

**Assessing Risk for Adverse Outcomes and Clinically
Meaningful Change: An Examination of the SAVRY,
START:AV, and VRS-YV in an Adolescent Residential
Treatment Setting**

by

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Abstract

The following dissertation addresses two important areas of consideration in adolescent risk assessment, namely the assessment of multiple adverse outcomes and the rating and formulation of change in risk for violence. Notwithstanding the strong empirical support for assessing risk for violence and general reoffending among adolescents, examinations of other adverse outcomes common among this age group are limited. To address this gap, the first study examined the predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY), Short-Term Assessment of Risk and Treatability (START:AV), and the Violence Risk Scale-Youth Version (VRS-YV) among a sample of 87 male and female adolescents referred to a residential treatment program. Using adverse outcomes coded from file, the SAVRY and VRS-YV achieved larger effects for outcomes related to harming others and rule violations (e.g., violence, non-violent offenses) relative to those involving harm to the adolescent (e.g., non-suicidal self-injury, victimization), whereas the START:AV demonstrated greater consistency in predicting outcomes across both domains. Focusing on violence and suicidal/non-suicidal self-injury, accuracy of the SAVRY, START:AV, and VRS-YV peaked within the first three months, with recurrent event survival analysis revealing that dynamic risk factors were superior in predicting repeated events involving violence relative to static/historical factors, whereas only dynamic factors associated with the START:AV were predictive of repeated events involving suicidal/non-suicidal self-injury. For the second study, two cases were selected for the purpose of conducting a case study and examination of current methods for reassessing risk for violence, with the introduction of a newly developed structured professional judgment framework for rating and formulating change in risk. Methods based on pre-post reliable change indices, stages of change, and the newly developed framework were exemplified using the SAVRY, VRS-YV, and START:AV, respectively. Although the findings of the study illustrate the capacity for each method/tool to detect change in dynamic factors, several meaningful differences emerged. The clinical and research implications of the two studies are discussed, with recommendations for future research being provided.

Keywords: adolescent risk assessment; dynamic factors; violence; adverse outcomes; reassessment; formulation

Dedication

This dissertation is dedicated to the three women who at the outset of this journey inspired and supported me but could not join me in celebrating this accomplishment. To Christina and Dorothy, my two wonderful grandmothers, I love and miss you both and will always have fond memories of our time together. To my amazing mother, Dale, I miss you more than you will ever know. You were such an inspiration to me and although it pains me that you cannot be here now, I know that you are at peace. I hope that you are proud of your son and look forward to the day that we will see each other again. I love you mom.

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List of Acronyms

AG	Anderson-Gill model
AUC	Area under the curve
AUC _t	Time-dependent area under the curve
AWOL	Absent without leave
DSM-IV-TR	Diagnostic and Statistical Manual, fourth edition, text revision
FASD	Fetal alcohol spectrum disorder
HCR-20	Historical-Clinical-Risk Management-20 Scheme
ICC	Intraclass correlation coefficient
LAC	Library and Archives Canada
MDC	Minimally detectable change
NCRMD	Not criminally responsible on account of mental disorder
NSSI	Non-suicidal self-injury
PWP-CP	Prentice-Williams-Peterson conditional probability model
RCI	Reliable change index
ROC	Receiver operating characteristic
SAVRY	Structured Assessment of Violence Risk in Youth
SFU	Simon Fraser University
SPJ	Structured professional judgment
START	Short-Term Assessment of Risk and Treatability
START:AV	Short-Term Assessment of Risk and Treatability: Adolescent Version
UST	Unfit to stand trial
VRS-YV	Violence Risk Scale-Youth Version

Chapter 1. Introduction

Adolescent risk assessment is an important and complex process. As mental health professionals have an ethical and professional duty to assess and manage risk, it is important that the various risks posed by adolescents are accounted for and that changes in risk are monitored and documented. Violence and reoffending have often been the primary focus of adolescent risk assessment and serve as a logical starting point given the high prevalence of crime and violence among this age group (Borum & Verhaagen, 2006; Moffitt, 1993). Within Canada, according to trends in police-reported crime, common assault (e.g., pushing, slapping, punching) was the most prevalent criminal offence committed by adolescents, despite a 63% decline between 2010 and 2020 in the rate of adolescents accused of committing a crime (Moreau, 2021). Nevertheless, assessing risk for outcomes beyond violence is warranted. Adolescence is marked by rapid developmental change and is associated with heightened risk for multiple adverse outcomes (Borum & Verhaagen, 2006; Viljoen et al., 2012, 2016). Prevalence rates for suicidal behaviour and non-suicidal self-injury are high among adolescents (Labelle et al., 2015), with suicide being the second most common cause of death worldwide among youth (Hawton et al., 2012). Adolescents are also at increased vulnerability for developing substance use disorders (Chen & Kandel, 1995) and are more likely to be victims of violence relative to other age groups (Hashima & Finkelhor, 1999; Truman & Langton, 2014). Moreover, according to the World Health Organization (2020), interpersonal violence is the fourth leading cause of death among individuals 10 to 29 years of age.

Comprised of two primary studies presented in complete manuscript format, the purpose of the current dissertation was to build upon existing assessment procedures and contribute to the growing body of evidence concerning adolescent risk assessment. First, despite strong empirical support for assessing risk for violence and general reoffending among adolescents, there is limited research examining risk for other adverse outcomes common among this age group (e.g., victimization; Viljoen et al., 2012). In an attempt to address this knowledge gap, Chapter 2 consists of an examination of the predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), the Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV; Viljoen et al., 2014), and the Violence Risk Scale-Youth Version (VRS-YV; Wong et al., 2004-2011) among a sample of 87 male and female adolescents referred to a residential

treatment program, with an emphasis placed on the prediction of multiple adverse outcomes related to harm to others and rule violations and harm to the adolescent.

Second, considering the rapid developmental changes associated with adolescence, it is commonly recommended that risk for violence be reassessed regularly (Borum & Verhaagen, 2006; Viljoen et al., 2016). This has led to an increasing emphasis being placed on the assessment of change in risk and the methodology for which such change is to be measured and interpreted (e.g., Gray et al., 2019; Wong et al., 2009). Chapter 3 consists of a multiple case study and examination of methods currently available to clinicians for reassessing violence risk and discusses the development of a structured professional judgment framework for rating and formulating change in risk. Methods based on pre-post reliable change indices, stages of change, and the newly developed framework are exemplified using the SAVRY, VRS-YV, and START:AV, respectively, and applied to two adolescents charged with a violent offence across three time-points (i.e., Baseline, Time 2, and Time 3). Lastly, within the final chapter of the dissertation (Chapter 4), a brief overview of the findings of the two studies is provided, with recommendations for future research being discussed.

1.1. References

- Borum, R., Bartel, P., & Forth, A. (2006). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY)*. Psychological Assessment Resources.
- Borum, R., & Verhaagen, D. (2006). *Assessing and managing violence risk in juveniles*. Guilford.
- Briggs, E. C., Greeson, J. K. P., Layne, C. M., Fairbank, J. A., Knoverek, A. M., & Pynoos, R. S. (2012). Trauma exposure, psychosocial functioning, and treatment needs of youth in residential care: Preliminary findings from the NCTSN Core Data Set. *Journal of Child & Adolescent Trauma*, 5, 1-15. <https://doi.org/10.1080/19361521.2012.646413>
- Chen, K., & Kandel, D. B. (1995). The natural history of drug use from adolescence to the mid-thirties in a general population sample. *American Journal of Public Health*, 85(1), 41-47.
- Gray, A. L., Shaffer, C. S., Viljoen, J. L., Muir, N. M., & Nicholls, T. L. (2019). Assessing violence risk in youth. In J. L. Ireland, C. A. Ireland, & P. Birch (Eds.), *Violent and sexual offenders: Assessment, treatment and management* (2nd ed., pp. 92-113). Routledge.

- Hashima, P. Y., & Finkelhor, D. (1999). Violent victimization of youth versus adults in the National Crime Victimization Survey. *Journal of Interpersonal Violence, 14*(8), 799-820. <https://doi.org/10.1177/088626099014008002>
- Hawton, K., Saunders, K. E. A., O'Connor, R. C. (2012). Self-harm and suicide in adolescents. *Lancet, 379*, 2373-2382.
- Labelle, R., Pouliot, L., & Janelle, A. (2015). A systematic review and meta-analysis of cognitive behavioural treatments for suicidal and self-harm behaviours in adolescents. *Canadian Psychology/Psychologie canadienne, 56*(4), 368–378. <https://doi.org/10.1037/a0039159>
- Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*(4), 674–701. <https://doi.org/10.1037/0033-295X.100.4.674>
- Moreau, G. (2021). *Police-reported crime statistics in Canada, 2020* (Juristat, Catalogue no. 85-002-X). Statistics Canada. <https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2021001/article/00013-eng.pdf?st=2M22XUgv>
- Truman, J. L., & Langton, L. L. (2014, September). Criminal Victimization, 2013. (NCJ247648). Washington, DC: U.S. Department of Justice Bureau of Justice Statistics
- Viljoen, J. L., Cruise, K. R., Nicholls, T. L., Desmarais, S. L., & Webster, C. D. (2012). Taking stock and taking steps: The case for an adolescent version of the Short-Term Assessment of Risk and Treatability. *International Journal of Forensic Mental Health, 11*, 135-149. <https://doi.org/10.1080/14999013.2012.737406>
- Viljoen, J. L., Gray, A. L., & Barone, C. (2016). Assessing risk for violence and offending in adolescents. In R. Jackson and R. Roesch (Eds.), *Learning forensic assessment: Research and practice* (2nd ed., pp. 357-388). Routledge/Taylor & Francis Group.
- Viljoen, J. L., Nicholls, T. L., Cruise, K. R., Desmarais, S. L., & Webster, C. D. (2014). *Short-Term Assessment of Risk and Treatability: Adolescent Version: START:AV User Guide*. Mental Health, Law and Policy Institute, Simon Fraser University.
- World Health Organization. (2020, June 8). *Youth violence*. <https://www.who.int/news-room/fact-sheets/detail/youth-violence>
- Wong, S. C. P., Lewis, K., Stockdale, K., & Gordon, A. (2004-2011). *The Violence Risk Scale: Youth Version (VRS: YV)*. Department of Psychology, University of Saskatchewan.

Wong, S. C. P., Olver, M. E., & Stockdale, K. C. (2009). The utility of dynamic and static factors in risk assessment, prediction, and treatment. In J. T. Andrade (Ed.), *Handbook of violence risk assessment and treatment: New approaches for mental health professionals* (pp. 83-120). Springer.

Chapter 2. Assessing Risk for Adverse Outcomes: An Examination of the Predictive Validity of the SAVRY, START:AV, and VRS-YV in a Residential Treatment Setting

2.1. Abstract

Despite strong empirical support for the assessment of risk for violence and general reoffending, little research has examined risk for other adverse outcomes common among adolescents. Attempting to address this knowledge gap, the current study examined the predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY), Short-Term Assessment of Risk and Treatability (START:AV), and the Violence Risk Scale-Youth Version (VRS-YV) among a sample of 87 male and female adolescents referred to a residential treatment program. Adverse outcomes related to Harm to Others and Rule Violations (e.g., violence, non-violent offenses) and Harm to the Adolescent (e.g., non-suicidal self-injury, victimization) were coded from file. Although the predictive validity of the SAVRY and VRS-YV was greater for outcomes related to harming others and rule violations relative to those involving harm to the adolescent, the START:AV was a more consistent predictor across both domains. Examining the timeframe for optimal predictive validity revealed that accuracy of the SAVRY, START:AV, and VRS-YV in predicting violence and suicidal/non-suicidal self-injury peaked within the first three months, with sharp declines in accuracy thereafter. Using recurrent event survival analysis, purportedly dynamic risk factors were found to be superior in predicting repeated events involving violence relative to static/historical factors, whereas only dynamic factors associated with the START:AV were predictive of repeated events involving suicidal/non-suicidal self-injury. These results emphasize the need for further research examining risk for adverse outcomes among adolescents and the importance of aligning research with the realities of clinical practice.

Keywords: risk assessment, dynamic factors, adolescent, violence, adverse outcomes

2.2. Introduction

Assessing risk for adverse outcomes (e.g., violence, self-harm) among adolescents is a complex endeavour, and many mental health professionals will be required to assess and possibly manage such risk during their career. Much of what is known about risk assessment, however, has been drawn from the psychiatric/psychological literature, with the primary focus being the assessment of risk for violence and general reoffending (Menon, 2013). According to Hart (1998), risk assessment is defined “as *the process of evaluating individuals to (1) characterize the likelihood they will commit acts of violence [or engage in/experience an adverse outcome] and (2) develop interventions to manage or reduce that likelihood*” (p. 122; emphasis in original). Although prediction remains an integral aspect of the risk assessment process, equally important is the notion of preventing or managing risk (Andrews & Bonta, 2010; Hart, 1998, 2008; Douglas et al., 1999; Douglas & Kropp, 2002; Viljoen & Vincent, 2020).

Despite strong empirical support for the assessment of risk in adolescents (Viljoen, Gray, et al., 2016), many of the risk assessment measures released to-date have been developed with a focus on the assessment of risk for violence (Viljoen, Cruise, et al., 2012). As such, validation of such measures has focused on the prediction of violence or general delinquency almost to the exclusion of other adverse outcomes such as victimization, non-suicidal self-injury (NSSI), and substance abuse. Thus, the purpose of the current study was to investigate the predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), the Short-Term Assessment of Risk and Treatability (START:AV; Viljoen et al., 2014), and the Violence Risk Scale-Youth Version (VRS-YV; Wong et al., 2004-2011) in predicting multiple adverse outcomes – specifically, outcomes related to harm to the adolescent (e.g., suicide attempt, victimization) and harm to others and rule violations (violence, unauthorized absences).

2.2.1. Approaches to Assessing Risk for Violence

The three common approaches to violence risk assessment have consisted of unstructured clinical judgment, actuarial or statistical risk assessment, and structured clinical judgment (also referred to as structured professional judgment [SPJ]). Historically, mental health professionals have used unstructured clinical judgement, relying on their clinical intuition when making decisions concerning an individual’s level of risk (Borum,

2000; Hanson, 2009; Hart, 1998; Mills, 2005, 2017). This process would generally consist of routine information gathering of pertinent clinical and historical data and often be accompanied by the administration and interpretation of psychological tests. Using this “general clinical data,” a judgment regarding an individual’s level of risk or dangerousness would then be rendered by the mental health professional (Borum, 2000, p. 1265). Though once commonly used, for more than half a century, multiple concerns regarding the use of unstructured clinical judgment have been raised, with researchers citing issues related to low predictive accuracy (e.g., Ægisdóttir et al., 2006; Borum, 1996; Hiltermann et al., 2016; Mori et al., 2017); albeit, with concerns regarding the methodological limitations of previous studies on the subject being recently raised (see Viljoen et al., 2021). Other concerns raised about unstructured clinical judgment have included inconsistency within and across professionals, particularly due to a lack of structure in selecting, measuring, or combining risk factors and the resulting lack of transparency (Grove & Meehl, 1996; Hart, 2008; Meehl, 1954; Mills, 2005). As recently stated by Heilbrun et al. (2021), “[u]nstructured clinical judgment by itself is no longer a useful or necessary approach to appraising violence risk” (p. 8).

Considering the limitations of unstructured clinical judgement, use of structured risk assessment measures has become the recommended method for assessing risk for violence based on ethical and legal grounds (Olver et al., 2009; Urquhart & Viljoen, 2014; Viljoen, Gray, et al., 2016). Under the actuarial framework, risk factors are summed to generate a total score and incorporate pre-specified cut-offs with associated probability estimates, whereas within the SPJ framework risk factors are identified and rated via professional guidelines, with the final determination of risk being based on the judgment of the assessor. Further differentiating the two approaches is the weighting of risk factors and incorporation of case-specific factors, which is determined by the assessor within the SPJ approach, whereas the actuarial approach excludes additional risk factors and may treat each risk factor as equally important (i.e., providing no weights) or provide item weightings derived from a development sample. Some SPJ measure developers have also incorporated a structured framework to assist with case formulation and scenario planning (e.g., Hart et al., 2003). Other important distinctions between the two approaches include the ability of the measures to reflect changes in risk and provide information for risk management/intervention planning, with actuarial measures being variable and limited in these aspects, respectively (Heilbrun et al., 2021). As adolescence is a time of dramatic

psychological and physiological change, the SPJ model has become the recommended approach (Borum, 2000), and is the approach most often adopted by clinicians when assessing risk among youth (Viljoen et al., 2010).

Although many of the structured risk assessment measures available have been developed for adult populations, there have been substantial strides made in the development of measures for use with adolescents. For instance, Viljoen, Cruise, et al. (2012) noted a 400% increase in the number of publications on assessing violence risk in adolescents between 2000 and 2012. With the development and publication of the first wave of risk assessment measures designed for use with adolescents in the early 2000s (e.g., Consultation Edition of the SAVRY; Bartel et al., 2000), there has been a proliferation of measures developed with the START:AV and VRS-YV representing two of the most recently developed measures. With a growing evidence base supporting their inter-rater reliability and predictive validity (e.g., Borum et al., 2021; Gray et al., 2019; Koh et al., 2020a; Viljoen, Gray, et al., 2016), each of the three measures meet full criteria for evidence-based tools as each are accompanied by a manual, contain empirically supported items, and have demonstrated support for their reliability (i.e., inter-rater reliability) and predictive validity from a minimum of two studies conducted by independent parties (see Gray et al., 2019; Vincent et al., 2009 for further details). Results from available published outcome studies examining the validity of the START:AV and VRS-YV in predicting reoffending outcomes are provided in Table 2.1. As the SAVRY is the most widely used and researched adolescent risk assessment measure, only systematic review and meta-analytic findings are provided.

Predictive validity of the SAVRY, START:AV, and VRS-YV has generally ranged from moderate to high in predicting various reoffending outcomes, the exception being sexual reoffending for which there is very limited data (see Table 2.1). Whereas there have been multiple studies examining the predictive validity of the SAVRY (Koh et al. 2020a), only a small number of studies were identified in the published literature examining the predictive validity of the START:AV and VRS-YV with two and three studies being identified, respectively. Follow-up length among the studies examining predictive validity of the measures has ranged from a few months to several years, with fixed and variable follow-ups being used. For instance, average follow-up periods for studies examining the SAVRY have ranged from 6 months to 10.4 years, with the vast majority being one year or more (see Koh et al., 2020a), whereas follow-up lengths for the

START:AV were 3 months (Sher et al., 2017; Viljoen, Beneteau, et al., 2012) and those for the VRS-YV ranged from 1 year to 7.21 years (Koh et al., 2020b; Lovatt et al., 2021; Stockdale et al., 2014).

