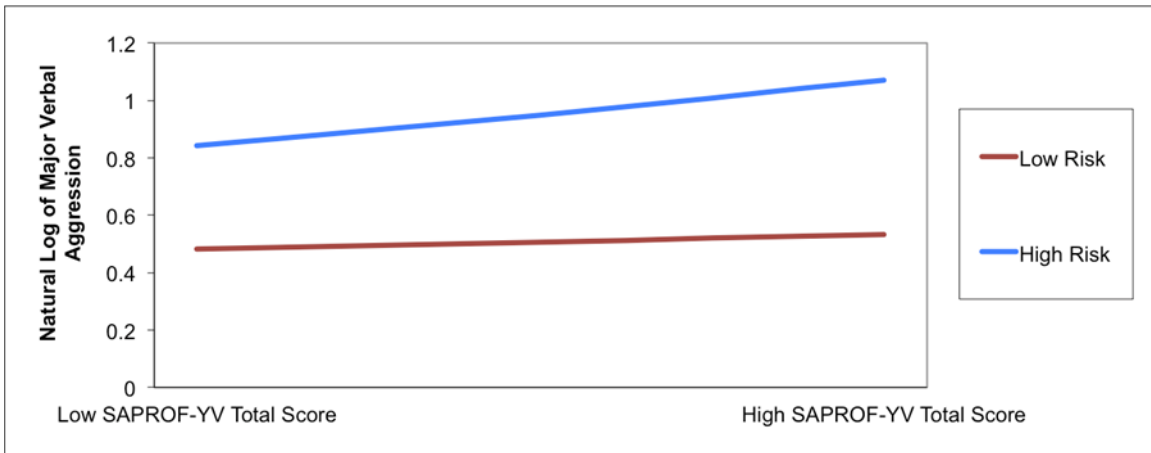

Figure 1.   **Predictive Validity of the SAPROF-YV Total Score in the Prediction of (the Absence of) Major Verbal Aggression by SAVRY Risk Total Score.**
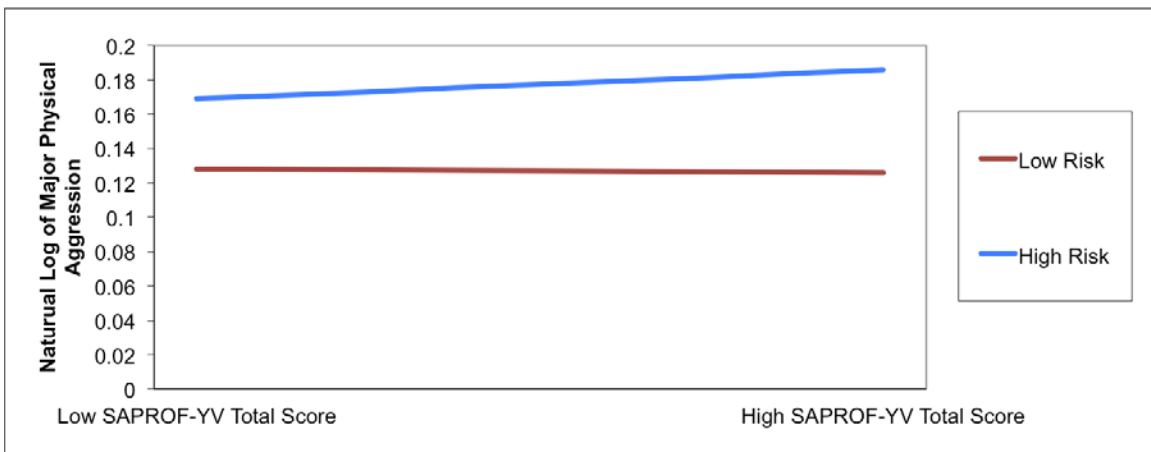

Figure 2.   **Predictive Validity of the SAPROF-YV Total Score in the Prediction of (the Absence of) Major Physical Aggression by SAVRY Risk Total Score.**

Discussion

As the SAPROF-YV is a recently constructed measure, it is imperative for research to first evaluate its psychometric properties (de Vries Robbé et al., 2015). This research is one of the first studies to examine the validity of the SAPROF-YV. Moreover, the present study examined the use of the SAPROF-YV in both an adolescent inpatient treatment sample and a community offender sample.