As is evident from Table 2.1, the area under the curve (AUC) is by far the most common metric used to examine predictive validity in risk assessment research. However, much like logistic regression, reoffending status (i.e., whether a particular adolescent has engaged in violence) remains fixed over the entirety of the follow-up period within AUC analysis (Heagerty et al., 2000). For instance, an adolescent having violently reoffended after three years would be considered a violent reoffender over the course of the entire follow-up period, despite not having done so until much later into the study. In addition, variations in follow-up time at the individual level (i.e., censoring) are ignored. As such, no information is provided as to the predictive accuracy of a risk assessment measure over time. Although attempts have been made to examine AUC values across fixed time periods (e.g., Rice et al., 2013), recent applications of time-dependant AUC analysis which combines elements of survival analysis with AUC analysis have begun to emerge (Glover et al., 2018; Viljoen, Gray, Shaffer, Bhanwer, et al., 2017). Despite its promise, however, time-dependent AUC analysis is limited in its application as it can only account for time to an initial adverse outcome (e.g., violence). As some adolescents may engage in multiple adverse outcomes over the course of follow-up, statistical approaches such as recurrent event survival analysis are warranted (Kleinbaum & Klein, 2009).

2.2.2. Prevalence and Prediction of Adverse Outcomes

Despite adolescent violence remaining an important area of consideration, assessing risk for other adverse outcomes is not only warranted by the empirical evidence but is a requirement of many mental health agencies. Rates of adverse outcomes such as NSSI are among the highest during adolescence, whereas suicide remains the second most common cause of death worldwide among youth (Hawton et al., 2012). Furthermore, children and adolescents treated within residential and in-patient settings are much more likely to harm themselves or others relative to adults (Stewart & Hirdes, 2015) and youth accessing residential treatment often present with a history of trauma (e.g., abuse, neglect, witnessing domestic violence) and involvement in child welfare services (Yehekel et al., 2020). In comparing pre-treatment prevalence rates of residential (n = 9,942) and non-residential (n = 525) youth (i.e., children and adolescents), Briggs et al.

(2012) found significantly higher rates among residential youth with respect to behavioural problems (e.g., violence; 80.3% vs. 68.6%, respectively), running away (29.9% vs. 4.9%, respectively), substance use problems (41.5% vs. 8.7%, respectively), self-injury (28.4% vs. 11.7%, respectively), suicidality (i.e., ideation and attempts; 29.5% vs. 12.9%, respectively), and criminal activity (30.3% vs. 5.7%, respectively). Furthermore, youth in residential treatment exhibited significantly higher rates of varying forms of trauma/victimization (i.e., physical abuse, sexual abuse, emotional abuse, domestic violence, traumatic loss/bereavement, impaired caregiver, school violence, and community violence) and had a significantly higher number of trauma experiences in comparison to youth not in residential treatment ($M = 5.8$ vs. 3.6). Such findings reinforce the need to identify adolescents at risk of adverse outcomes, particularly those within residential treatment settings.

When examining the risk factors for these various adverse outcomes, there is a growing body of empirical evidence indicative of substantial overlap among them (Viljoen, Cruise, et al., 2012; Viljoen, Nicholls, et al., 2016; Webster et al., 2004). For instance, risk factors for violence incorporated into the SAVRY such as impulsivity and previous self-harm have been found to be significantly predictive of subsequent self-harm (e.g., Favril et al., 2020; Fox et al., 2015). Other overlapping risk factors for violence and self-harm include substance abuse and receiving a diagnosis of schizophrenia (e.g., Brown et al., 2018) and outcomes such as violence and suicide are known to coincide (e.g., murder-suicide). As a result, the authors of Version 3 of the HCR-20 (Douglas et al., 2013) have included suicidal behaviour on the part of the perpetrator that has resulted in physical harm to others in their definition of violence. Among children and adolescents, those displaying increased levels of reactive aggression are at heightened risk to engage in suicidal behaviours (e.g., attempted or completed suicide; Hartley et al., 2018).

These findings, however, are not exclusive to violence and suicide. As demonstrated by the victim/offender overlap, victimization during childhood increases the risk of engaging in offending during adolescence (Miley et al., 2020), whereas prior victimization, alcohol use, offending behaviours, and associating with deviant peers is predictive of criminal victimization among male and female adolescents (Pusch & Holtfreter, 2021). Among a heterogeneous sample of adults with serious mental illness, violence perpetration and victimization were significantly associated (partial correlation = $.50$, $p < .001$), with the occurrence of one outcome being “associated with an 11-fold

increase in risk for the other” (Desmarais et al., 2014, p. 2345). Taken together, there is clear evidence of overlap between risk factors for violence and general criminality with those of other adverse outcomes (e.g., self-harm, victimization) and that the occurrence of some adverse outcomes may have a cascading effect and increase the likelihood of another adverse outcomes occurring (e.g., victimization and violence perpetration).

Yet, despite this growing evidence demonstrating overlap among risk factors for violence and other adverse outcomes, few empirical investigations have been conducted that examine the validity of existing risk assessment measures in predicting adverse outcomes outside of general, violent, and non-violent reoffending. Those that have been conducted have primarily focused on adult forensic psychiatric samples using the HCR-20, a risk assessment measure designed to assess risk for violence, to predict self-harm. Gray et al. (2003) found the HCR-20 to be a moderate, but non-significant, predictor of self-harm (AUC = .64), whereas Daffern and Howells (2007) found a moderate effect for the Clinical scale of the HCR-20 in predicting self-harm (AUC = .66, $p < .05$) and Fagan et al. (2009) found a large effect for the HCR-20 total score in predicting self-harm (AUC = .89, $p = .02$). O’Shea et al. (2014) found the HCR-20 total score to be a moderate predictor of any self-harm (AUC = .64, $p < .001$), sever self-harm (AUC = .64, $p < .01$), and repeated self-harm (AUC = .66, $p < .001$), while Campbell and Beech (2018) demonstrated that the total score on Version 3 of the HCR-20 was predictive of increased frequency of self-harm among a sample of adult female patients. Interpretation of these findings suggests that items embedded within the HCR-20 are tapping into more than just risk for violence and some researchers have suggested that the HCR-20 could be of assistance in informing clinical decision-making regarding an individual’s risk for self-harm (i.e., making a judgment of risk for self-harm; O’Shea et al., 2014). This has important clinical implications and raises the question of whether use of multiple risk assessment measures (including specially designed measures) is necessary as the HCR-20 is often administered in forensic mental health settings in conjunction with the adult version of the START (Webster et al., 2004), a measure designed to assess risk for multiple adverse outcomes.

With respect to the adult version of the START, O’Shea and Dickens (2014) meta-analytically examined its predictive validity and found it to be a strong predictor of various forms of aggression (i.e., any aggression, physical-others, physical-object, and verbal) with weighted AUC values ranging from .70 to .75 and .73 to .78 for the Strength and

Vulnerability total scores, respectively. In contrast, the predictive validity of the Strength and Vulnerability total scores was much lower when other forms of adverse outcomes were examined (e.g., self-harm, self-neglect, and victimization), with weighted AUC values ranging from .53 to .60 and .57 to .61, respectively. That said, when O'Shea and Dickens examined the risk estimates for self-harm, victimization, and self-neglect, they found larger weighted AUC values between the risk estimate and its respective domain (.74, .60, and .69, respectively). In interpreting these findings, the authors suggested that this may be the result of clinicians taking into consideration only those "items most pertinent to the outcome in question" (p. 998). This trend does not appear to be exclusive to the adult version of the START as preliminary research with the START:AV has found differential associations between the individual items and the various risk estimates (Desmarais et al., 2012). Additionally, slightly higher predictive accuracy has also been demonstrated for the risk estimates in comparison to the Strengths and Vulnerabilities total scores in predicting outcomes such as NSSI, substance use, and, to a lesser extent, victimization (Viljoen, Beneteau, et al., 2012; Viljoen et al., 2015).

2.2.3. The Present Study

Presently, there remain a number of gaps within the empirical literature concerning the SAVRY, START:AV, and VRS-YV. First, given the demonstrated overlap in risk factors and empirical findings concerning the HCR-20 in predicting self-harm within the adult literature, it remains to be seen whether adolescent measures designed to assess violence risk (such as the SAVRY and VRS-YV) can predict adverse outcomes beyond violence and general reoffending (e.g., NSSI, suicide attempt, victimization) or whether the START:AV, a measure designed specifically to assess risk for multiple adverse outcomes, will demonstrate greater associations across all outcomes. Second, while there exists an extensive research base supporting the validity of the SAVRY in predicting violence over longer-term follow-up periods (e.g., Borum et al., 2021), research examining its accuracy in predicting violence over shorter-term follow-ups (e.g., 30, 90, and 180 days) is limited. Third, despite the START:AV and VRS-YV representing advances in the risk assessment process, they remain understudied in light of their relatively recent development. Fourth, studies examining the predictive validity of the three measures have primarily been conducted using correctional samples (e.g., Dolan & Rennie, 2008; Stockdale et al., 2014; Viljoen, Beneteau, et al., 2012); although one study demonstrated

that setting (i.e., custody vs. mental health setting) did not have a moderating effect on the association between the SAVRY and outcome (Penny et al., 2010).

In an effort to address these identified gaps and contribute to the growing body of research on adolescent risk assessment, the current study consisted of a direct examination of the validity of the SAVRY, START:AV, and VRS-YV in predicting adverse outcomes among a sample of adolescents with significant psychiatric and behavioural difficulties admitted to a residential treatment facility. It was hypothesized that the SAVRY, START:AV, and VRS-YV would demonstrate adequate concurrent and discriminant validity, with medium to large positive associations being observed among the risk/vulnerability domains and between the strengths/protective factors of the SAVRY and START:AV, whereas an inverse association would be observed between the strengths/protective factors and risk factors. Concerning predictive validity, in light of past findings regarding the HCR-20 and adult START, it was hypothesized that the SAVRY, START:AV, and VRS-YV would demonstrate moderate to high accuracy in predicting harm to others and rule violations (i.e., violence, non-violent offences, substance abuse, and unauthorized absences) and low to moderate predictive validity in predicting harm to the adolescent (i.e., suicide attempt, non-suicidal self-injury [NSSI], victimization, and health neglect). The exception to this being the risk estimates of the START:AV which were hypothesized to be moderately to highly related to their respective domain. Lastly, novel statistical procedures such as time-dependent AUC and recurrent event survival analysis were employed as part of the current study in an effort to encourage their use and address some of the methodological gaps identified within prior research.

2.3. Method

Reporting of the methodology and results of the present study is in accordance with the Risk Assessment Guidelines for the Evaluation of Efficacy (RAGEE) Statement (Singh et al., 2015). The Statement consists of a 50-item checklist designed to increase consistency in reporting among risk-assessment studies examining predictive validity.

2.3.1. Participants

The current sample included 87 adolescents admitted to a residential treatment facility in Western Canada. The facility provides specialized programming to adolescents

with significant psychiatric and behavioural difficulties (e.g., severe conduct disorder [CD], attention-deficit/hyperactivity disorder [ADHD]) who are between the ages of 12 and 17 years. Adolescents within the current sample received residential treatment in one of two programs. Program 1 is an eight-bed residential treatment program designed for adolescents with mental health problems (typically consisting of CD with comorbid mental health disorders). This program assists caregivers and communities when substantial problems related to the provision of care exist and serves as the designated inpatient program for youth between the ages of 12 and 18 who have been found Unfit to Stand Trial (UST) or Not Criminally Responsible on Account of Mental Disorder (NCRMD).¹ In contrast, Program 2 is a six-bed residential treatment program that incorporates assessment, intervention, and post-discharge services designed for youth experiencing internalized symptoms related to thought, mood, or anxiety disorders.

2.3.2. Measures, Demographic/Background Information, and Adverse Outcomes

The Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006)

The SAVRY is a 30-item SPJ guide designed to assess risk of future violence in male and female youth between the ages of 12 and 18 years and assist in intervention planning/risk management. The 30 items are comprised of 24 risk factors grouped into three risk domains (i.e., *Historical Risk Factors*, *Social/Contextual Risk Factors*, and *Individual/Clinical Risk Factors*) and six protective factors representing a single protective domain (i.e., *Protective Factors*). The SAVRY manual provides operational definitions and rating instructions for each of the 30 items. The risk factors are rated based on a three-level coding structure (i.e., Low, Moderate, and High), whereas the protective factors are rated dichotomously (i.e., Present/Absent). Consistent with the SPJ model, item scores on risk and protective factors are not summed, rather evaluators use the SAVRY to make

¹ As outlined under Section 2 and 16(1) of the Criminal Code of Canada (CCC; 1985), individuals suffering from a mental disorder may be designated as unfit to stand trial (UST) and/or found not criminally responsible on account of mental disorder (NCRMD), respectively. Individuals designated as UST are deemed to be suffering from a mental disorder that renders them unable to “(a) understand the nature or object of the proceedings, (b) understand the possible consequences of the proceedings, or (c) communicate with counsel” and can occur at any stage of the proceedings. Whereas for individuals found NCRMD, the mental disorder must have been present during the commission of the index offence and to have rendered them “incapable of appreciating the nature and quality of the act or omission or of knowing that it was wrong.”

a summary risk rating or risk estimate of Low, Moderate, or High regarding a youth's risk for violent and non-violent reoffending. In addition to the risk estimates, total scores were calculated for the current study by summing the items for each of the three risk domains and the protective domain, with a total risk score for the SAVRY being computed by summing all risk factors. There is a strong evidence base supporting the inter-rater reliability and internal consistency of the SAVRY across research and applied settings, with the intraclass correlation coefficient (ICC) ranging from good to excellent for the risk estimate and risk total score of the SAVRY (for a review see Borum et al., 2021; Koh et al., 2020a; Viljoen, Gray, et al., 2016).

The Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV; Viljoen et al., 2014)

The START:AV is a SPJ guide designed to assess risk of various adverse outcomes (e.g., violence, victimization, NSSI) in youth between the ages of 12 to 18 years. It is comprised of 24 items (with an optional case-specific item) falling into three clusters: *Individual Adolescent, Relationships and Environment, and Response to Interventions*. All items of the START:AV are rated as Low, Moderate, and High based on whether the youth has displayed minimal, some, or substantial Strengths or Vulnerabilities on a factor within the past three months, respectively. As such, a factor may simultaneously be considered both a Strength and Vulnerability (e.g., presence of prosocial and antisocial peers; Viljoen, Gray, et al., 2016). Following the rating of the individual items, the presence of a prior history (i.e., any time prior to the past three months) or recent history (i.e., within the past three months) of an adverse outcome is determined, with a final Risk Estimate of Low, Moderate, or High being made by the assessor for each of the nine adverse outcomes embedded within the START:AV. Consistent with prior research, the current study calculated total scores for the Strengths and Vulnerabilities subscales. Viljoen, Beneteau, et al. (2012) found strong internal and inter-rater reliability for the Strengths and Vulnerabilities total scores (Cronbach's $\alpha = .89$ for both scales; ICC [single raters] = .92 and .86, respectively). Likewise, ICC values ranged from good to excellent (ICC [single raters] = .52 to .88) for the risk estimates.

The Violence Risk Scale – Youth Version (VRS – YV; Wong et al., 2004 – 2011)

The VRS-YV is a 23-item clinician rated risk assessment measure designed to systematically account for change in dynamic risk items which measure the extent to

which youth are at risk for committing a violent offence. Each of the items have been found to be empirically, conceptually, or theoretically related to violence in youth (Wong et al., 2009). Items are rated on a 4-point scale (0 to 3) with higher scores indicating increased risk levels. Dynamic items receiving a rating of 2 or 3 are considered criminogenic needs for which change is systematically rated using an adapted form of Prochaska et al.'s (1992) transtheoretical model of change. Stockdale et al. (2014) found the VRS-YV to have adequate internal consistency (Cronbach's $\alpha = .73$ for Static, $.88$ for Dynamic, and $.90$ for Total score) and excellent interrater reliability as measured by intraclass correlation coefficients (ICC = $.87$ for Static, $.89$ for Dynamic, and $.90$ for Total score), whereas Koh et al. (2021) found good interrater reliability for the Total score (ICC = $.68$). As the current study did not examine change in risk, only pre-treatment (i.e., baseline) total, static, and dynamic scores were calculated which is in keeping with prior validation studies examining the VRS-YV and related measures (e.g., Stockdale et al., 2014).

Demographic/Background Information

Demographic and background information related to psychiatric history (e.g., diagnoses), education, home and relationships (e.g., history of foster care placement), and mental health and psychosocial factors was coded from file information.

Adverse Outcomes

Coding of the adverse outcomes was based on available file information and included incidents only occurring during the adolescents' time in program post-baseline assessment (i.e., post-baseline anchoring date). Two broad outcome domains as described by Viljoen et al. (2014) were examined within the current study. Falling under Harm to Others and Rule Violations was violence (i.e., any attempted or actual physical violence and threats of death with or without a weapon in hand), non-violent offences (e.g., theft, property damage), substance abuse (e.g., marijuana use, alcohol intoxication), and unauthorized absences (e.g., absent without leave [AWOL] for < 12 hours). Falling under Harm to the Adolescent was suicide attempt (e.g., attempted suicide by hanging, slashing with suicidal intent), non-suicidal self-injury (NSSI; e.g., burning and/or slashing without suicidal intent), victimization (e.g., bullying victimization, being physically assaulted by peers), and health neglect (e.g., sexual risk-taking such as failure to use condoms and engaging in sexual activity with co-patients). Coding of the adverse outcomes was based on definitions provided within the START:AV manual and consisted of a dichotomous

(yes/no) variable and a total number of incidents or count variable. Given the underreporting of harmful physical health behaviours (e.g., unhealthy diet, inadequate exercise/sleep, tobacco use), only sexual risk-taking was coded in place of other harmful physical health behaviours associated with health neglect at follow-up.

Days-at-risk

Days-at-risk was calculated for each of the adverse outcomes and represented the number of days between the end of the coding interval (i.e., baseline anchoring date) and either the date of the adverse outcome or date of follow-up/discharge.

2.3.3. Procedure

Prior to data collection, research approval was granted by the Office of Research Ethics of Simon Fraser University (Study No. 2013s0578) and the Applied Practice Research and Learning Branch of the Ministry of Children and Family Development of British Columbia, Canada (File No. 146-45/06ARP).

Inclusion Criteria

Closed clinical files were flagged for potential inclusion within the current study, with 167 independent files being identified. Figure 2.1 provides an overview of the screening process. Two cases were unavailable for screening and were removed from any further analyses. For inclusion within the current study, the following criteria were required:

1. To increase the likelihood of identifying cases with adequate follow-up periods and to maximize the sample size, an adolescent's time from admission to discharge must have been ≥ 70 days. Cases falling below this threshold were generally in the program for 30 days or less, had been referred for brief treatment or assessment only, or did not have sufficient follow-up time post-assessment phase.
2. To ensure sufficient information for scoring the risk assessment measures among adolescents referred to Program 2 or for non-forensic referrals to Program 1, a psychological assessment and family/psychosocial history report had to be available either on their file or via a computerized information system. Only reports completed through the residential program or forensic services at the time of or

just prior to admission into the residential treatment program were considered as these reports were considered the most comprehensive (e.g., commented on insight into violent behaviour) and representative of the adolescents' most recent functioning.

3. To ensure sufficient information for scoring the risk assessment measures for forensic referrals (i.e., individuals deemed UST or NCRMD), a case management report and the psychiatrist's report to the Review Board had to be available either on file or via the computerized information system. In addition, these reports must have preceded the provincial Review Board's initial disposition regarding the adolescent following their admission.
4. The adolescent remained in the program ≥ 30 days following the intake assessment phase at the residential treatment facility (using the date of the most recent report referred to above in steps 2 and 3 as an anchor point), thus ensuring a follow-up period of at least one month.