Overall, the results provide support for the convergent and divergent validity of the SAPROF-YV. In particular, large positive correlations were observed between the SAPROF-YV Total score and SAVRY Protective factors (i.e., $r > .50$; Cohen, 1988). Further, large, inverse correlations were found between the SAPROF-YV total score and SAVRY Risk factors. This is consistent with the pilot studies on the SAPROF-YV (de Vries Robbé et al., 2015). Moreover, whereas the pilot research focused on adolescent forensic samples (de Vries Robbé et al., 2015), the present results examined both a psychiatric and an offender sample, suggesting that convergent and discriminant validity with the SAVRY may be generalizable to forensic and psychiatric samples of adolescents.

With respect to predictive validity, the SAPROF-YV total score and Protection SPJ rating were significant predictors of (a lack of) verbal aggression and physical aggression in sample 1. In particular, both the SAPROF-YV total score and Protection SPJ rating had large effect sizes for the prediction of the absence of minor verbal aggression, which was the most common and frequent form of aggression. For minor verbal aggression, the AUC scores appeared larger for sample 1 (i.e., Maples) than for sample 2 (i.e., large versus moderate effect sizes); however, the confidence intervals overlapped, suggesting the values did not differ. Although past research has focused on physical aggression, or have collapsed verbal and physical aggression (Nagin & Tremblay, 1999), verbal aggression may be important to examine because it is common in inpatient settings. Further, instances of verbal aggressions (e.g., threats to others) might trigger or escalate to physical violence.

With respect to sexual aggression, the SAPROF-YV Total score and SPJ ratings did not demonstrate significant predictive validity. However, the effect size for the

SAPROF-YV Total score were similar to that of the SAVRY Risk total score and were in the moderate range (Rice & Harris, 2005), albeit non-significant. Base rates of sexual aggression were also rare in the samples. Previous research has found that the SAPROF (adult version) was not predictive of sexual offending in adolescents (Klein et al., 2015; Zeng et al., 2015). Further, Zeng et al. (2015) found that the SAPROF did not have incremental predictive validity over a youth risk assessment tool for sexual offending (i.e., Estimate of Adolescent Sexual Offense Recidivism; Worling & Curwen, 2000b). Prior studies with adolescent offenders have also found that protective factors on the SAVRY do not predict sexual offending (Schmidt et al., 2011; Spice, Viljoen, Latzman, Scalora, & Ullman, 2013). Risk assessment tools that are specific to sexual offending, rather than general violence risk tools, may be more appropriate for predicting sexual aggression in youth. However, the SAPROF-YV may address limitations of the use of the SAPROF, in that it is intended for adolescents, as well as limitations of the SAVRY Protective Factors, as the SAPROF-YV is more comprehensive and does not use dichotomous ratings. Future studies with larger sample sizes should examine if the SAPROF-YV is predictive of sexual aggression in adolescent sexual offenders.

Analysis of the moderating effects of risk on protective factors revealed that the predictive validity of the SAPROF-YV total score appeared to vary somewhat as a function of the SAVRY Risk total score. Specifically, the SAPROF-YV total score had greater predictive validity for both major verbal aggression and major physical aggression for adolescents with higher SAVRY Risk total scores than for adolescents with lower SAVRY Risk total scores. However, due to limited power (as described below in the Limitations section), the *p*-value was adjusted to .10, therefore these results should be interpreted with caution. Rates of violence among adolescents rated as low-risk are typically low (Meyers & Schmidt, 2008), so protective factors may have a reduced effect on predictive validity. For adolescents rated as high-risk, protective factors may function as a buffer for risk factors in which the presence of protective factors reduces the negative effects of risk factors (Lodewijks et al., 2010; Lösel & Farrington, 2012). Moreover, the moderation effect of risk level was present for the prediction of more severe forms of aggression only. That is, among higher risk adolescents, increased protective factors predicted not engaging in severe incidents of aggression (e.g., clear threats of violence, physical assault resulting in injury). In contrast, the lack of significant findings for minor verbal aggression, minor

physical aggression, and minor sexual aggression highlight the importance of protective factors across adolescents with varied risk level.

Although many researchers and practitioners consider the assessment of protective factors to be important, there is some uncertainty about whether protective factors add to predictions above and beyond risk factors. In the current study, SAPROF-YV total scores were not predictive of (the absence of) verbal, physical, or sexual aggression above and beyond SAVRY Risk factors. Previous research has also found inconsistent findings regarding the incremental validity of protective factors over risk factors (Dolan & Rennie, 2008; Penney et al., 2010; Schmidt et al., 2011). These findings suggest that the variance captured by protective factors may be explained by risk factors. In addition, the AUC scores for predictive validity were generally higher for the SAVRY Risk total score and SPJ rating, compared to the SAPROF-YV scores and SPJ ratings. Risk factors may appear more useful for risk assessment (i.e., prediction), but it is unknown whether protective factors have added utility for violence prevention and risk management.

One of the primary rationales for the development of the SAPROF-YV is that existing measures of protective factors, such as the SAVRY Protective factors, are brief. In the current study, SAPROF-YV total scores, Protection SPJ ratings, and SAVRY Protective scores had similar effect sizes for minor verbal aggression in both samples. Similar predictive validity was also found for physical aggression in sample 1, but in sample 2 the SAPROF-YV Protection SPJ rating outperformed the SAVRY Protective Factors in the prediction of major physical aggression. Moreover, the SAPROF-YV showed incremental validity over SAVRY Protective factors for the prediction of minor verbal aggression, suggesting that it adds more information than is captured by the SAVRY Protective factors alone. However, the SAPROF-YV did not outperform the SAVRY Protective factors in the prediction of physical or sexual aggression, despite being a lengthier tool (i.e., 16 ordinal items on SAPROF-YV versus 6 dichotomous items on the SAVRY Protective factors).

Beyond providing results on the validity of the SAPROF-YV, this study also provided information on the distribution of protective factors, SPJ ratings, and the

frequencies of aggression in the present samples. Although few adolescent risk assessment studies have been conducted with psychiatric samples, this study found that base rates of some forms aggression were fairly high (e.g., greater than SOS rates in adult inpatient samples; Desmarais et al., 2012), suggesting that it may be important to regularly assess risk in this population. In addition, whereas a fairly high proportion of adolescents showed some protective factors (e.g., within the Motivational domain), other protective factors were scarce (e.g., Resilience domain). As such, these factors might be particularly important to address in treatment. The present findings are important as they provide some indication of pre-treatment protective factors in an adolescent psychiatric sample and rates of inpatient aggression in an adolescent residential treatment facility. These results suggest that it may be important to assess violence risk in adolescent psychiatric populations.

Limitations

Sample size and power. The main limitation of the proposed study concerns the small sample size. Due to the limited number of files available at Maples[1], additional files were coded at the Probation office to increase the overall sample size and to include a greater diversity in the types of adolescents included in the study. Risk assessment tools such as the SAVRY have been examined in both psychiatric and offender populations (e.g., Gammelgård, Koivisto, Eronen, & Kaltiala- Heino, 2015), and probation is the most common disposition in adolescents (Alam, 2015). This resulted in two subsamples: an inpatient psychiatric sample and a community forensic sample. The heterogeneity between these two groups often resulted in the presentation of analyses by sample. Although the total sample size is comparable to some studies (e.g., Klein et al., 2015; Lodewijks et al., 2008) and expands upon pilot research on the SAPROF-YV (e.g., $n =$ 37), it was nevertheless smaller than ideal.

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[1] The reason that the Maples sample included 39 files only was that many available files did not meet the inclusion criteria (i.e., 68 files did not meet inclusion criteria due to having missing documents, too short of treatment length, or the file was active or was cancelled).