Data Collection and Scoring of the Measures

Data collection and scoring of the measures was completed by the current author. To facilitate the reliable scoring of the SAVRY, START:AV, and VRS-YV, prior to data collection, official training was received via a one-and-a-half day workshop on the SAVRY (presented in November of 2012 by Patrick A. Bartel, Ph.D.), a one day workshop on the START:AV (presented in June of 2015 by Jodi L. Viljoen, Ph.D.), and a one day workshop on the VRS-YV (presented in December of 2014 by Mark E. Olver, Ph.D.). Each of the trainings incorporated the completion of a single or small number of practice cases compared against a gold standard scoring protocol.

Within the current study, scoring of the study variables (i.e., background/demographic information, risk assessment measures, and adverse outcomes) was based on a thorough review of psychological, psychiatric (including Fitness/NCRMD Assessment reports), medical, social history and family assessment reports, in addition to discharge summaries contained within the closed health care files stored within Health Records at the facility. Incident reports, progress notes, and any other pertinent documents available through the computerized information system were also reviewed. Other relevant documentation included completed psychological testing and

questionnaires (e.g., cognitive testing, self-report measures), psychological/psychiatric reports prepared by forensic services, and other various documents available for youth with a history of involvement in the criminal justice system (e.g., Nursing Discharge Summary from a forensic inpatient assessment unit). Although the date of the most recent assessment report served as the baseline anchoring date, when available the date of the Review Board's Disposition hearing was used as the anchoring date.

Due to the structural nature of the medical records and some portions of the files not being in chronological order, remaining blind to adverse outcomes was not feasible when coding file information due to outcome information being dispersed throughout (e.g., police reports/charges were at times mixed in with earlier assessment reports). As a result, a file coding protocol canvassing the relevant domains (e.g., history of violence, substance abuse, mental health/cognitive state, leisure) was developed to enable recording of pertinent information required to score the risk assessment measures, with item ratings being based on the information contained within the file coding protocol. To further reduce risk of criterion contamination, scoring of the risk assessment measures and coding of adverse outcomes was completed at separate time intervals, with the coding of adverse outcomes and completion of the file coding protocol occurring onsite, whereas the scoring of the risk assessment measures (i.e., item ratings and risk estimates) occurred approximately four months later and was based on information contained within the file coding protocol. Scoring of the measures was independent of the adverse outcomes previously coded from file. Risk estimates for the START:AV and SAVRY represent professional judgment ratings of the current author and were made in accordance with instructions outlined within their respective manuals using item ratings and information contained on the file coding protocol. None of the three measures had been adopted into clinical use at the site at the time of data collection.

In keeping with other research studies (e.g., Viljoen, Gray, Shaffer, Bhanwer, et al., 2017), scores on the SAVRY, START:AV, and VRS-YV were prorated when 10% or less of the items were omitted either due to a lack of information or lack of applicability, with no cases exceeding this cutoff. Thirty-two percent of cases ($n = 28$) could not be rated on Item D10 (Insight into Violence) on the VRS-YV due to having no known history of violence, whereas four cases could not be rated on Item D14 (Cognitive Distortions) due to missing information; however, these latter cases were among the 28 cases that required the VRS-YV score to be prorated due to Item D10. Although not a missing item per se,

Item 23 (Medication Adherence) on the START:AV was not applicable for 11.5% of cases ($n = 10$) due to the adolescents not being prescribed medication within the past three months. START:AV scores for these 10 cases were prorated to ensure they were congruent with scores derived for the remainder of the sample.

2.3.4. Data Analysis

Descriptive statistics (i.e., means and standard deviations) and frequencies were computed for demographic variables and for domain/total scores and risk ratings/estimates of the SAVRY, START:AV, and VRS-YV. As the data were not normally distributed, intercorrelations were calculated using Spearman's rank-order correlation (r_s). Between-group comparisons were conducted using Mann-Whitney U tests and chi-square analyses with the non-directional rank-biserial correlation (r_{rb} ; Kerby, 2014) and phi coefficient (ϕ), or Cramer's V for variables with more than two categories, representing their respective effect sizes.

Validity of the measures scored at baseline (i.e., following admission) in predicting adverse outcomes over the course of the entire follow-up period was examined using the area under the curve (AUC) of the receiver operating characteristic (ROC; Hanley & McNeil, 1982) using the R package "pROC" (Robin et al., 2011). AUC values can range from 0 to 1 (with .5 representing chance) and represent the probability that a randomly selected case will score higher on a risk assessment measure than a randomly selected control (Hanley & McNeil, 1982; Rice & Harris, 1995). In contrast to other effect sizes such as Pearson's r or Cohen's d , the AUC is easily interpreted and is robust against violations of normality, fluctuations in base rate, and selection ratios; making it the preferred method by which predictive accuracy is determined (Mossman, 1994; Rice & Harris, 1995; Rice & Harris, 2005). According to Rice and Harris (2005), AUC values of .556, .639, and .714 are considered reflective of small, moderate, and large effect sizes, respectively. To determine the degree of association between the risk assessment measures and continuous adverse outcome variables (i.e., total number of incidents and days-at-risk), Spearman's rank order correlation (r_s) was calculated. Lastly, to account for time to an adverse event, Cox proportional hazards survival analyses were conducted using the R package "survival" (Fox & Weiberg, 2011). Tests of the proportional hazards assumption were conducted using the weighted Schoenfeld residuals test (Grambsch & Therneau, 1994).

Time-dependent AUC (AUC_t) analysis was conducted to examine predictive validity at specific time-points (e.g., 30, 90, and 180 days post-baseline) and to determine the timeframe in which optimal predictive accuracy occurs or diminishes over time (i.e., the shelf-life; Heagerty et al., 2000). Combining elements of ROC and survival analysis, the time-dependent AUC represents the area under the time-dependent ROC curve and is defined as the probability that a risk score measured on a random case (i.e., a youth who has engaged or experienced an adverse outcome) exceeds that for a random control (i.e., a youth who has not engaged or experienced an adverse outcome) at time t (where t represents a fixed point in time – e.g., 60 days post-baseline). Among the various forms of the AUC_t is the *Cumulative/Dynamic* time-dependent AUC ($AUC_t^{C/D}$) (Heagerty & Zheng, 2005). The cumulative/dynamic time-dependent AUC is *dynamic* with respect to specificity such that if T_i (i.e., the survival time for subject i) is greater than t for a case, then the case will serve as a control (i.e., if an identified youth who commits violence at follow-up had not been violent by time t , they would be counted as a non-violent youth). However, once $t \geq T_i$, the individual is classified as a case (i.e., the youth is recognized as having committed violence).

Sensitivity of the $AUC_t^{C/D}$ is calculated such that all cases for which $t \geq T_i$ is included in the computation for each fixed time point (that is, those who are violent at or prior to the fixed time point are considered cases at that time point). Therefore, all initial events occurring throughout the time interval are included. As a result, the base rate increases over time as prior cases are retained in the calculation of sensitivity; however, a limitation of this approach is that there is no distinction between sensitivity to events occurring early within the time interval versus those occurring later in the time interval (Pepe et al., 2008). Though some statisticians have raised concerns regarding the use of $AUC_t^{C/D}$ given the redundant information included within the calculation of sensitivity (Pepe et al., 2008), Blanche et al. (2013) argue that the *cumulative/dynamic* definition “is the most relevant as clinicians often want to predict disease onset in a period of time rather than at a specific time t (as in *incident* sensitivity) and want to distinguish healthy subjects at the end of the same period rather than at a later prespecified time τ (as in *static* specificity)” (p. 688). Therefore, calculation of $AUC_t^{C/D}$ was chosen for the purposes of the present study.

A nonparametric approach is recommended when calculating $AUC_t^{C/D}$ to ensure monotony of the ROC curve and to protect against dependence between the marker and censoring (e.g., if violence risk were associated with death [a censoring variable] this

would indicate that there is dependence). Therefore, use of the nearest neighbor estimator (NNE) is recommended. Based on work by Akritas (1994), the NNE method can be applied by the selection of lambda (i.e., $\lambda_n = O[n^{-1/3}]$; where O is a constant [i.e., values of 1.0]; P. J. Heagerty, personal communication, April 21, 2015).

Given that some adolescents may experience repeated occurrences of an adverse outcome such as violence over the course of the follow-up period, predictive validity of the measures was further examined using recurrent event survival analysis (Hosmer et al., 2008; Kleinbaum & Klein, 2009). Though standard survival analysis allows for the examination of time to an event (i.e., days-at-risk) and is equipped to handle right censored cases (i.e., youth who have not experienced an adverse outcome by the end of the study period), recurrent event survival analysis utilizes the Cox proportional hazards (PH) model to assess the relationship between a predictor (or predictors) and the rate of occurrence of an event (i.e., an adverse outcome) while allowing for multiple events per subject. This differs from other statistical approaches designed to examine repeated events (e.g., count data models such as Poisson or negative binomial regression) as time between events over the follow-up period is considered (Amorim & Cai, 2015).

As recurrent event survival analysis considers all observed events occurring over the course of the follow-up period (beyond the initial event), statistical power is increased relative to standard Cox regression procedures (Ozga et al., 2018). Unlike standard Cox regression, multiple observations are contributed to the model by individuals experiencing repeated events. As this violates the assumption of independence of observations, robust variance estimation was applied to account for the dependence among observations originating from a single subject (Castañeda & Gerritse, 2010; Kleinbaum & Klein, 2012). For the current study, recurrent event analyses were conducted using the R package “survival” (Fox & Weiberg, 2011) and are presented using the Anderson-Gill Counting Process (AG) and Prentice-Williams-Peterson Conditional Probability (PWP-CP) models (see Hosmer et al., 2008; Kleinbaum & Klein, 2012). Both models have been deemed suitable for examining recurrent event data and have been found to produce similar results when compared under simulated conditions (Ozga et al., 2018).

Though the AG model is appropriate for multiple recurrent events, it assumes that recurrent events are independent and that subjects are at risk for all subsequent events (i.e., the number of prior events are unaccounted for; Clark et al., 2003; Hosmer et al.,

2008). In contrast, the PWP-CP model represents a conditional model in which the order of events is accounted for. Within this model, the presence of a prior event increases the likelihood of subsequent events occurring (i.e., outside of the first event, a subject is not assumed to be at risk of a subsequent event without having experienced a prior event). For example, an adolescent would not be considered at risk of engaging in a second incident of violence during the follow-up period without having engaged in the first incident. For the PWP-CP model, recurrent events are stratified with the number of events per subject represented by a stratum variable.

2.4. Results

2.4.1. Sample Characteristics and Adverse Outcomes

Relative to the 78 adolescents not meeting inclusion criteria (see Figure 2.1 for details), there were no statistically significant differences observed among the 87 adolescents included within the study with respect to age ($U = 3195.50$, $r_{tb} = .06$), gender ($\chi^2 [1] = 0.03$, $\phi = .01$), race/ethnicity ($\chi^2 [5] = 2.87$, $\nu = .14$; 11 cases were unknown), or program ($\chi^2 [1] = 0.03$, $\phi = -.01$). Not surprisingly, number of days in program was significantly shorter among the adolescents screened out ($M = 76.14$, $SD = 89.24$) in comparison to the adolescents who met inclusion criteria for the current study ($M = 157.15$, $SD = 139.30$, $U = 1206.50$, $p < .001$, $r_{tb} = .64$).

Among the adolescents meeting inclusion criteria, approximately a third participated in the Program 1 (33.3%), with the remainder attending Program 2 (66.7%). Age at admission ranged from 12 to 18 years ($M = 15.44$, $SD = 1.42$) and the average length of stay within the program was 157 days ($SD = 139.30$ days, range = 73 to 846 days). Most of the youth were born in Canada (90.8%), with the remainder being born outside the country (6.8%; two cases were unknown). Just over half of the sample was male (55.2%) and the racial/ethnic composition was as follows: European Canadian/White (55.2%), Indigenous (24.1%), Asian (11.5%; of which six and three cases were East Asian and South/Southeast Asian, respectively, and one case was identified only as Asian), African Canadian/Black (3.4%), other ethnic descent (2.3%), and Latinx (1.1%; two cases were unknown). Table 2.2 provides further information concerning psychiatric diagnoses, education, home and relationships, and mental health and psychosocial factors. Approximately a quarter of the sample had a history of foster care placement (25.3%) and

many of the adolescents presented with a history of psychological/psychiatric intervention (e.g., previous mental health services). Past victimization and health neglect were also highly prevalent among the sample (87.4% and 95.4%, respectively). Regarding harm to self, 66.7% of the sample had engaged in NSSI on at least one occasion and just under half of the sample had at least one prior suicide attempt, with over a quarter (i.e., 27.6%) of the sample having attempted two or more times.

With respect to criminal history, almost a third of the sample had at least one prior/current charge listed on file ($n = 25$, 28.7%), with 25.3% having been charged with a violent offence (see Table 2.3 for a breakdown of the various violent and non-violent offences). Adolescents admitted to Program 1 were significantly more likely to have a prior/current charge compared to adolescents admitted to Program 2 ($n = 23$ [79.3%] and $n = 2$ [3.4%], respectively; $\chi^2 [1] = 54.33$, $p = .79$). Despite only a quarter of the sample being charged with a violent offence, approximately 85.1% ($n = 74$) were identified as having a history of violence up to three months prior to baseline, with 36.8% ($n = 32$) of the sample having engaged in violence within the three months leading up to baseline (see Table 2.4). Apart from substance use and attempted suicide, over two-thirds of the sample presented with a prior history of the various adverse outcomes. When recent history was examined, health neglect and unauthorized absences (e.g., AWOL) were the most prevalent outcomes.

Among the adverse outcomes recorded over the follow-up period (i.e., post-baseline), violence and victimization were the most prevalent and were observed in just over a third of the sample (34.5% for each outcome). The post-baseline follow-up period for the current study ranged from 30 to 818 days ($M = 111.69$, $SD = 139.62$), with the initial incident of some of the adverse outcomes being recorded within the first three days of the follow-up period (see Days-at-Risk column, Table 2.4).

2.4.2. Descriptive Statistics and Intercorrelations for the SAVRY, START:AV, and VRS-YV

Descriptive statistics for the risk assessment measures are presented in Tables 2.5 and 2.6. The mean risk total score for the SAVRY within the current study ($M = 25.10$, $SD = 9.01$) was similar to scores reported among justice-involved youth and youth on probation drawn from similar geographic regions ($M = 26.62$, $SD = 7.28$ from McLachlan

et al., 2018; $M = 25.92$, $SD = 8.47$ from Viljoen, Gray, Shaffer, Bhanwer, et al., 2017), though lower than a sample of justice-involved youth diagnosed with fetal alcohol spectrum disorder (FASD; $M = 33.40$, $SD = 6.69$ from McLachlan et al., 2018). As for the VRS-YV, the observed scores were lower relative to those reported by Stockdale et al. (2014) among a Canadian sample of justice-involved youth from Saskatchewan (e.g., VRS-YV total score: $M = 43.1$, $SD = 12.0$). Mean scores on the START:AV Strengths and Vulnerabilities subscales were somewhat higher relative to prior research conducted with Canadian youth on probation ($M = 19.27$, $SD = 8.10$, and $M = 22.12$, $SD = 8.24$, respectively; Viljoen, Beneteau, et al., 2012).

Intercorrelations between and within the various risk/protective domains and total scores among the three measures are presented in Table 2.6. Using Cohen's (1992) criteria, medium to large effect sizes were observed among the Vulnerability factors of the START:AV and the risk domains/total scores of the SAVRY and VRS-YV ($r_s = .46$ to $.79$, $p < .001$). As hypothesized, a large and significant correlation was found between the strength/protective factors of the START:AV and SAVRY ($r_s = .69$, $p < .001$), and medium to large inverse associations were observed between the risk domain/total scores of the three measures and the strength/protective factors ($r_s = -.36$ to $-.82$, $p < .001$). Intercorrelations between measure domain/total scores and risk estimates for the SAVRY and START:AV are available in Supplemental Information (see Table 2.16).

2.4.3. Validity of Baseline SAVRY, START:AV, and VRS-YV in Predicting Adverse Outcomes

General Predictive Validity Analysis

Predictive validity analyses for the SAVRY are presented in Tables 2.7 and 2.8 for the two adverse outcome domains. AUC values for the SAVRY risk total scores and risk estimates fell within the moderate to large range as defined by Rice and Harris (2005) for all adverse outcomes, with statistical significance being generally higher among outcomes associated with harm to others and rule violations. Outside of violence, the SAVRY domain scores were more consistently associated with outcomes related to harm to others and rule violations (e.g., non-violent offences) relative to those associated with harm to the adolescent (e.g., NSSI). Protective factors on the SAVRY tended to show inverse associations across all adverse outcomes, though these were not always statistically significant (e.g., violence, suicide attempt). Relative to the AUC analyses, similar trends

were observed for the time-to-event analyses and when the association between the SAVRY and total number of incidents was examined.

As displayed in Table 2.9, the START:AV significantly predicted all adverse outcomes related to harm to others and rule violations. Apart from the Strengths subscale predicting violence, AUC values observed for the START:AV Vulnerabilities and Strengths subscale scores and the respective risk estimates for each adverse outcome exceeded the threshold for a large effect ($AUC \geq .71$; Rice & Harris, 2005). Similar trends were observed for the time-to-event analyses and when examining the association between the START:AV and the total number of incidents, with statistical significance being achieved in all but one analysis. A relatively similar pattern of results emerged for the START:AV in predicting adverse outcomes associated with harm to the adolescent (Table 2.10); however, AUC values for the victimization and health neglect risk estimates were only slightly above chance for the outcomes of victimization and health neglect (i.e., risky sexual behaviour; $AUC = .52$ and $.54$, respectively) and their association with total number of incidents was small ($r_s = .05$ for each). Results for the time-to-event analyses were less consistent relative to AUC analyses for the START:AV in predicting harm to the adolescent.

For the VRS-YV, the Dynamic and Total scores significantly predicted all adverse outcomes associated with harm to others and rule violations, with large effect sizes being observed for dichotomous outcomes and medium to large effect sizes ($r_s \geq .37$) for number of incidents (see Table 2.11). The Static score was not strongly associated with violence or substance abuse, though it was a significant predictor of non-violent offenses and unauthorized absences. For time-to-event analyses, the Static score was significant in only one of the analyses (i.e., non-violent offenses), whereas the Dynamic and Total scores were significant predictors of violence, non-violent offenses, and unauthorized absences, but not substance abuse. For outcomes related to harm to the adolescent (see Table 2.12), despite the observed AUC values for the Dynamic and Total scores being within or falling just below the threshold for a medium effect size ($AUC = .62$ to $.67$), the VRS-YV was not a statistically significant predictor of attempted suicide and NSSI. In contrast, the VRS-YV was predictive of victimization and health neglect, albeit the Static score was only moderately predictive for each outcome. Apart from the Dynamic score and victimization, none of the remaining time-to-event analyses achieved statistical significance.

Contrary to expectations, the SAVRY, START:AV, and VRS-YV tended to be unrelated to days-at-risk when examining outcomes related to harm to others and rule violations. In contrast, significant associations with days-at-risk were observed for some outcomes related to harm to the adolescent; however, these tended to be in the *opposite* direction of what would be expected (e.g., greater days-at-risk for adolescents rated as higher risk for violence).

As several of the survival analyses may have been impacted by the relatively small sample size and low base rates for some adverse outcomes leading to possible empty cells (e.g., none of the youth rated as Low for the SAVRY non-violent risk estimate engaged in a non-violent offence during follow-up), all Cox regression analyses were re-ran using penalized Cox regression to reduce potential bias in the estimation of the hazard ratio (Heinze & Schemper, 2001). With few exceptions, the results of the penalized Cox regression analyses were very similar to those reported previously and are available in Supplemental Information (see Tables 2.17 to 2.22).

Examining Violence and Suicidal/Non-Suicidal Self-Injury with Time-dependent AUC Analysis and Recurrent Event Survival Analysis

Given the novelty of the time-dependent AUC and recurrent event analyses and possible unfamiliarity among readers, examination of the adverse outcomes was narrowed to two primary outcomes of concern. Specifically, violence and suicidal/non-suicidal self-injury were chosen as the two primary outcomes having been selected a priori on the basis of their clinical relevance among adolescents in residential and in-patient care settings (Stewart & Hirdes, 2015) and empirical findings regarding the HCR-20 (e.g., O’Shea et al., 2014). Combining adverse outcomes related to suicide and NSSI, suicidal/non-suicidal self-injury included any attempted suicide and any self-injurious behaviour with or without the intent to die. Sixteen adolescents within the sample (18.4%) engaged in some form of self-injury over the follow-up period, with a combined total of 26 incidents occurring. For violence, a total of 91 incidents occurred during the follow-up period.

The time-dependent AUCs for the SAVRY, START:AV, and VRS-YV are provided in Figure 2.2. Despite some fluctuations in AUC values at the outset of the follow-up period, which was truncated at 180 days as only 15 adolescents remained under observation beyond this point, there was a gradual increase in the $AUC_t^{C/D}$ values for the three measures in predicting violence (which appeared relatively consistent for the initial

100 days), with some of the scores declining sharply in their predictive accuracy shortly thereafter. This trend was reflected in the $AUC_t^{C/D}$ values for the measures at the shorter-term intervals ($t = 30$ and 90 days) and longer-term interval ($t = 180$ days; see Table 2.13), with the largest values being produced at $t = 90$ days. Regarding suicidal/non-suicidal self-injury, the VRS-YV displayed poor predictive accuracy at the outset of the follow-up period. Nevertheless, there was a gradual increase in $AUC_t^{C/D}$ values for the VRS-YV beyond the initial 50 days, with the Static, Dynamic, and Total scores achieving similar results, after which the Static score gradually declined to some extent. A gradual increase was also evident for the SAVRY risk total score and START:AV in predicting suicidal/non-suicidal self-injury, with the $AUC_t^{C/D}$ values ranging from .65 to .77 at $t = 180$ days, whereas the Protective Factors domain and risk estimate of the SAVRY displayed relatively consistent predictive accuracy over the follow-up period.

To examine whether the SAVRY, START:AV, and VRS-YV could predict repeated events first involving violence and, separately, suicidal/non-suicidal self-injury (while controlling for days-at-risk between events), recurrent event survival analysis was first conducted using the Anderson-Gill model and revealed that a greater presence of purportedly dynamic risk factors was associated with increased risk of recurrent episodes of violence, whereas static/historical factors such as those on the SAVRY Historical Factors and the VRS-YV Static domains were found to be unrelated (Table 2.14). Although the Strengths domain of the START:AV was a statistically significant predictor of recurrent episodes of violence, the Protective Factors score on the SAVRY did not achieve statistical significance ($p = .06$). Regarding suicidal/non-suicidal self-injury, only the START:AV was predictive of recurrent episodes. This same pattern of results emerged when the order of the recurrent events was accounted for in the model (see Table 2.15); however, the Social/Contextual factors were no longer significant predictors of recurrent episodes of violence ($p = .08$).²

² As the number of recurrent events may cause the estimates to become unstable within the PWP-CP model, the data were truncated to three recurrent events (Amorim & Cai, 2015); however, the results did not differ substantially from those reported in Table 2.15. Results are available upon request.

2.5. Discussion

The current study sought to contribute to the growing body of empirical research on assessing risk in adolescents by examining the predictive validity of the SAVRY, START:AV, and VRS-YV among a sample of adolescents with significant psychiatric and behavioural difficulties. However, unlike past research which has primarily focused on predicting violence and general antisocial behaviour among justice-involved adolescents, focus of the current study centered on the prediction of multiple adverse outcomes that are both clinically relevant to mental health professionals (Viljoen, Gray, et al., 2016) and common among adolescents undergoing residential treatment (Briggs et al., 2012).

2.5.1. Prevalence of Adverse Outcomes

Within the current sample, previous victimization and health neglect was highly prevalent (87.4% and 95.4%, respectively) and a relatively large number of the adolescents had engaged in suicidal and self-injurious behaviour prior to entering the program (44.8% and 66.7%, respectively). Having a history of violence was also high among the sample (85.1% for prior history), despite less than a quarter having been charged with a violent offence. This latter finding emphasizes the importance of not solely relying on criminal history (e.g., charges) to determine whether there is a history of violence, particularly among adolescents. The degree of discrepancy between the rate of violent charges relative to the rate of violent behaviours within the current sample may be the result of attempts by families and caregivers to manage their children's violent behaviour within the home and/or with the aid of community agencies (e.g., group homes, school boards, child welfare agencies, mental health agencies), while also diverting them away from the criminal justice system through the use of other corrective means (e.g., suspensions, involuntary psychiatric admissions). In addition, for a small number of the participants, their violent behaviour may have occurred prior to the age in which they could be criminally charged (e.g., see Augimeri et al., 2021).

Moderate prevalence rates were evident for outcomes related to harm to others and rule violations post-baseline (e.g., 34.5% for violence, 28.7% for substance abuse), whereas, with the exception of victimization, the post-baseline rates for outcomes related to harm to the adolescent tended to be low (e.g., 8.0% for suicide attempt, 14.9% for NSSI). Relative to other research examining adverse outcomes among justice-involved

adolescents, prevalence rates observed within the current study were much lower in comparison to those reported by Viljoen, Beneteau, et al. (2012) over a three-month follow-up period (e.g., the prevalence rate for self-reported victimization was 66.7%, $n = 81$). Although the lower prevalence rates observed over the follow-up period within the current study may be reflective of differences in setting (i.e., residential treatment setting vs. community supervision) and study design (e.g., retrospective vs. prospective, self-report vs. staff recorded), they nevertheless highlight the need for professionals to assess and manage risk not only for violence and antisocial behaviour but for a broader range of adverse outcomes, particularly those more common among adolescents (e.g., victimization, NSSI). In doing so, this would ensure the completion of a more comprehensive risk assessment which, in turn, could aid in appropriate resource allocation and matching with risk management/reduction efforts (Gray et al., 2019).

2.5.2. Validity of the SAVRY, START:AV, and VRS-YV

As hypothesized and in keeping with other research (e.g., Viljoen, Beneteau, et al., 2012), support for the concurrent and discriminant validity of the SAVRY, START:AV, and VRS-YV was found as medium to large intercorrelations were observed among the three measures and all within the expected direction. Regarding predictive validity, the results of the current study lend preliminary support to the utility of SAVRY, START:AV, and VRS-YV in predicting multiple adverse outcomes. Though the SAVRY and VRS-YV exhibited significant predictive accuracy for adverse outcomes related to harm to others and rule violations (e.g., violence, substance abuse), there was less consistency in predicting outcomes related to harm to the adolescent, save for victimization, suggesting that there may be less overlap between risk factors for certain adverse outcomes such as NSSI and those for violence and antisocial behaviour as contained within the two measures. Although the former indicates that the measures are operating as intended (i.e., assessing risk for violence and general reoffending), the latter finding regarding victimization lends further support to the hypothesized overlap between victim and offender (Miley et al., 2020) and that interventions aimed at reducing risk for violence and reoffending may serve to reduce risk of victimization (Pusch & Holtfreter, 2021). In contrast, the general lack of association between outcomes related to self-harm (i.e., NSSI and suicide attempt) and the SAVRY and VRS-YV challenge the empirical findings with the HCR-20 (e.g., O'Shea et al., 2014) and may be reflective of differences in item content

due to the populations for which they were designed (adult vs. adolescent) or that the overlap in risk factors for violence and self-harm may be more prevalent in adults as opposed to adolescents.

As for the START:AV, results of the current study revealed it to be the most robust and consistent predictor of multiple adverse outcomes, with the Vulnerabilities and Strengths being significantly predictive irrespective of outcome type. Despite this latter finding running contrary to research conducted using the adult version of the START (e.g., O'Shea & Dickens, 2014), this may reflect differences in item content between the adult and adolescent version of the tools, with adjustments to item anchors to increase relevance with outcome and developmental considerations being taken into account when developing the START:AV. Though the risk estimates for the START:AV generally demonstrated greater predictive accuracy relative to the Vulnerabilities and Strengths scores for suicide attempt and outcomes related to harm to others and rule violations, contrary to expectations, the risk estimates were less predictive for NSSI and not predictive of victimization or health neglect.

A possible explanation may relate to the outcome criteria within the current study not being representative of all factors included within the outcome definitions outlined within the START:AV manual (Viljoen et al., 2014). For instance, when generating the victimization risk estimate various forms of victimization are to be considered (e.g., relational); however, physical assaults were among the most common type of incident reported within the medical records making it difficult to determine whether adolescents at increased risk of relational victimization (e.g., being bullied) were being actively rejected/ostracized by their peers. Similarly, as sexual risk-taking was coded in place of health neglect at follow-up, this likely had a detrimental impact on the association between the risk estimate and outcome given that the risk estimates were made in accordance with the procedures as outlined within the START:AV manual and were not adapted for the current study. Nevertheless, results for the START:AV are promising and clinical adoption of the measure may assist mental health professionals in carrying out their ethical and professional duty to assess and manage risk for various adverse outcomes among adolescents. Furthermore, the START:AV has the potential to inform comprehensive care while increasing efficiency and reducing resources required to clinically assess multiple adverse outcomes through the use of a single risk assessment measure. Notwithstanding its advantage within the current study over the SAVRY and VRS-YV through its

development and purpose, the START:AV may also serve to compliment these measures in light of its focus on short-term risk for multiple adverse outcomes. Similar to the common practice of administering the HCR-20 and START in adult forensic settings (O'Shea et al., 2014), the START:AV could be administered in tandem with a measure of longer-term violence risk that incorporates static/historical risk factors such as the SAVRY. However, such an approach would depend on the clinical context and the question remains whether there would be a benefit to doing so.

Another noteworthy finding within the current study pertains to the role of purportedly dynamic risk factors in predicting multiple adverse outcomes relative to static/historical factors. Static/historical risk factors contained within the SAVRY and VRS-YV were among the poorest predictors, whereas dynamic risk factors generally achieved medium to large effect sizes across the various outcomes. In addition, the robust findings related to the Strengths/Protective Factors of the START:AV and SAVRY contribute to the growing body of research on the importance of assessing protective factors among adolescents (e.g., McLachlan et al., 2018; Viljoen, Gray, et al., 2016; Viljoen et al., 2020).

Unlike previous research (e.g., Viljoen, Gray, Shaffer, Bhanwer, et al., 2017) which has found an inverse association between risk scores and days-at-risk (e.g., higher risk youth reoffend at a faster rate), days-at-risk were found to be either unrelated among outcomes related to harm to others and rule violations or demonstrated an association within the opposite direction of what was expected among outcomes related to harm to the adolescent. This counterintuitive finding may be reflective of a greater degree of supervision or restriction being placed on high risk/high need adolescents when entering the program, which may have inhibited their ability to engage in adverse outcomes such as suicide attempt and NSSI. This in turn may also explain the inverse association between days-at-risk and Strengths on the START:AV and, to a lesser extent, the Protective domain of the SAVRY, as those exhibiting a greater number of strengths may have been monitored less.

Contrary to results found among justice-involved adults and adolescents (Glover et al., 2017; Viljoen, Gray, Shaffer, Bhanwer, et al., 2017), analyses conducted using Cumulative/Dynamic time-dependent AUCs revealed that, with few exceptions, optimal predictive accuracy for the SAVRY, START:AV, and VRS-YV in predicting violence and suicidal/non-suicidal self-injury generally peaked within the initial three months, with some

scores exhibiting sharp declines in accuracy following this timeframe. Though this aligns with the rating timeframe specified when scoring the START:AV, this finding was unexpected regarding the SAVRY as there is neither an explicit timeframe provided when rendering a final judgment of risk, nor was its predictive validity found to diminish over a 2-year follow-up period (Viljoen, Gray, Shaffer, Bhanwer, et al., 2017). One factor that may have impacted the results is that, within the current sample, higher risk adolescents remained in treatment longer than their lower risk counterparts, which may have resulted in marker-dependent censoring (i.e., loss of follow-up for some adolescents due to being discharged on account of their low-risk status). Although marker-dependent censoring was accounted for when calculating the time-dependent AUC values through the use of the nearest neighbor estimator, this may still have had an impact on the results due to the relatively small sample size (Kamarudin et al., 2017). Another possible explanation may relate to the treatment context as adolescents within the current sample may have become more stabilized with the passage of time, thus diminishing the clinical relevance of their assessments over the follow-up period. Further research examining the timeframe for optimal predictive accuracy under various conditions is required before any firm conclusions can be drawn.

2.5.3. Strengths and Limitations

There are a number of methodological strengths associated with the current study. Whereas studies conducted examining the validity of the SAVRY, START:AV, and VRS-YV have utilized criminal justice samples and outcomes primarily related to violence and antisocial behaviour, the current study examined multiple adverse outcomes among a sample of adolescents undergoing residential treatment for significant psychiatric and behavioural difficulties. As such, the current study more closely approximates the clinical realities faced by service providers working with adolescents under similar circumstances. In considering the sample and setting in which the current study was conducted, further insight is provided into the “behaviour” of measures such as the SAVRY and VRS-YV beyond standard criminal justice settings and, to some extent, their generalizability to adolescents with complex mental health needs, especially those who have come into conflict with the law (e.g., those deemed UST and NCRMD).

Furthermore, this study aimed to utilize novel data analytic approaches by employing statistical techniques not commonly found within the forensic

psychological/psychiatric literature (e.g., Cumulative/Dynamic time-dependent AUC and recurrent event survival analyses). Despite the repetitive nature of adverse outcomes such as violence, very few studies have examined the rate of reoffending and, among those that have, the statistical approaches selected have often ignored survival time (e.g., negative binomial regression; McLachlan et al., 2018). To the current author's knowledge, this study represents the first application of recurrent event survival analysis to the prediction of adverse outcomes such as violence.

Though promising, consideration of study limitations is warranted when interpreting these results. One such limitation is the lack of inter-rater reliability analysis for the SAVRY, START:AV, and VRS-YV. Due to the nature of the file coding procedures, establishing inter-rater reliability with an independent rater was not feasible. Nevertheless, official training provided by one of the developers was secured for each measure prior to data collection commencing. Prior research examining the inter-rater reliability of the three risk assessment measures have generally found ICC values ranging from good to excellent among trained raters (e.g., Viljoen, Beneteau, et al., 2012) and great care was taken in ensuring that the scoring of the risk assessment measures was in keeping with the scoring procedures as outlined within their respective manuals. Although identified and acknowledged at the outset of data collection, the inability to remain blind to outcome when coding the files is a considerable limitation of the current study and may have inadvertently introduced bias into the results. Issues related to criterion contamination are not uncommon among archival/retrospective risk assessment studies (e.g., Edens et al., 2002) and various steps were taken in an effort to reduce the risk of contamination (e.g., use of file coding protocol). Nevertheless, application of inter-rater reliability analysis, use of multiple independent raters to separately score the risk assessment measures and code outcome, and/or having the files prepared in advance of data collection to ensure blindness to outcomes may have assisted in further reducing this risk.

Another potential limitation includes the smaller sample size. As this may have resulted in power limitations for various analyses (e.g., AUC analysis), efforts were made to mitigate this through the selection and use of nonparametric analyses and other novel statistical approaches intended to reduce the impact of small sample sizes and low base rates (e.g., penalized Cox regression), while potentially increasing statistical power (Gibbon & Chakraborti, 2011; Kleinbaum & Klein, 2009). With the application of recurrent event survival analysis, more information was utilized and greater statistical power was

provided, thus yielding a more robust analysis of the predictive validity of the SAVRY, START:AV, and VRS-YV. This, in turn, increases confidence in the results of the study. Although smaller samples resembling the one used within the current study are not uncommon within the risk assessment literature (e.g., Glover et al., 2017; McLachlan et al., 2017; Mills & Gray, 2013; Viljoen, Beneteau, et al., 2012), this precluded predictive validity analyses being conducted for subsamples based on gender and race/ethnicity as the number of participants included within these analyses would have been below 50 which can detrimentally impact the accuracy of the AUC estimates (Hanczar et al., 2010). The effects of gender and race/ethnicity represents an important area of adolescent risk assessment in need of further research (Muir et al., 2020) and the inability to examine these factors within the current study is itself a limitation.

Although the current study examined multiple adverse outcomes accounting for time and repeated events, it was not possible to conduct a multi-wave study due to limitations in file information required to rescore the measures over the follow-up period. As such, the current study focused on predictive validity of baseline scores which limits examination of the dynamic factors included within the measures (i.e., whether they are truly dynamic and change over time; Wilson et al., 2013). Other important limitations to note relate to the retrospective nature of the study and subsequent reliance on archival data, with coding of the risk assessment measures and outcomes being based on information recorded by staff within the adolescents' closed medical files. This reliance on archival data may have inadvertently introduced various biases and recording practices unique to the setting (Nicholls et al., 1999). As coding of the outcome data did not incorporate all potential methods of data collection (e.g., adolescent self-report), relying heavily on information recorded by staff, it is likely that the true prevalence rates were underestimated (Douglas & Ogloff, 2003).

2.5.4. Summary and Future Directions

In summary, by examining multiple adverse outcomes, beyond violence and general antisocial behaviour, the current study provides a more comprehensive picture of the predictive validity of SAVRY, START:AV, and VRS-YV. Such empirical examination is crucial given the professional and ethical obligations often faced by mental health professionals tasked with assessing risk among adolescents. Despite these results lending preliminary support to the applicability of these measures extending beyond

criminal justice samples to adolescents with complex mental health needs, future research would benefit from the use of a prospective study design conducted across various settings (e.g., psychiatric and correctional) with inter-rater reliability analysis, multiple sources for outcome coding (i.e., adolescent/caregiver self-report, official records, and hospital charts), and an increased follow-up period to examine both short- and long-term validity. This would serve to increase the generalizability of the findings while also broadening the research base on adolescent risk assessment, further aligning research with clinical practice.