In particular, power for some analyses was limited. First, power was insufficient to detect a significant AUC value in ROC analyses. Post-hoc power analyses using MedCalc revealed that based on the base rates of aggression in sample 1, a minimum of $n = 63$ and 150 individuals were required to detect significant large (i.e., .71) and moderate (i.e., .64) effect sizes, respectively (Rice & Harris, 2005). Sample 2 had lower base rates and required a minimum of $n = 90$ and 210 individuals to detect significant large and moderate effect sizes, respectively. Thus, the current samples of $n = 39$ and 30 adolescents were insufficient to detect significant AUC scores. As such, effect sizes were also examined and used in interpretations, rather than solely relying on whether or not an AUC reached the threshold for significance. Second, power was limited for the logistic regression analyses. For moderator analyses[2], it is recommended that the sample size be four times the sample size required to detect a main effect of a similar magnitude. Therefore, with required sample sizes of 21 and 77 to detect a main effect, samples of 84 to 308 individuals were needed to detect a moderation effect with a power of .80 and an alpha level of .05 (for minor verbal and sexual aggression, respectively).[3] Power also was insufficient for incremental validity logistic regression analyses.[4] These analyses required a minimum of 42 cases for minor verbal aggression and a minimum of 153 to cases for minor sexual aggression to detect a small interaction effect with a power of .80 and an alpha level of .05. Bearing in mind these limitations in power, all results were interpreted with caution. Despite the lack of power, some results nevertheless reached significance, indicating that a true effect was likely found. Other studies with small samples have found significant AUC scores (e.g., Wilson, Desmarais, Nicholls, Hart, & Brink, 2013). Future research should include larger samples of adolescents, which could also allow for comparisons across groups (i.e., by gender, offender versus psychiatric).

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[2] Power calculations for moderator analyses were conducted using the formula $N = 10k/p$, in which k is equal to the number of predictors in the model, and p is equal to the smallest percentage of negative or positive cases within the sample (i.e., adolescents who did or did not engage in aggression; Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996).

[3] The percentage of positive cases (adolescents who did engage in aggression) ranged from 13.04% for minor sexual aggression, to 47.28% for minor verbal aggression.

[4] For incremental validity, power was also calculated using the formula $N = 10k/p$ (Peduzzi et al., 1996).

Outcome coding and file quality. This study measured inpatient aggressive behaviours as outcome variables for sample 1. Although most risk assessment studies focus on official records of offending, the individual may have charges dropped, or may be charged after a significant time period following the actual offense date. While some of the aggressive behaviours included on the SOS may not have been sufficient to lead to charges or convictions (particularly the minor severity aggressive behaviours), these situations remain problematic for patients, treatment providers (Renwick et al., 2016), and possibly the public upon discharge. Thus, measuring these behaviours allows research to examine instances of aggression that may not be detected by official records. Previous research on the SAPROF has also measured inpatient aggression as an outcome (e.g., de Vries Robbé et al., 2012; de Vries Robbé et al., 2016).

In addition, the use of inpatient and community samples resulted in differences in the quality of information used for outcome coding. For instance, outcome coding for sample 2 relied entirely on contact logs noted by the Probation Officer and on official records of recidivism. Although base rates of aggression were less prevalent in sample 2, this may be attributable to differences in the sources of information captured by file information. In particular, the adolescents in sample 1 (i.e., inpatient psychiatric sample) were under extensive supervision by treatment staff (e.g., records for multiple time points each day), whereas the adolescents in sample 2 were living in the community and had relatively infrequent observations from their Probation Officers (e.g., weekly or biweekly), which limited opportunities to observe aggressive behaviour. Further, official records likely did not detect instances of minor aggression that may have been observed by staff in an inpatient setting. Therefore, the low base rates within sample 2 may have be due to the quality of the information reviewed, rather than true differences in rates of these behaviours across samples.

Study design. Another limitation concerns the retrospective study design. The SAPROF-YV manual suggests conducting interviews with the adolescent if feasible. In the current study, all files were closed and no interviews were conducted. However, file information was comprehensive and cases were excluded if the information was insufficient for coding ($n = 68$). Moreover, this retrospective design was consistent with the majority of studies on risk assessment (Campbell, French, & Gendreau, 2009; Yang,

Wong, & Coid, 2010), including the only study on the validity of the SAPROF-YV (de Vries Robbé et al., in preparation). Follow-up studies should use a prospective study design (Lösel & Farrington, 2012) with both interviews and file reviews to disentangle the effects of the SAPROF-YV protective factors on future risk for violence.