2.6. References

- Ægisdóttir, S., White, M. J., Spengler, P. M., Maugherman, A. S., Anderson, L. A., Cook, R. S, Nichols, C. N., Lampropoulos, G. K., Walker, B. S., Cohen, G., & Rush, J. D. (2006). The meta-analysis of clinical judgment project: Fifty-six years of accumulated research on clinical versus statistical prediction. *The Counseling Psychologist*, *34*(3), 341-382. <https://doi.org/10.1177/0011000005285875>
- Akritis, M. G. (1994). Nearest neighbor estimation of a bivariate distribution under random censoring. *The Annals of Statistics*, *22*(3), 1299-1327. <https://www.jstor.org/stable/2242227>
- Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct* (5th ed.). Anderson Publishing.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). <https://doi.org/10.1176/appi.books.9780890420249.dsm-iv-tr>
- Amorim, L. D., & Cai, J. (2015). Modelling recurrent events: A tutorial for analysis in epidemiology. *International Journal of Epidemiology*, *44*(1), 324-333. <https://doi.org/10.1093/ije/dyu222>
- Augimeri, L. K., Walsh, M., Enebrink, P., Jiang, D., Blackman, A., & Smaragdi, A. (2021). The Early Assessment Risk Lists for Boys (EARL-20B) and Girls (EARL-21G). In K. Douglas & R. Otto (Eds.), *Handbook of violence risk assessment* (2nd ed., pp. 227-252). Routledge.
- Bartel, P., Borum, R., & Forth, A. (2000). *Structured Assessment for Violence Risk in Youth (SAVRY), Consultation Edition*. University of South Florida.

- Blanche, P., Dartigues, J.-F., & Jacqmin-Gadda (2013). Review and comparison of ROC curve estimators for a time-dependent outcome with marker-dependent censoring. *Biometrical Journal*, *55*(5), 687-704. <https://doi.org/10.1002/bimj.201200045>
- Borum, R. (1996). Improving the clinical practice of violence risk assessment: Technology, guidelines, and training. *American Psychologist*, *51*(19), 945-956. <https://doi.org/10.1037/0003-066X.51.9.945>
- Borum, R. (2000). Assessing violence risk among youth. *Journal of Clinical Psychology*, *56*(10), 1263-1288. [https://doi.org/10.1002/1097-4679\(200010\)56:10<1263::AID-JCLP3>3.0.CO;2-D](https://doi.org/10.1002/1097-4679(200010)56:10<1263::AID-JCLP3>3.0.CO;2-D)
- Borum, R., Bartel, P., & Forth, A. (2006). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY)*. Psychological Assessment Resources.
- Borum, R., Lodewijks, H. P. B., Bartel, P. A., & Forth, A. E. (2021). The Structured Assessment of Violence Risk in Youth (SAVRY). In K. Douglas & R. Otto (Eds.), *Handbook of violence risk assessment* (2nd ed., pp. 438-461). Routledge.
- Briggs, E. C., Greeson, J. K. P., Layne, C. M., Fairbank, J. A., Knoverek, A. M., & Pynoos, R. S. (2012). Trauma exposure, psychosocial functioning, and treatment needs of youth in residential care: Preliminary findings from the NCTSN Core Data Set. *Journal of Child & Adolescent Trauma*, *5*, 1-15. <https://doi.org/10.1080/19361521.2012.646413>
- Brown, S., O'Rourke, S., & Schwannauer, M. (2017). Risk factors for inpatient violence and self-harm in forensic psychiatry: The role of head injury, schizophrenia and substance misuse. *Brain Injury*, *33*(3), 313-321. <https://doi.org/10.1080/02699052.2018.1553064>
- Campbell, L., & Beech, A. (2018). Do scores on the HCR-20 and FAM predict frequency of self-harm in females within a secure psychiatric hospital? *The Journal of Forensic Psychiatry & Psychology*, *29*(6), 914-933. <https://doi.org/10.1080/14789949.2018.1477975>
- Castañeda, J., & Gerritse, B. (2010). Appraisal of several methods to model time to multiple events per subject: Modelling time to hospitalizations and death. *Revista Colombiana de Estadística*, *33*(1), 43-61.
- Clark, T. G., Bradburn, M. J., Love, S. B., & Altman, D. G. (2003). Survival analysis part I: Basic concepts and first analyses. *British Journal of Cancer*, *89*, 232-238. <https://doi.org/10.1038/sj.bjc.6601118>
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155-159. <https://doi.org/10.1037/0033-2909.112.1.155>

- Criminal Code of Canada, R.S.C. 1985, c. C-46, as amended (last amended on July 1, 2020).
- Daffern, M., & Howells, K. (2007). The prediction of imminent aggression and self-harm in personality disordered patients of a high security hospital using the HCR-20 Clinical scale and the Dynamic Appraisal of Situational Aggression. *International Journal of Forensic Mental Health*, 6(2), 137-143. <https://doi.org/10.1080/14999013.2007.10471258>
- Desmarais, S. L., Sellers, B. G., Viljoen, J. L., Cruise, K. R., Nicholls, T. L., & Dvoskin, J. A. (2012). Pilot implementation and preliminary evaluation of START:AV assessments in secure juvenile correctional facilities. *International Journal of Forensic Mental Health*, 11(3), 150-164. <https://doi.org/10.1080/14999013.2012.737405>
- Desmarais, S. L., Van Dorn, R. A., Johnson, K. L., Grimm, K. J., Douglas, K. S., & Swartz, M. S. (2014). Community violence perpetration and victimization among adults with mental illness. *American Journal of Public Health*, 104(12), 2342-2349. <https://doi.org/10.2105/AJPH.2013.301680>
- Dolan, M. C., & Rennie, C. E. (2008). The Structured Assessment of Violence Risk in Youth as a predictor of recidivism in a United Kingdom cohort of adolescent offenders with conduct disorder. *Psychological Assessment*, 20(1), 35-46. <https://doi.org/10.1037/1040-3590.20.1.35>
- Douglas, K. S., Cox, D. N., & Webster, C. D. (1999). Violence risk assessment: Science and practice. *Legal and Criminological Psychology*, 4(2), 149-184. <https://doi.org/10.1348/135532599167824>
- Douglas, K. S., Hart, S. D., Webster, C. D., & Belfrage, H. (2013). *HCR-20^{V3}: Assessing Risk for Violence: User Guide*. Mental Health, Law and Policy Institute, Simon Fraser University.
- Douglas, K. S., & Kropp, P. R. (2002). A prevention-based paradigm for violence risk assessment: Clinical and research applications. *Criminal Justice and Behavior*, 29(5), 617-658. <https://doi.org/10.1177/009385402236735>
- Douglas, K. S., & Ogloff, J. R. (2003). Violence by psychiatric patients: The impact of archival measurement source on violence base rates and risk assessment accuracy. *Canadian Journal of Psychiatry*, 48(11), 734-740. <https://doi.org/10.1177/070674370304801105>
- Edens, J. F., Petrila, J., Buffington-Vollum, J. K. (2001). Psychopathy and the death penalty: Can the Psychopathy Checklist-Revised identify offenders who represent "a continuing threat to society"? *The Journal of Psychiatry & Law*, 29(4), 433-481. <https://doi.org/10.1177/009318530102900403>

- Fagan, J., Papaconstantinou, A., Ijaz, A., Lynch, A., O'Neill, H., & Kennedy, H. G. (2009). The Suicide Risk Assessment and Management Manual (S-RAMM) validation study II. *Irish Journal of Psychological Medicine*, 26(3), 107-113. <https://doi.org/10.1017/S0790966700000380>
- Forth, A. E., Kosson, D. S., & Hare, R. D. (2003). *Hare Psychopathy Checklist: Youth version*. Multi-Health Systems.
- Fox, K. R., Franklin, J. C., Ribeiro, J. D., Kleiman, E. M., Bentley, K. H., & Nock, M. K. (2015). Meta-analysis of risk factors for nonsuicidal self-injury. *Clinical Psychology Review*, 42, 156-167. <https://doi.org/10.1016/j.cpr.2015.09.002>
- Fox, J., & Weiberg, S. (2011). *Cox proportion-hazards regression for survival data in R*. Retrieved from <http://socserv.socsci.mcmaster.ca/jfox/Books/Companion/appendix/Appendix-Cox-Regression.pdf>
- Favril, L., Yu, R., Hawton, K., & Fazel, S. (2020). Risk factors for self-harm in prison: A systematic review and meta-analysis. *The Lancet Psychiatry*, 7(8), 682-691. [https://doi.org/10.1016/S2215-0366\(20\)30190-5](https://doi.org/10.1016/S2215-0366(20)30190-5)
- Gibbon, J. D., & Chakraborti, S. (2011). Nonparametric statistical inference. In M. Lovric (Ed.), *International encyclopedia of statistical science* (pp. 977-979). Springer.
- Glover, A. J. J., Churcher, F. P., Gray, A. L., Mills, J. F., & Nicholson, D. E. (2017). A cross-validation of the Violence Risk Appraisal Guide-Revised (VRAG-R) within a correctional sample. *Law and Human Behavior*, 41(16), 507-518. <https://doi.org/10.1037/lhb0000257>
- Grambsch, P. M., & Therneau, T. M. (1994). Proportional hazards tests and diagnostics based on weighted residuals. *Biometrika*, 81(3), 515-526. <https://doi.org/10.1093/biomet/81.3.515>
- Gray, A. L. (2019). Structured Assessment of Violence Risk in Youth (SAVRY). In R. D. Morgan (Ed.), *The SAGE encyclopedia of criminal psychology*. SAGE Publications. <https://doi.org/10.4135/9781483392240.n479>
- Gray, A. L., Shaffer, C. S., Viljoen, J. L., Muir, N. M., & Nicholls, T. L. (2019). Assessing violence risk in youth. In J. L. Ireland, C. A. Ireland, & P. Birch (Eds.), *Violent and sexual offenders: Assessment, treatment and management* (2nd ed., pp. 92-113). Routledge.
- Gray, N. S., Hill, C., McGleish, A., Timmons, D., MacCulloch, M. J., & Snowden, R. J. (2003). Prediction of violence and self-harm in mentally disordered offenders: A prospective study of the efficacy of HCR-20, PCL-R, and psychiatric

- symptomatology. *Journal of Consulting and Clinical Psychology*, 71(3), 443-451. <https://doi.org/10.1037/0022-006X.71.3.443>
- Grove, W. M., & Meehl, P. E. (1996). Comparative efficiency of informal (subjective, impressionistic) and formal (mechanical, algorithmic) prediction procedures: The clinical-statistical controversy. *Psychology, Public Policy, and Law*, 2(2), 293-323. <https://doi.org/10.1037/1076-8971.2.2.293>
- Guy, L. S. (2008). *Performance indicators of the structured professional judgment approach for assessing risk for violence to others: A meta-analytic survey* (Publication No. 89265011) [Doctoral dissertation, Simon Fraser University]. ProQuest Dissertations and Theses database.
- Hanczar, B., Hua, J., Sima, C., Weinstein, J., Bittner, M., & Dougherty, E. R. (2010). Small-sample precision of ROC-related estimates. *Bioinformatics*, 26(6), 822-830. <https://doi.org/10.1093/bioinformatics/btq037>
- Hanley, J. A., & McNeil, B. J. (1982). The meaning and use of the area under the receiver operating characteristic (ROC) curve. *Radiology*, 143(1), 29-36. <https://doi.org/10.1148/radiology.143.1.7063747>
- Hanson, R. K. (2009). The psychological assessment of risk for crime and violence. *Canadian Psychology*, 50(3), 172-182. <https://doi.org/10.1037/a0015726>
- Hart, S. D. (1998). The role of psychopathy in assessing risk for violence: Conceptual and methodological issues. *Legal and Criminological Psychology*, 3(1), 121-137. <https://doi.org/10.1111/j.2044-8333.1998.tb00354.x>
- Hart, S. D. (2008). Preventing violence: The role of risk assessment and management. In A. C. Baldry & F. W. Winkel (Eds.), *Intimate partner violence prevention and intervention* (pp. 7-18). Nova Science.
- Hart, S. D., Kropp, P. R., Laws, D. R., Klaver, J., Logan, C., & Watt, K. A. (2003). *The risk for sexual violence protocol (RSVP): Structured professional guidelines for assessing risk of sexual violence*. Burnaby, BC: Mental Health, Law, and Policy Institute, Simon Fraser University.
- Hartley, C. M., Pettit, J. W., & Castellanos, D. (2018). Reactive aggression and suicide-related behaviors in children and adolescents: A review and preliminary meta-analysis. *Suicide and Life-Threatening Behavior*, 48(1), 38-51. <https://doi.org/10.1111/sltb.12325>
- Hawton, K., Saunders, K. E. A., O'Connor, R. C. (2012). Self-harm and suicide in adolescents. *Lancet*, 379(9834), 2373-2382. [https://doi.org/10.1016/S0140-6736\(12\)60322-5](https://doi.org/10.1016/S0140-6736(12)60322-5)

- Heagerty, P. J., Lumley, T., & Pepe, M. S. (2000). Time-dependent ROC curves for censored survival data and a diagnostic marker. *Biometrics*, *56*(2), 337-344. <https://doi.org/10.1111/j.0006-341X.2000.00337.x>
- Heagerty, P. J., & Zheng, Y. (2005). Survival model predictive accuracy and ROC curves. *Biometrics*, *61*(1), 92-105. <https://doi.org/10.1111/j.0006-341X.2005.030814.x>
- Heilbrun, K., Yasuhara, K., Shah, S., & Locklair, B. (2021). Approaches to violence risk assessment. In K. Douglas & R. Otto (Eds.), *Handbook of violence risk assessment* (2nd ed., pp. 3-27. Routledge.
- Heinze, G., & Schemper, M. (2001). A solution to the problem of monotone likelihood in Cox regression. *Biometrics*, *57*(1), 114-119. <https://doi.org/10.1111/j.0006-341X.2001.00114.x>
- Hilterman, E. L. B., Bongers, I., Nicholls, T. L., & van Nieuwenhuizen, C. (2016). Identifying gender specific risk/need areas for male and female juvenile offenders: Factor analyses with the Structured Assessment of Violence Risk in Youth (SAVRY). *Law and Human Behavior*, *40*(1), 82-96. <https://doi.org/10.1037/lhb0000158>
- Hosmer, D. W., Lemeshow, S., & May, S. (2008). *Applied survival analysis: Regression modeling of time-to-event data* (2nd ed.). Wiley.
- Kamarudin, A. N., Cox, T., & Kolamunnage-Dona, R. (2017). Time-dependent ROC curve analysis in medical research: Current methods and applications. *BMC Medical Research Methodology*, *17*, Article 53. <https://doi.org/10.1186/s12874-017-0332-6>
- Kerby, D. S. (2014). The simple difference formula: An approach to teaching nonparametric correlation. *Comprehensive Psychology*, *3*, Article 1. <https://doi.org/10.2466/11.IT.3.1>
- Kleinbaum, D. G., & Klein, M. (2009). *Survival analysis: A self-learning text* (3rd ed.). Springer.
- Koh, L. L., Day, A., Klettke, B., Daffern, M., & Chu, C. M. (2020a). The predictive validity of youth violence risk assessment tools: A systematic review. *Psychology, Crime & Law*, *26*(8), 776-796. <https://doi.org/10.1080/1068316X.2020.1734200>
- Koh, L. L., Day, A., Klettke, B., Daffern, M., & Chu, C. M. (2020b). The predictive validity of three youth violence assessment instruments: The SAVRY, VRS-YV, and SAPROF-YV. *International Journal of Offender Therapy and Comparative Criminology*. Advance online publication. <https://doi.org/10.1177/0306624X20970887>

- Koh, L. L., Day, A., Klettke, B., Daffern, M., & Chu, C. M. (2021). An exploration of risk and protective characteristics of violent youth offenders in Singapore across adolescent developmental stages. *International Journal of Forensic Mental Health*. Advance online publication. <https://doi.org/10.1080/14999013.2021.1886203>
- Lovatt, K. M., Stockdale, K. C., & Olver, M. E. (2021). Dynamic violence risk, protective factors, and therapeutic change in a gender and ethnoculturally diverse sample of court-adjudicated youth. *Psychological Assessment*. Advance online publication. <https://doi.org/10.1037/pas0001071>
- McLachlan, K., Gray, A. L., Roesch, R., Douglas, K. S., & Viljoen, J. L. (2018). An evaluation of the predictive validity of the SAVRY and YLS/CMI in justice-involved youth with fetal alcohol spectrum disorder. *Psychological Assessment*, 30(12), 1640-1651. <https://doi.org/10.1037/pas0000612>
- Meehl, P. E. (1954). *Clinical versus statistical prediction: A theoretical analysis and a review of the evidence*. University of Minnesota Press. <https://doi.org/10.1037/11281-000>
- Menon, V. (2013). Suicide risk assessment and formulation: An update. *Asian Journal of Psychiatry*, 6(5), 430-435. <https://doi.org/10.1016/j.ajp.2013.07.005>
- Mori, T., Takahashi, M., & Kroner, D. G. (2017). Can unstructured clinical risk judgment have incremental validity in the prediction of recidivism in a non-Western juvenile context? *Psychological Services*, 14(1), 77-86. <https://doi.org/10.1037/ser0000107>
- Miley, L. N., Fox, B., Muniz, C. N., Perkins, R., & DeLisi, M. (2020). Does childhood victimization predict specific adolescent offending? An analysis of generality versus specificity in the victim-offender overlap. *Child Abuse & Neglect*, 101, Article 104328. <https://doi.org/10.1016/j.chiabu.2019.104328>
- Mills, J. F. (2005). Advances in the assessment and prediction of interpersonal violence. *Journal of Interpersonal Violence*, 20(2), 236-241. <https://doi.org/10.1177/0886260504267745>
- Mills, J. F. (2017). Violence risk assessment: A brief review, current issues, and future directions. *Canadian Psychology*, 58(1), 40-49. <https://doi.org/10.1037/cap0000100>
- Mills, J. F., & Gray, A. L. (2013). Two-Tiered Violence Risk Estimates: A validation study of an integrated-actuarial risk assessment instrument. *Psychological Services*, 10(4), 361-371. <https://doi.org/10.1037/a0032608>

- Mossman, D. (1994). Assessing predictions of violence: Being accurate about accuracy. *Journal of Consulting and Clinical Psychology, 62*(4), 783-792. <https://doi.org/10.1037/0022-006X.62.4.783>
- Muir, N. M., Viljoen, J. L., Jonnson, M. R., Cochrane, D. M., & Rogers, B. J. (2020). Predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY) with Indigenous and Caucasian female and male adolescents on probation. *Psychological Assessment, 32*(6), 594–607. <https://doi.org/10.1037/pas0000816>
- Nicholls, T. L., Brink, J., Greaves, C., Lussier, P., Verdun-Jones, S. (1999). Forensic psychiatric inpatients and aggression: An exploration of incidence, prevalence, severity, and interventions by gender. *International Journal of Law and Psychiatry, 32*(1), 23-30. <https://doi.org/10.1016/j.ijlp.2008.11.007>
- Olver, M. E., Stockdale, K. C., & Wormith, J. (2009). Risk assessment with young offenders: A meta-analysis of three assessment measures. *Criminal Justice and Behavior, 36*(4), 329-353. <https://doi.org/10.1177/0093854809331457>
- O'Shea, L. E., & Dickens, G. L. (2014). Short-Term Assessment of Risk and Treatability (START): Systematic review and meta-analysis. *Psychological Assessment, 26*(3), 990-1002. <https://doi.org/10.1037/a0036794>
- O'Shea, L. E., Picchioni, M. M., Mason, F. L., Sugarman, P. A., & Dickens, G. L. (2014). Predictive validity of the HCR-20 for inpatient self-harm. *Comprehensive Psychiatry, 55*(8), 1937-1949. <https://doi.org/10.1016/j.comppsy.2014.07.010>
- Ozga, A.-K., Kieser, M., Rauch, G. (2018). A systematic comparison of recurrent event models for application to composite endpoints. *BMC Medical Research Methodology, 18*(2). <https://doi.org/10.1186/s12874-017-0462-x>
- Pepe, M. S., Zheng, Y., Jin, Y., Huang, Y., Parikh, C. R., Levy, W. C. (2008). Evaluating the ROC performance markers for future events. *Lifetime Data Analysis, 14*, 86-113. <https://doi.org/10.1007/s10985-007-9073-x>
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to the addictive behaviors. *Addictions Nursing Network, 5*(1), 2-16. <https://doi.org/10.3109/10884609309149692>
- Pusch, N. & Holtfreter, K. (2021). Sex-based differences in criminal victimization of adolescents: A meta-analysis. *Journal of Youth and Adolescence, 50*(1), 4-28. <https://doi.org/10.1007/s10964-020-01321-y>
- Rice, M. E., & Harris, G. T. (1995). Violent recidivism: Assessing predictive validity. *Journal of Consulting and Clinical Psychology, 63*(5), 737-748. <https://doi.org/10.1037/0022-006X.63.5.737>

- Rice, M. E., & Harris, G. T. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's *d*, and *r*. *Law and Human Behavior*, 29(5), 615-620. <https://doi.org/10.1007/s10979-005-6832-7>
- Rice, M. E., Harris, G. T., & Lang, C. (2013). Validation of and revision to the VRAG and SORAG: The Violence Risk Appraisal Guide-Revised (VRAG-R). *Psychological Assessment*, 25(3), 951-965. <https://doi.org/10.1037/a0032878>
- Robin, X., Turck, N., Hainard, A., Tiberti, N., Lisacek, F., Sanchez, J. C., & Müller, M. (2011). pROC: An open-source package for R and S + to analyze and compare ROC curves. *BMC Bioinformatics*, 12, Article 77. <https://doi.org/10.1186/1471-2105-12-77>
- Singh, J. P., Grann, M., & Fazel, S. (2011). A comparative study of violence risk assessment tools: A systematic review and metaregression analysis of 68 studies involving 25,980 participants. *Clinical Psychology Review*, 31(3), 499-513. <https://doi.org/10.1016/j.cpr.2010.11.009>
- Singh, J. P., Yang, S., Mulvey, E. P., & the RAGEE Group. (2015). Reporting guidance for violence risk assessment predictive validity studies: The RAGEE Statement. *Law and Human Behavior*, 39(1), 15-22. <https://doi.org/10.1037/lhb0000090>
- Stewart, S. L., & Hirdes, J. P. (2015). Identifying mental health symptoms in children and youth in residential and in-patient care settings. *Healthcare Management Forum*, 28(4), 150-156. <https://doi.org/10.1177/0840470415581240>
- Stockdale, K. C., Olver, M. E., & Wong, C. P. (2014). The validity of the Violence Risk Scale-Youth Version in a diverse sample of violent young offenders. *Criminal Justice and Behavior*, 41(1), 114-138. <https://doi.org/10.1177/0093854813496999>
- Urquhart, T. A., & Viljoen, J. L. (2014). The use of the SAVRY and YLS/CMI in adolescent court proceedings: A case law review. *International Journal of Forensic Mental Health*, 13(1), 47-61. <https://doi.org/10.1080/14999013.2014.885470>
- Viljoen, J. L., Beneteau, J. L., Gulbransen, E., Brodersen, E., Desmarais, S. L., Nicholls, T. L., & Cruise, K. R. (2012). Assessment of multiple risk outcomes, strengths, and change with the START:AV: A short-term prospective study with adolescent offenders. *International Journal of Forensic Mental Health*, 11(3), 165-180. <https://doi.org/10.1080/14999013.2012.737407>
- Viljoen, J. L., Bhanwer, A. K., Shaffer, C. S., & Douglas, K. S. (2020). Assessing protective factors for adolescent offending: A conceptually informed examination of the SAVRY and YLS/CMI. *Assessment*, 27(5), 959-975. <https://doi.org/10.1177/1073191118768435>

- Viljoen, J. L., Cruise, K. R., Nicholls, T. L., Desmarais, S. L., & Webster, C. D. (2012). Taking stock and taking steps: The case for an adolescent version of the Short-Term Assessment of Risk and Treatability. *International Journal of Forensic Mental Health, 11*(3), 135-149. <https://doi.org/10.1080/14999013.2012.737406>
- Viljoen, J. L., Gray, A. L., & Barone, C. (2016). Assessing risk for violence and offending in adolescents. In R. Jackson and R. Roesch (Eds.), *Learning forensic assessment: Research and practice* (2nd ed., pp. 357-388). Routledge/Taylor & Francis Group.
- Viljoen, J. L., Gray, A. L., Shaffer, C., Bhanwer, A., Tafreshi, D., & Douglas, K. S. (2017). Does reassessment of risk improve predictions? A framework and examination of the SAVRY and YLS/CMI. *Psychological Assessment, 29*(9), 1096-1110. <https://doi.org/10.1037/pas0000402>
- Viljoen, J. L., Gray, A. L., Shaffer, C., Latzman, N. E., Scalora, M. J., & Ulman, D. (2017). Changes in J-SOAP-II and SAVRY scores over the course of residential, cognitive-behavioral treatment for adolescent sexual offending. *Sexual Abuse: A Journal of Research and Treatment, 29*(4), 342-374. <https://doi.org/10.1177/1079063215595404>
- Viljoen, J. L., McLachlan, K., & Vincent, G. M. (2010). Assessing violence risk and psychopathy in juvenile and adult offenders: A survey of clinical practices. *Assessment, 17*(3), 377-395. <https://doi.org/10.1177/1073191109359587>
- Viljoen, J. L., Nicholls, T. L., Cruise, K. R., Beneteau-Douglas, J., Desmarais, S. L., Barone, C. C., Petersen, K., Morin, S., & Webster, C. D. (2016). *START:AV knowledge guide: A research compendium on the START:AV strength and vulnerability items*. Simon Fraser University.
- Viljoen, J. L., Nicholls, T. L., Cruise, K. R., Desmarais, S. L., & Webster, C. D. (2014). *Short-Term Assessment of Risk and Treatability: Adolescent Version: START:AV User Guide*. Burnaby, British Columbia, Canada: Mental Health, Law and Policy Institute, Simon Fraser University.
- Viljoen, J., Shaffer, C., Bhanwer, A., Gray, A., Nicholls, T., Cruise, K., & Desmarais, S. (2015, September). *Are risk assessment tools created equal? A comparison of the SAVRY, YLS/CMI, and START:AV among adolescents on probation* [Paper presentation]. Young People and the Law Conference, Prato, Italy.
- Viljoen, J. L., Vargen, L. M., Cochrane, D. M., Jonnson, M. R., Goossens, I., & Monjazebe, S. (2021). Do structured risk assessments predict violent, any, and sexual offending better than unstructured judgment? An umbrella review. *Psychology, Public Policy, and Law, 27*(1), 79-97. <https://doi.org/10.1037/law0000299>

- Viljoen, J. L., & Vincent, G. M. (2020). Risk assessments for violence and reoffending: Implementation and impact on risk management. *Clinical Psychology: Science and Practice*. Advance online publication. Article e12378. <https://doi.org/10.1111/cpsp.12378>
- Webster, C. D., Martin, M.-L., Brink, J., Nicholls, T. L., & Middleton, C. (2004). *Short-Term Assessment of Risk and Treatability (START): An evaluation and planning guide* (Version 1.0, consultation ed.). Hamilton, ON: Forensic Psychiatric Services Commission, St. Joseph's Healthcare.
- Wong, S. C. P., Lewis, K., Stockdale, K., & Gordon, A. (2004-2011). The Violence Risk Scale: Youth Version (VRS: YV). Unpublished manuscript. Department of Psychology, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.
- Yehekel, A., Jekielek, A., & Sandor, S. (2020). Taking up residence: A review of outcome studies examining residential treatment for youth with serious emotional and behavioural disorders. *Children and Youth Services Review*, 111. Article 104842. <https://doi.org/10.1016/j.chidyouth.2020.104842>

2.7. Tables for Chapter 2

Table 2.1. Outcome Studies Examining Predictive Validity of the SAVRY, START:AV, and VRS-YV

Instrument and study	Measure	Outcome	<i>n</i>	Statistic	Results
SAVRY					
Guy (2008)	Risk total score	General reoffending	1,481 (<i>k</i> = 16)	AUC _w [95% CI]	.72 [.67, .77]
		Violent reoffending	720 (<i>k</i> = 8)		.75 [.67, .82]
		Non-violent reoffending	798 (<i>k</i> = 8)		.68 [.61, .75]
	Risk estimate	General reoffending	1,039 (<i>k</i> = 10)		.69 [.62, .75]
		Violent reoffending	493 (<i>k</i> = 5)		.79 [.69, .89]
		Non-violent reoffending	658 (<i>k</i> = 6)		.70 [.62, .77]
Koh et al. (2020a)	Risk total score	Violent reoffending	66 – 712 (<i>k</i> = 26)	AUC	.54 – .84
	Risk estimate	Violent reoffending	66 – 712 (<i>k</i> = 26)		.56 – .86
Olver et al. (2009)	Risk total score	General reoffending	807 (<i>k</i> = 7)	<i>r_w</i> [95% CI]	.32 [.28, .35]
		Violent reoffending	1,032 (<i>k</i> = 9)		.30 [.24, .36]
		Non-violent reoffending	229 (<i>k</i> = 2)		.38 [.24, .51]
		Sexual reoffending	169 (<i>k</i> = 1)		<i>r_{pb}</i> [95% CI]
Singh et al. (2011)	Risk total score	Serious reoffending	915 (<i>k</i> = 8)	Mdn AUC	
START:AV					
Sher et al. (2017)	Vulnerabilities	Physical aggression	90	AUC [95% CI]	.70 [.59, .81]
	Strengths	Physical aggression	90		.63 [.52, .75]
Viljoen, Beneteau, et al. (2012)	Vulnerabilities	General reoffending	81	AUC (SE)	.70 (.06)
		Violent reoffending	81		.70 (.07)
	Strengths	General reoffending	81		.69 (.07)
		Violent reoffending	81		.73 (.08)
	Risk estimate	General reoffending	81		.69 (.08)
		Violent reoffending	81		.65 (.07)

Instrument and study	Measure	Outcome	<i>n</i>	Statistic	Results	
VRS-YV						
Koh et al. (2020b) ^a	Total (pre)	General reoffending	233	AUC	.66	
		Violent reoffending	233		.63	
		Non-violent reoffending	233		.63	
Lovatt et al. (2021) ^a	Static	General reoffending	256	AUC [95% CI]	.62 [.55, .69]	
		Violent reoffending	256		.60 [.53, .67]	
		Non-violent reoffending	256		.62 [.55, .69]	
	Dynamic (pre)	General reoffending	256		.69 [.62, .75]	
		Violent reoffending	256		.68 [.62, .75]	
		Non-violent reoffending	256		.62 [.55, .69]	
	Total (pre)	General reoffending	256		.68 [.61, .74]	
		Violent reoffending	256		.67 [.60, .73]	
		Non-violent reoffending	256		.67 [.60, .73]	
	Stockdale et al. (2014)	Static	General reoffending	145	AUC [95% CI]	.71 [.63, .80]
			Violent reoffending	145		.77 [.69, .84]
			Non-violent reoffending	145		.71 [.62, .79]
Dynamic (pre)		General reoffending	145		.72 [.63, .81]	
		Violent reoffending	145		.75 [.67, .83]	
		Non-violent reoffending	145		.71 [.62, .80]	
Total (pre)		General reoffending	145		.73 [.64, .82]	
		Violent reoffending	145		.77 [.70, .85]	
		Non-violent reoffending	145		.72 [.64, .81]	

Note. SAVRY = Structured Assessment of Violence Risk in Youth; VRS-YV = Violence Risk Scale-Youth Version; START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version; AUC = area under the curve; CI = confidence interval; r_w = mean weighted correlation; r_{pb} = point-biserial correlation; Mdn = median; SE = standard error.

^a AUC values reported for Koh et al. (2020b) and Lovatt et al. (2021) are for 3-year and 5-year follow-up periods, respectively.

Table 2.2. Sample Characteristics (N = 87)

Sample characteristic	n (%)
DSM-IV-TR Diagnoses (any)	
Anxiety disorders	59 (67.8)
Attention-deficit and disruptive behavior disorders	42 (48.3)
Disorders usually first diagnosed in infancy, childhood, or adolescence	37 (42.5)
Mood disorders	54 (62.1)
Personality disorders (includes traits)	12 (13.8)
Schizophrenia and other psychotic disorders	28 (32.2)
Substance-related disorders	26 (29.9)
Education	
Currently attending school	31 (35.6)
Current/past special education ^a	74 (85.0)
Ever held back ^a	21 (24.1)
Ever suspended	34 (39.1)
Ever expelled ^a	13 (14.9)
Home and Relationships	
Currently residing with	
Both biological parents	23 (26.4)
Biological mother	24 (27.6)
Biological father	6 (6.9)
Other relatives	4 (4.6)
Adoptive parent/parents	6 (6.9)
Foster care	10 (11.5)
Group home	9 (10.3)
Custody	2 (2.3)
Residential facility	1 (1.1)
Living independently	2 (2.3)
History of foster care placement	22 (25.3)
History of gang involvement ^a	5 (5.7)
History of prostitution	3 (3.4)
History of pregnancy	4 (4.6)
Any children	1 (1.1)
Mental Health and Psychosocial Factors	
Previous mental health services	83 (95.4)
Previous psychiatric hospitalizations	68 (78.1)
Previously on psychotropic medication	81 (93.1)
Currently on psychotropic medication ^a	67 (77.0)
Past suicide attempt	
None	48 (55.2)
One prior attempt	15 (17.2)
Two or more prior attempts	24 (27.6)

Sample characteristic	<i>n</i> (%)
Prior NSSI	
None	29 (33.3)
One prior incident	5 (5.7)
Two or more prior incidents	53 (60.9)
Prior treatment for drugs/alcohol ^a	12 (13.7)
Previous residential treatment	11 (12.6)
Previous victimization ^a	76 (87.4)
Previous health neglect	83 (95.4)

Note. DSM-IV-TR = Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; American Psychiatric Association, 2000).

^a Includes possible cases combined with confirmed cases.

Table 2.3. Descriptive Statistics for Prior/Current Charges

Type of Prior/Current Charge	Base Rate	Frequency	
	<i>n</i> (%)	<i>M</i> (<i>SD</i>)	Range
Violent Offences			
Assault ^a	18 (20.7)	0.47 (1.06)	0 – 5
Murder	2 (2.3)	0.02 (0.15)	0 – 1
Robbery	2 (2.3)	0.02 (0.15)	0 – 1
Uttering threats	9 (10.3)	0.18 (0.69)	0 – 5
Non-Violent Offences			
Arson	3 (3.4)	0.05 (0.26)	0 – 2
Drug Offences	1 (1.1)	0.01 (0.11)	0 – 1
Miscellaneous	8 (9.2)	0.13 (0.45)	0 – 3
Obstruction of Justice	3 (3.4)	0.03 (0.18)	0 – 1
Theft	9 (10.3)	0.15 (0.47)	0 – 2
Violations	8 (9.2)	0.80 (4.18)	0 – 36
Weapon Offences	3 (3.4)	0.05 (0.26)	0 – 2

Note. *N* = 87. Categorization of prior/current charges was based on scoring procedures for the Criminal Versatility item outlined within the Psychopathy Checklist: Youth Version manual (Forth et al., 2003).

^aCategory of assault includes charges for violence committed against a police officer.

Table 2.4. Descriptive Statistics for Pre- and Post-Baseline Adverse Outcomes

Adverse Outcomes	Pre-Baseline				Post-Baseline		Days-at-Risk		
	Prior History		Recent History		<i>n</i>	%	<i>M</i>	<i>SD</i>	Range
	<i>n</i>	%	<i>n</i>	%					
Harm to Others and Rule Violations									
Violence	74	85.1	32	36.8	30	34.5	58.03	61.75	1 – 49
Non-Violent Offenses	61	70.1	23	13.8	18	20.7	83.70	110.89	1 – 818
Substance Abuse	44	50.6	33	37.9	25	28.7	85.47	117.70	2 – 818
Unauthorized Absences	71	81.6	53	60.9	23	26.4	89.16	120.21	2 – 818
Harm to the Adolescent									
Suicide Attempt	36	41.4	7	8.0	7	8.0	106.44	138.45	12 – 818
Non-Suicidal Self-Injury (NSSI)	57	65.5	34	39.1	13	14.9	97.93	136.77	2 – 818
Victimization	75	86.2	33	37.9	30	34.5	74.26	102.53	3 – 818
Health Neglect ^a	84	96.6	81	93.1	9	10.3	101.66	122.88	11 – 818

Note. *N* = 87.

^a Health neglect at post-baseline represents Sexual Risk-Taking.

Table 2.5. Descriptive Statistics for the SAVRY and START:AV Risk Estimates

	<i>n</i>	%
Structured Assessment of Violence Risk in Youth		
Risk estimate (violence)		
Low	26	29.9
Moderate	31	35.6
High	30	34.5
Risk estimate (non-violent)		
Low	35	40.2
Moderate	26	29.9
High	26	29.9
Short-Term Assessment of Risk and Treatability: Adolescent Version		
Risk estimate (violence)		
Low	36	41.4
Moderate	21	24.1
High	30	34.5
Risk estimate (non-violent offenses)		
Low	39	44.8
Moderate	25	28.7
High	23	26.4
Risk estimate (substance abuse)		
Low	46	52.9
Moderate	9	10.3
High	32	36.8
Risk estimate (unauthorized absences)		
Low	22	25.3
Moderate	27	31.0
High	38	43.7
Risk estimate (suicide)		
Low	53	60.9
Moderate	28	32.2
High	6	6.9
Risk estimate (non-suicidal self-injury)		
Low	31	35.6
Moderate	20	23.0
High	36	41.4
Risk estimate (victimization)		
Low	19	21.8
Moderate	40	46.0
High	28	32.2
Risk estimate (health neglect)		
Low	7	8.0
Moderate	44	50.6

	<i>n</i>	%
High	36	41.4

Table 2.6. Descriptive Statistics and Intercorrelations (Spearman's rho) for the SAVRY, VRS-YV, and START:AV Domain and Total Scores

Measure	M	SD	Range	Intercorrelations										
				1	2	3	4	5	6	7	8	9	10	
SAVRY														
1. Historical	9.80	4.10	2 – 20	-	.50	.53	-.36	.84	.46	-.42	.83	.62	.69	
2. Social/contextual	6.30	2.44	1 – 12		-	.61	-.64	.78	.68	-.56	.59	.68	.70	
3. Individual/clinical	9.07	4.20	0 – 16			-	-.63	.87	.79	-.78	.53	.86	.84	
4. Protective	1.59	1.34	0 – 4				-	-.63	-.62	.69	-.38	-.59	-.58	
5. Risk total score	25.10	9.01	7 – 41					-	.76	-.70	.79	.87	.90	
START:AV														
6. Vulnerabilities	28.64	8.38	11 – 46						-	-.82	.48	.77	.76	
7. Strengths	20.43	8.95	4 – 41							-	-.41	-.72	-.70	
VRS-YV														
8. Static	5.47	2.95	0 – 12									-	.64	.74
9. Dynamic	29.29	13.35	4 – 57										-	.99
10. Total	34.77	15.42	4 – 66											-

Note. SAVRY = Structured Assessment of Violence Risk in Youth; VRS-YV = Violence Risk Scale-Youth Version; START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version. All correlation coefficients significant at the $p < .001$ level.