Implications

The results of this study were generally positive with respect to convergent, discriminant, and predictive validity, which may prompt more research on the SAPROF-YV. First, research should continue to examine the predictive validity of this tool with adolescents. Future research should aim to examine the specific effects of individual protective factors. Different factors may have greater predictive validity in different samples of adolescents (e.g., by gender, by forensic versus mental health settings). For instance, Prosocial Involvement on the SAVRY has been associated with future violence in girls but not in boys (Sijtsema, Kretschmer, & van Os, 2015). Preliminary research on the SAPROF-YV has found that some protective factors (i.e., Social Competence, Coping, School/Work, Parents/Guardians, Other Supportive Relationships, and Pedagogical Climate) were correlated with recidivism in boys (de Vries Robbé et al, in preparation); however, item-level predictive validities were not examined in girls due to low base rates. In addition, the SAPROF-YV manual acknowledges that some factors have limited empirical support, such as Social Competence and Court Order (de Vries Robbé et al., 2015), and these factors require further validation to support their inclusion in the tool.

Future research could also examine the incremental validity of the Protective or Risk SPJ ratings on the SAPROF-YV over the SAPROF-YV total score to test whether these final judgments add unique variance in the prediction of violence. In addition, it would be beneficial to incorporate time at risk within studies. Researchers could use survival analysis or Cox regression analyses to test whether the SAPROF-YV is related to the time until an adolescent reoffends. For instance, within treatment samples survival analysis could be used to test whether SAPROF-YV Protective factors are associated with decreased aggression near admission.

Second, research should examine the extent to which professionals consider the SAPROF-YV in treatment planning and decision-making. For instance, findings on other adolescent tools suggest that the majority of youth Probation Officers found an SPJ risk assessment tool (i.e., SAVRY) to be very helpful for making services and supervision-related recommendations post-implementation (Guy, Nelson, Fusco-Morin, & Vincent, 2014). Studies on adolescent risk assessment tools have also found that implementation of the SAVRY, which consists of few protective factors, lead to greater consideration of protective factors for supervision recommendations by youth justice professionals (Vincent, Paiva-Salisbury, Cook, Guy, & Perrault, 2012). To date, no research has examined a comprehensive assessment of protective factors in field settings; however, similar research could examine the SAPROF-YV. Relatedly, future studies should investigate if the SAPROF-YV improves treatment and supervision recommendations and enhances outcomes in treatment (e.g., Hunsley & Bailey, 1999). Researchers have suggested that using protective factors to guide interventions may be valuable (Singh et al., 2014), such as by leveraging or improving protective factors that are present or lacking, respectively. Although this approach appears beneficial at face value, there is a dearth of literature examining strength-based intervention planning, and it requires examination (Singh et al., 2014).

Finally, the results highlight some areas of intervention needs for these particular samples. The majority of adolescents were lacking Resilience items such as Coping, Social Competence, and Self-control. Thus, it would be advantageous for mental health facilities and youth justice services to focus on building these Resilience protective factors. Research on the SAPROF (adult version) has found that increases in post-treatment SAPROF scores were predictive of a lack of violence post-discharge (de Vries Robbé et al., 2016). In the present study, SAPROF-YV assessments were conducted shortly after admission. It would be beneficial to reassess adolescents at discharge to determine whether these internal protective factors increased after treatment, and how such changes relate to aggression. Future studies could also examine which SAPROF-YV items are most easily targeted in treatment; that is, which factors may be targeted to reduce future violence. Thus, the use of the SAPROF-YV may provide a connection between risk assessment and risk management (de Vries Robbé et al., 2015).

Conclusion

In sum, these results provide preliminary support for the psychometric properties of the SAPROF-YV. Both the SAPROF-YV and SAVRY were predictive of verbal and physical aggression. While the SAPROF-YV did not demonstrate incremental predictive validity over the SAVRY, the SAPROF-YV had greater predictive validity in adolescents with more risk factors than those with fewer risk factors present (with a higher p-value). These results suggest that further validation studies are needed with large, adolescent offender samples; however, the SAPROF-YV is a recently developed tool and several international studies are currently underway (de Vries Robbé et al., 2016). More generally, assessing protective factors in adolescents and strengthening these factors in interventions may be crucial in promoting desistance and preventing adolescent offenders from becoming prolific offenders as adults.

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