Table 2.7. Structured Assessment of Violence Risk in Youth (SAVRY) Predictive Validity Analyses for Harm to Others and Rule Violations

SAVRY	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					B	SE	Wald	HR	95% CI _{HR}
Violence									
Historical	.58	[.46, .71]	-.02	.14	.04	.04	0.92	1.04	[0.96, 1.14]
Social/contextual	.60	[.47, .73]	.01	.19	.11	.08	2.03	1.12	[0.96, 1.30]
Individual/clinical	.70***	[.59, .81]	-.12	.36**	.12	.05	6.53*	1.13	[1.03, 1.24]
Protective ^a	.60	[.48, .73]	-.01	-.20	-.18	.15	1.56	0.83	[0.63, 1.11]
Risk total score	.65*	[.53, .77]	-.06	.28*	.04	.02	4.09*	1.04	[1.00, 1.09]
Risk estimate (violence)	.77***	[.68, .87]	-.16	.49***	1.07	.29	13.75***	2.91	[1.65, 5.11]
Risk estimate (non-violent)	.65*	[.53, .77]	-.09	.29**	.49	.22	4.78*	1.63	[1.05, 2.53]
Non-Violent Offenses									
Historical	.69**	[.57, .82]	-.01	.29**	.14	.06	5.68*	1.15	[1.03, 1.30]
Social/contextual	.83***	[.74, .92]	-.03	.47***	.38	.11	12.12***	1.46	[1.18, 1.80]
Individual/clinical	.79***	[.70, .88]	.02	.42***	.23	.08	8.39**	1.26	[1.08, 1.47]
Protective ^a	.80***	[.69, .90]	.05	-.43***	-.97	.31	9.73**	0.38	[0.21, 0.70]
Risk total score	.81***	[.72, .90]	-.00	.46***	.12	.04	11.13***	1.13	[1.05, 1.21]
Risk estimate (violence)	.84***	[.76, .92]	.04	.51***	1.87	.58	10.36***	6.48	[2.08, 20.20]
Risk estimate (non-violent)	.90***	[.84, .96]	-.11	.60***	3.15	.99	10.12**	23.35	[3.35, 162.70]
Substance Abuse									
Historical	.61	[.48, .73]	.04	.19	.03	.05	0.41	1.03	[0.94, 1.13]
Social/contextual	.74***	[.63, .86]	.06	.41***	.21	.09	5.34*	1.23	[1.03, 1.46]
Individual/clinical	.79***	[.68, .90]	.02	.46***	.18	.06	8.57**	1.20	[1.06, 1.36]
Protective ^a	.72***	[.60, .84]	-.02	-.38***	-.44	.20	4.95*	0.64	[0.43, 0.95]
Risk total score	.74***	[.63, .85]	.05	.41***	.06	.03	5.10*	1.06	[1.01, 1.11]
Risk estimate (violence)	.73***	[.62, .84]	.14	.37***	.61	.31	3.91	1.85	[1.01, 3.39]
Risk estimate (non-violent)	.77***	[.66, .87]	-.01	.44***	.81	.28	8.45**	2.26	[1.30, 3.90]

SAVRY	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					<i>B</i>	<i>SE</i>	Wald	HR	95% CI _{HR}
Unauthorized Absences									
Historical	.68*	[.54, .82]	.02	.31**	.12	.05	5.22*	1.13	[1.02, 1.25]
Social/contextual	.69**	[.57, .81]	.03	.32**	.18	.09	4.13*	1.19	[1.01, 1.41]
Individual/clinical	.73***	[.62, .85]	.03	.38***	.15	.06	6.50*	1.16	[1.04, 1.31]
Protective ^a	.67*	[.53, .80]	-.03	-.27*	-.33	.19	3.04	0.72	[0.50, 1.04]
Risk total score	.75***	[.62, .88]	.03	.41***	.08	.03	7.62**	1.08	[1.02, 1.14]
Risk estimate (violence)	.70***	[.59, .81]	.19	.33**	.59	.31	3.78	1.81	[1.00, 3.29]
Risk estimate (non-violent)	.74***	[.63, .85]	.02	.40***	.83	.29	8.30**	2.30	[1.31, 4.05]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

^a For ease of interpretation, scores on the Protective Factors domain were reversed for the AUC analysis such that higher scores represent a deficit in protective factors.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.8. Structured Assessment of Violence Risk in Youth (SAVRY) Predictive Validity Analyses for Harm to the Adolescent

SAVRY	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					<i>B</i>	<i>SE</i>	Wald	HR	95% CI _{HR}
Suicide Attempt									
Historical	.58	[.34, .81]	.17	.07	.02	.09	0.06	1.02	[0.86, 1.22]
Social/contextual	.60	[.36, .84]	.26*	.09	.07	.16	0.19	1.07	[0.78, 1.48]
Individual/clinical	.72**	[.55, .89]	.28*	.21	.15	.11	1.61	1.16	[0.92, 1.45]
Protective ^a	.68	[.45, .91]	-.21*	-.17	-.39	.37	1.14	0.67	[0.33, 1.39]
Risk total score	.65	[.44, .87]	.28*	.14	.04	.05	0.70	1.04	[0.95, 1.14]
Risk estimate (violence)	.64	[.49, .79]	.38***	.14	.28	.54	0.26	1.32	[0.45, 3.82]
Risk estimate (non-violent)	.69	[.49, .88]	.23*	.19	.58	.51	1.32	1.79	[0.66, 4.81]
Non-Suicidal Self-Injury									
Historical	.55	[.38, .72]	.14	.05	.02	.07	0.07	1.02	[0.89, 1.16]
Social/contextual	.64	[.48, .80]	.24*	.17	.10	.12	0.73	1.11	[0.88, 1.39]
Individual/clinical	.60	[.48, .73]	.26*	.12	.04	.07	0.34	1.04	[0.91, 1.20]
Protective ^a	.73**	[.59, .87]	-.12	-.30**	-.61	.29	4.28*	0.54	[0.31, 0.97]
Risk total score	.61	[.45, .76]	.25*	.12	.02	.03	0.39	1.02	[0.96, 1.09]
Risk estimate (violence)	.76**	[.63, .89]	.25*	.34**	1.15	.51	5.12*	3.15	[1.17, 8.52]
Risk estimate (non-violent)	.78***	[.68, .87]	.11	.36***	1.07	.43	6.22*	2.92	[1.26, 6.77]
Victimization									
Historical	.66**	[.55, .78]	.03	.28**	.08	.05	2.86	1.08	[0.99, 1.19]
Social/contextual	.62*	[.50, .75]	.17	.20	.07	.08	0.69	1.07	[0.92, 1.25]
Individual/clinical	.73***	[.62, .84]	.06	.38***	.11	.05	4.77*	1.12	[1.01, 1.23]
Protective ^a	.62*	[.50, .74]	-.11	-.19	-.11	.15	0.49	0.90	[0.66, 1.21]
Risk total score	.72***	[.61, .83]	.08	.37***	.05	.02	3.95	1.05	[1.00, 1.09]
Risk estimate (violence)	.72***	[.61, .82]	.09	.38***	.54	.27	4.00	1.71	[1.01, 2.89]

SAVRY	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					<i>B</i>	<i>SE</i>	Wald	HR	95% CI _{HR}
Risk estimate (non-violent)	.68**	[.57, .80]	-.02	.33**	.50	.24	4.53*	1.65	[1.04, 2.62]
Sexual Risk-Taking									
Historical	.64	[.43, .86]	.14	.16	.07	.08	0.72	1.07	[0.91, 1.26]
Social/contextual	.71*	[.51, .92]	.22*	.23*	.22	.14	2.39	1.25	[0.94, 1.65]
Individual/clinical	.68	[.48, .89]	.27*	.20	.11	.10	1.36	1.12	[0.92, 1.37]
Protective ^a	.71*	[.51, .91]	-.19	-.23*	-.51	.35	2.05	0.60	[0.30, 1.21]
Risk total score	.73*	[.51, .94]	.24*	.25*	.06	.04	1.84	1.06	[0.97, 1.16]
Risk estimate (violence)	.74**	[.57, .91]	.31**	.28**	.93	.60	2.41	2.52	[0.78, 8.11]
Risk estimate (non-violent)	.77***	[.62, .93]	.18	.32**	1.23	.57	4.66*	3.43	[1.12, 10.49]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

^a For ease of interpretation, scores on the Protective Factors domain were reversed for the AUC analysis such that higher scores represent a deficit in protective factors.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.9. Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV) Predictive Validity Analyses for Harm to Others and Rule Violations

START:AV	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					B	SE	Wald	HR	95% CI _{HR}
Violence									
Vulnerabilities	.71***	[.59, .83]	-.11	.39***	.07	.02	7.66**	1.07	[1.02, 1.13]
Strengths ^a	.70***	[.59, .81]	.10	-.35***	-.06	.02	7.03**	0.94	[0.90, 0.98]
Risk estimate	.79***	[.69, .88]	-.15	.53***	.96	.25	14.42***	2.61	[1.59, 4.27]
Non-Violent Offenses									
Vulnerabilities	.82***	[.72, .91]	.07	.45***	.12	.04	8.90**	1.12	[1.04, 1.22]
Strengths ^a	.77***	[.66, .87]	-.02	-.39***	-.09	.03	7.10**	0.91	[0.86, 0.98]
Risk estimate	.83***	[.75, .91]	-.09	.49***	1.41	.38	14.08***	4.08	[1.96, 8.52]
Substance Abuse									
Vulnerabilities	.83***	[.75, .92]	.03	.53***	.10	.03	11.28***	1.11	[1.04, 1.18]
Strengths ^a	.72***	[.61, .84]	-.07	-.37***	-.05	.03	3.97	0.95	[0.90, 1.00]
Risk estimate	.84***	[.75, .93]	-.23*	.61***	1.28	.31	17.00***	3.60	[1.96, 6.62]
Unauthorized Absences									
Vulnerabilities	.76***	[.65, .87]	.03	.41***	.09	.03	9.07**	1.10	[1.03, 1.17]
Strengths ^a	.76***	[.64, .87]	-.03	-.40***	-.08	.03	8.09**	0.92	[0.87, 0.97]
Risk estimate	.73***	[.63, .83]	-.12	.37***	1.07	.37	8.39**	2.93	[1.42, 6.05]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; B = regression coefficient; SE = standard error of B; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

^a For ease of interpretation, scores on the Strengths domain were reversed for the AUC analysis such that higher scores represent a deficit in strengths.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.10. Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV) Predictive Validity Analyses for Harm to the Adolescent

START:AV	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					<i>B</i>	<i>SE</i>	Wald	HR	95% CI _{HR}
Suicide Attempt									
Vulnerabilities	.76***	[.61, .92]	.32**	.24*	.08	.06	2.02	1.08	[0.97, 1.21]
Strengths ^a	.72*	[.55, .89]	-.29**	-.20	-.07	.05	1.65	0.93	[0.84, 1.04]
Risk estimate	.81***	[.64, .99]	-.06	.35**	1.69	.53	10.17**	5.44	[1.92, 15.40]
Non-Suicidal Self-Injury									
Vulnerabilities	.72***	[.61, .84]	.27*	.28**	.06	.04	2.83	1.07	[0.99, 1.15]
Strengths ^a	.72***	[.60, .83]	-.18	-.28*	-.07	.04	3.24	0.93	[0.87, 1.01]
Risk estimate	.68*	[.53, .82]	.02	.24*	.67	.38	3.14	1.96	[0.93, 4.13]
Victimization									
Vulnerabilities	.71***	[.60, .83]	.10	.35***	.05	.03	3.51	1.05	[1.00, 1.10]
Strengths ^a	.73***	[.62, .84]	-.04	-.38***	-.05	.02	4.94*	0.95	[0.90, 0.99]
Risk estimate	.52	[.40, .64]	.17	.05	-.31	.27	1.27	0.74	[0.43, 1.25]
Sexual Risk-Taking									
Vulnerabilities	.71**	[.55, .86]	.31**	.23*	.06	.05	1.70	1.06	[0.97, 1.17]
Strengths ^a	.70*	[.51, .88]	-.25*	-.21*	-.06	.05	1.54	0.94	[0.86, 1.03]
Risk estimate	.54	[.37, .71]	-.07	.05	.36	.56	0.41	1.43	[0.48, 4.29]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

^a For ease of interpretation, scores on the Strengths domain were reversed for the AUC analysis such that higher scores represent a deficit in strengths.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.11. Violence Risk Scale – Youth Version (VRS – YV) Predictive Validity Analyses for Harm to Others and Rule Violations

VRS-YV	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					B	SE	Wald	HR	95% CI _{HR}
Violence									
Static	.58	[.45, .70]	.01	.15	.05	.06	0.71	1.05	[0.93, 1.19]
Dynamic	.73***	[.62, .84]	-.10	.44***	.04	.01	8.96**	1.04	[1.02, 1.07]
Total	.71***	[.60, .83]	-.08	.41***	.03	.01	7.52**	1.03	[1.01, 1.06]
Non-Violent Offenses									
Static	.71***	[.59, .84]	-.02	.32**	.22	.09	5.99*	1.24	[1.04, 1.48]
Dynamic	.84***	[.76, .92]	.12	.49***	.07	.02	9.56**	1.07	[1.03, 1.12]
Total	.84***	[.76, .92]	.10	.49***	.06	.02	9.84**	1.06	[1.02, 1.11]
Substance Abuse									
Static	.62	[.50, .75]	.10	.22*	.05	.07	0.44	1.05	[0.91, 1.20]
Dynamic	.77***	[.67, .87]	.18	.42***	.03	.02	3.95	1.03	[1.00, 1.07]
Total	.76***	[.65, .86]	.17	.41***	.03	.01	3.38	1.03	[1.00, 1.06]
Unauthorized Absences									
Static	.67*	[.53, .82]	.04	.30**	.14	.08	3.28	1.15	[0.99, 1.33]
Dynamic	.73***	[.60, .85]	.19	.37***	.03	.02	4.03*	1.03	[1.00, 1.07]
Total	.73***	[.60, .86]	.17	.38***	.03	.01	4.32*	1.03	[1.00, 1.06]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; B = regression coefficient; SE = standard error of B; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.12. Violence Risk Scale – Youth Version (VRS – YV) Predictive Validity Analyses for Harm to the Adolescent

VRS-YV	AUC	95% CI _{AUC}	r_s^{Time}	r_s^{Incident}	Cox Proportional Hazards Model				
					B	SE	Wald	HR	95% CI _{HR}
Suicide Attempt									
Static	.57	[.35, .79]	.17	.06	.02	.13	0.02	1.02	[0.79, 1.32]
Dynamic	.67	[.46, .88]	.41***	.15	.02	.03	0.37	1.02	[0.96, 1.08]
Total	.66	[.45, .88]	.38***	.15	.01	.03	0.30	1.02	[0.96, 1.07]
Non-Suicidal Self-Injury									
Static	.46	[.27, .64]	.24*	-.07	-.12	.10	1.45	0.89	[0.73, 1.08]
Dynamic	.64	[.49, .80]	.38***	.17	.01	.02	0.40	1.01	[0.97, 1.06]
Total	.62	[.46, .78]	.36***	.14	.01	.02	0.10	1.01	[0.97, 1.04]
Victimization									
Static	.65*	[.54, .77]	.05	.26*	.07	.06	1.29	1.08	[0.95, 1.22]
Dynamic	.75***	[.64, .85]	.11	.42***	.03	.01	4.21*	1.03	[1.00, 1.06]
Total	.74***	[.63, .85]	.10	.41***	.03	.01	3.94	1.03	[1.00, 1.05]
Sexual Risk-Taking									
Static	.65	[.39, .90]	.16	.16	.11	.13	0.78	1.12	[0.87, 1.44]
Dynamic	.76**	[.58, .95]	.37***	.29**	.05	.03	2.30	1.05	[0.99, 1.11]
Total	.76*	[.55, .96]	.34**	.28**	.04	.03	2.19	1.04	[0.99, 1.10]

Note. AUC = area under the curve; CI_{AUC} = confidence interval of AUC; r_s^{Time} = Spearman's rho correlation with days-at-risk; r_s^{Incident} = Spearman's rho correlation with number of incidents; B = regression coefficient; SE = standard error of B; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.13. Time-Dependent AUC Values for Violence and Suicidal/Non-Suicidal Self-Injury

Measure	Violence (AUC _{t^{CD}})			Suicidal/Non-Suicidal Self-Injury (AUC _{t^{CD}})		
	30 days	90 days	180 days	30 days	90 days	180 days
SAVRY						
Protective ^a	.54	.63	.61	.71	.71	.71
Risk total score	.63	.69	.24	.49	.61	.65
Risk estimate (violence)	.74	.78	.75	.72	.69	.73
START:AV						
Vulnerabilities	.60	.71	.56	.58	.69	.74
Strengths ^a	.62	.69	.35	.63	.63	.68
Risk estimate (violence)	.71	.81	.80	-	-	-
Risk estimate (suicide)	-	-	-	.72	.67	.77
Risk estimate (NSSI)	-	-	-	.57	.61	.68
VRS-YV						
Static	.59	.63	.26	.41	.48	.44
Dynamic	.63	.74	.57	.51	.65	.70
Total	.63	.73	.47	.48	.63	.67

Note. AUC_{t^{CD}} = Cumulative/dynamic time-dependent AUC; SAVRY = Structured Assessment of Violence Risk in Youth; VRS-YV = Violence Risk Scale-Youth Version; START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version.

^aFor ease of interpretation, scores on the Protective/Strengths domains were reversed for the time-dependent AUC analysis such that higher scores represent a deficit in protective factors/strengths.

Table 2.14. Recurrent Event Survival Analysis for Violence and Suicidal/Non-Suicidal Self-Injury

	Anderson-Gill Model				
	<i>B</i>	<i>SE_R</i>	Wald	HR	95% CI _{HR}
Violence					
SAVRY					
Historical	.00	.04	0.00	1.00	[0.93, 1.08]
Social/contextual	.15	.05	9.49**	1.16	[1.06, 1.28]
Individual/clinical	.16	.04	20.22***	1.17	[1.09, 1.25]
Protective	-.23	.13	3.47	0.79	[0.62, 1.01]
Risk total score	.04	.02	7.15**	1.04	[1.01, 1.08]
Risk estimate (violence)	1.00	.28	12.94***	2.72	[1.58, 4.69]
START:AV					
Vulnerabilities	.08	.02	17.01***	1.08	[1.04, 1.13]
Strengths	-.06	.02	11.69***	0.94	[0.91, 0.97]
Risk estimate (violence)	1.18	.25	22.95***	3.27	[2.01, 5.30]
VRS-YV					
Static	.05	.06	0.69	1.05	[0.93, 1.18]
Dynamic	.06	.01	40.07***	1.06	[1.04, 1.08]
Total	.04	.01	28.49***	1.04	[1.03, 1.06]
Suicidal/Non-Suicidal Self-Injury					
SAVRY					
Historical	-.02	.06	0.10	0.98	[0.88, 1.10]
Social/contextual	.07	.10	0.43	1.07	[0.88, 1.30]
Individual/clinical	.05	.05	0.69	1.05	[0.94, 1.16]
Protective	-.53	.43	1.51	0.59	[0.25, 1.37]
Risk total score	.01	.03	0.15	1.01	[0.96, 1.06]
Risk estimate (violence)	.43	.44	0.95	1.54	[0.64, 3.66]
START:AV					
Vulnerabilities	.07	.03	6.87**	1.07	[1.02, 1.13]
Strengths	-.08	.02	9.57**	0.93	[0.88, 0.97]
Risk estimate (suicide)	1.39	.24	33.22***	4.00	[2.50, 6.40]
Risk estimate (NSSI)	.80	.31	6.60*	2.22	[1.21, 4.09]
VRS-YV					
Static	-.14	.09	2.36	0.87	[0.72, 1.04]
Dynamic	.01	.02	0.10	1.01	[0.97, 1.05]
Total	-.00	.02	0.02	1.00	[0.97, 1.03]

Note. *B* = regression coefficient; *SE_R* = robust standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.15. Conditional Recurrent Event Survival Analysis for Violence and Suicidal/Non-Suicidal Self-Injury

	PWP-CP Model				
	<i>B</i>	<i>SE_R</i>	Wald	HR	95% <i>CI</i> _{HR}
Violence					
SAVRY					
Historical	-.00	.03	0.01	1.00	[0.95, 1.05]
Social/contextual	.07	.04	2.97	1.07	[0.99, 1.17]
Individual/clinical	.11	.03	18.14***	1.12	[1.06, 1.18]
Protective	-.07	.08	0.65	0.93	[0.79, 1.10]
Risk total score	.03	.01	5.65*	1.03	[1.01, 1.05]
Risk estimate (violence)	.88	.22	15.58***	2.41	[1.56, 3.73]
START:AV					
Vulnerabilities	.05	.02	8.92**	1.05	[1.02, 1.09]
Strengths	-.04	.01	9.70**	0.96	[0.93, 0.98]
Risk estimate (violence)	.93	.22	18.60***	2.53	[1.66, 3.87]
VRS-YV					
Static	.04	.04	0.89	1.04	[0.96, 1.12]
Dynamic	.05	.01	23.25***	1.05	[1.03, 1.07]
Total	.04	.01	20.34***	1.04	[1.02, 1.06]
Suicidal/Non-Suicidal Self-Injury					
SAVRY					
Historical	-.01	.05	0.04	0.99	[0.90, 1.09]
Social/contextual	.06	.09	0.42	1.06	[0.89, 1.26]
Individual/clinical	.06	.05	1.34	1.06	[0.96, 1.17]
Protective	-.36	.39	0.86	0.70	[0.32, 1.50]
Risk total score	.01	.02	0.34	1.01	[0.97, 1.06]
Risk estimate (violence)	.19	.33	0.33	1.21	[0.63, 2.33]
START:AV					
Vulnerabilities	.07	.02	8.11**	1.07	[1.02, 1.12]
Strengths	-.07	.02	8.31**	0.93	[0.89, 0.98]
Risk estimate (suicide)	1.32	.23	33.81***	3.73	[2.39, 5.81]
Risk estimate (NSSI)	.69	.25	7.46**	2.00	[1.22, 3.29]
VRS-YV					
Static	-.10	.08	1.38	0.91	[0.77, 1.07]
Dynamic	.01	.02	0.26	1.01	[0.98, 1.04]
Total	.00	.01	0.04	1.00	[0.97, 1.03]

Note. PWP-CP = Prentice-Williams-Peterson Conditional Probability Model; *B* = regression coefficient; *SE_R* = robust standard error of *B*; HR = hazard ratio; *CI*_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

2.8. Figures for Chapter 2

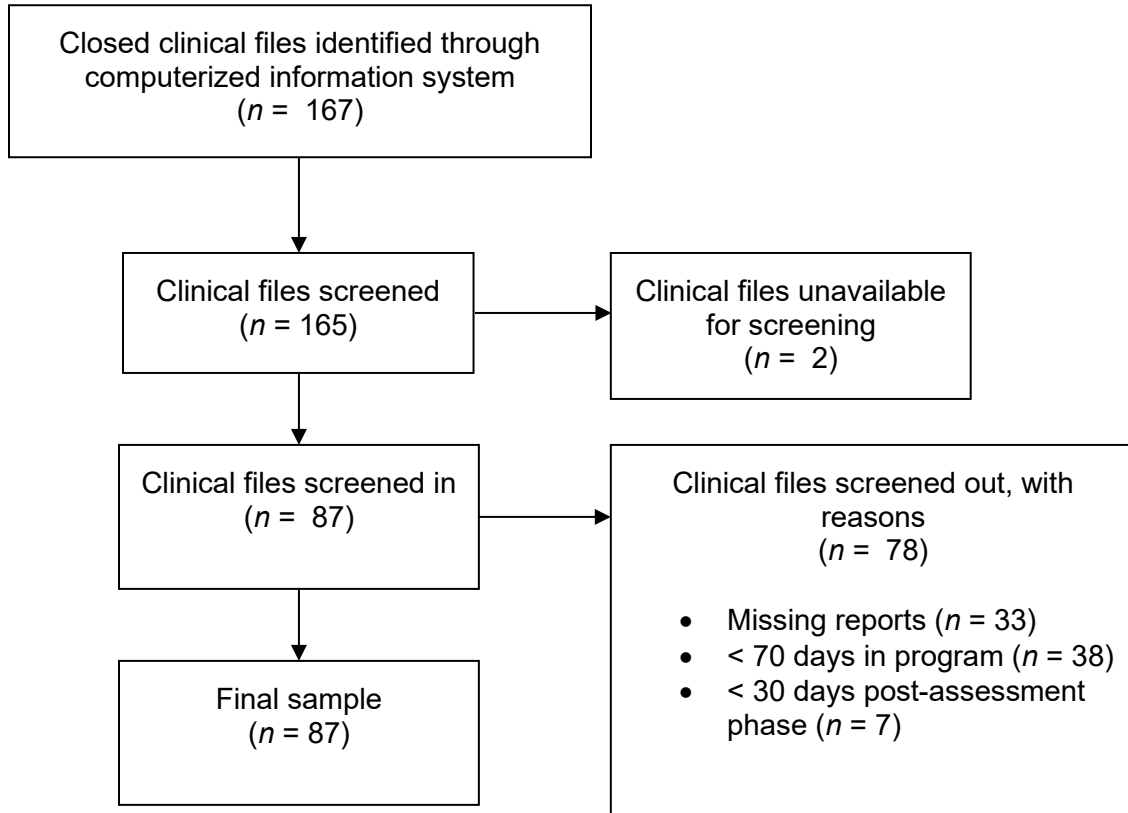


Figure 2.1. Screening Process

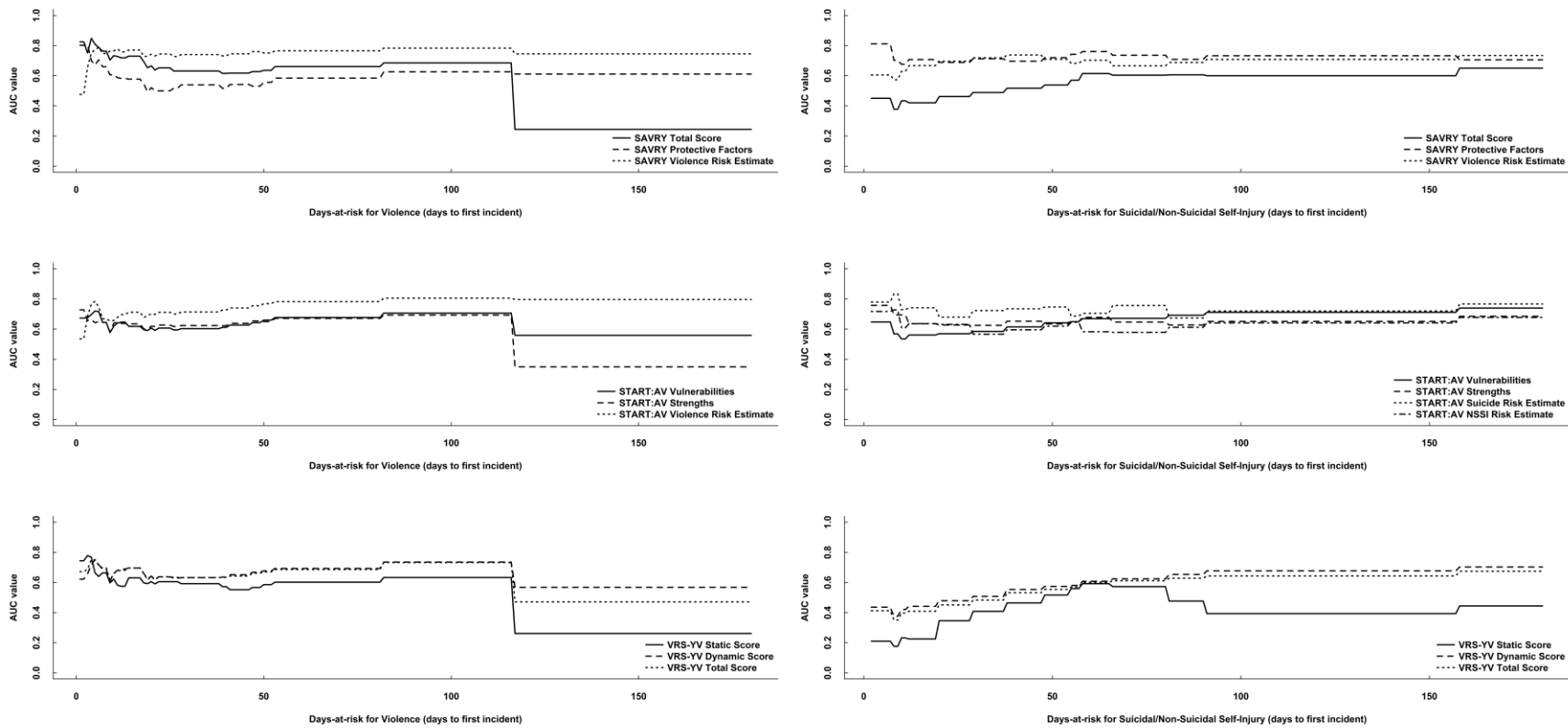


Figure 2.2. Time-dependent AUC Analysis Predicting Violence and Suicidal/Non-Suicidal Self-Injury (N=87)

Note. AUC = area under the curve. For ease of interpretation, scores on the Protective/Strengths domains were reversed for the time-dependent AUC analysis such that higher scores represent a deficit in protective factors/strengths.

2.9. Supplemental Information: Additional Tables

Table 2.16. Intercorrelations (Spearman's rho) for the SAVRY and START:AV Risk Estimates

Measure	6	7	13	14	15	16	17	18	19	20
SAVRY										
1. Historical	.55	.49	.34**	.40	.34**	.27*	.08 ^a	.30**	.13 ^a	.25*
2. Social/contextual	.53	.61	.53	.59	.52	.25*	.15 ^a	.22*	.34**	.12 ^a
3. Individual/clinical	.73	.69	.70	.64	.60	.43	.01 ^a	.21 ^a	.23*	.27*
4. Protective	-.49	-.53	-.46	-.42	-.46	-.31**	-.21 ^a	-.24*	-.11 ^a	-.18 ^a
5. Risk total score	.75	.70	.63	.64	.57	.39	.08 ^a	.29**	.26*	.28*
Risk estimate										
6. Violent	-	.61	.83	.55	.45	.35	.08 ^a	.19 ^a	.33**	.35**
7. Non-violent		-	.54	.75	.63	.52	.14 ^a	.20 ^a	.32**	.25*
VRS-YV										
8. Static	.49	.49	.42	.41	.32**	.17 ^a	.08 ^a	.18 ^a	.16 ^a	.05 ^a
9. Dynamic	.82	.69	.81	.67	.50	.35**	.07 ^a	.26*	.25*	.24*
10. Total	.80	.70	.79	.66	.50	.34**	.06 ^a	.26*	.24*	.22*
START:AV										
11. Vulnerabilities	.67	.65	.72	.68	.70	.51	.21*	.41	.28**	.41
12. Strengths	-.64	-.62	-.66	-.58	-.56	.52	-.18 ^a	-.23*	-.14 ^a	-.38
Risk estimate										
13. Violence			-	.61	.42	.30**	.14 ^a	.17 ^a	.42	.30**
14. Non-violent offenses				-	.61	.58	.08 ^a	.16 ^a	.38	.18 ^a
15. Substance abuse					-	.47	.10 ^a	.27*	.08 ^a	.32**
16. Unauthorized absences						-	.08 ^a	.11 ^a	.20 ^a	.24*
17. Suicide							-	.37	.06 ^a	.10 ^a
18. NSSI								-	-.07 ^a	.32**
19. Victimization									-	.07 ^a

Measure	6	7	13	14	15	16	17	18	19	20
20. Health neglect										-

Note. SAVRY = Structured Assessment of Violence Risk in Youth; VRS-YV = Violence Risk Scale-Youth Version; START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version. All correlation coefficients significant at the $p < .001$ level (two-tailed test) unless otherwise specified.

^a Correlation is non-significant.

* $p < .05$, ** $p < .01$ (two-tailed test).

Table 2.17. Penalized Cox Proportional Hazards Analysis of the Structured Assessment of Violence Risk in Youth (SAVRY) for Harm to Others and Rule Violations

SAVRY	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Violence					
Historical	.04	.04	0.92	1.04	[0.96, 1.14]
Social/contextual	.11	.08	2.03	1.12	[0.96, 1.30]
Individual/clinical	.12	.05	6.95**	1.13	[1.03, 1.24]
Protective	-.17	.15	1.52	0.84	[0.63, 1.11]
Risk total score	.04	.02	4.17*	1.04	[1.00, 1.09]
Risk estimate (violence)	1.03	.28	16.51***	2.81	[1.67, 5.11]
Risk estimate (non-violent)	.48	.22	4.86*	1.62	[1.05, 2.52]
Non-Violent Offenses					
Historical	.14	.06	5.76*	1.15	[1.03, 1.29]
Social/contextual	.37	.11	13.35***	1.45	[1.18, 1.80]
Individual/clinical	.22	.08	10.28**	1.24	[1.08, 1.47]
Protective	-.91	.30	13.54***	0.40	[0.21, 0.68]
Risk total score	.12	.04	13.74***	1.12	[1.05, 1.21]
Risk estimate (violence)	1.72	.54	17.30***	5.59	[2.25, 19.81]
Risk estimate (non-violent)	2.74	.80	34.74***	15.47	[4.51, 132.63]
Substance Abuse					
Historical	.03	.05	0.44	1.03	[0.94, 1.13]
Social/contextual	.20	.09	5.47*	1.22	[1.03, 1.46]
Individual/clinical	.18	.06	9.79**	1.19	[1.06, 1.36]
Protective	-.42	.20	5.31*	0.65	[0.43, 0.94]
Risk total score	.05	.02	5.34*	1.06	[1.01, 1.11]
Risk estimate (violence)	.59	.31	4.08*	1.80	[1.02, 3.39]
Risk estimate (non-violent)	.79	.28	9.47**	2.19	[1.32, 3.90]
Unauthorized Absences					
Historical	.12	.05	5.28*	1.13	[1.02, 1.25]
Social/contextual	.17	.09	4.20*	1.19	[1.01, 1.41]
Individual/clinical	.15	.06	7.10**	1.16	[1.04, 1.31]
Protective	-.31	.19	3.11	0.73	[0.50, 1.03]
Risk total score	.07	.03	8.35**	1.08	[1.02, 1.14]
Risk estimate (violence)	.57	.30	3.96*	1.76	[1.01, 3.29]
Risk estimate (non-violent)	.81	.29	9.19**	2.24	[1.32, 4.05]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.18. Penalized Cox Proportional Hazards Analysis of the Structured Assessment of Violence Risk in Youth (SAVRY) for Harm to the Adolescent

SAVRY	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Suicide Attempt					
Historical	.03	.09	0.09	1.03	[0.86, 1.22]
Social/contextual	.07	.16	0.17	1.07	[0.78, 1.48]
Individual/clinical	.12	.11	1.54	1.13	[0.94, 1.45]
Protective	-.33	.36	1.00	0.72	[0.33, 1.34]
Risk total score	.03	.05	0.61	1.03	[0.95, 1.14]
Risk estimate (violence)	.21	.53	0.18	1.23	[0.48, 3.76]
Risk estimate (non-violent)	.51	.49	1.28	1.67	[0.70, 4.72]
Non-Suicidal Self-Injury					
Historical	.02	.07	0.09	1.02	[0.89, 1.16]
Social/contextual	.10	.12	0.70	1.10	[0.88, 1.39]
Individual/clinical	.04	.07	0.28	1.04	[0.91, 1.20]
Protective	-.56	.29	4.84*	0.57	[0.31, 0.95]
Risk total score	.02	.03	0.35	1.02	[0.96, 1.09]
Risk estimate (violence)	1.05	.49	6.25*	2.85	[1.23, 8.43]
Risk estimate (non-violent)	1.00	.42	7.66**	2.70	[1.31, 6.73]
Victimization					
Historical	.08	.05	2.87	1.08	[0.99, 1.19]
Social/contextual	.06	.08	0.67	1.07	[0.92, 1.25]
Individual/clinical	.11	.05	4.99*	1.11	[1.01, 1.23]
Protective	-.10	.15	0.44	0.90	[0.66, 1.21]
Risk total score	.04	.02	4.05*	1.04	[1.00, 1.09]
Risk estimate (violence)	.52	.27	4.13*	1.68	[1.02, 2.89]
Risk estimate (non-violent)	.49	.24	4.63*	1.63	[1.04, 2.62]
Sexual Risk-Taking					
Historical	.07	.08	0.76	1.07	[0.91, 1.26]
Social/contextual	.21	.14	2.41	1.24	[0.95, 1.65]
Individual/clinical	.10	.10	1.29	1.11	[0.93, 1.36]
Protective	-.44	.34	2.06	0.64	[0.30, 1.16]
Risk total score	.05	.04	1.82	1.06	[0.98, 1.16]
Risk estimate (violence)	.81	.57	2.55	2.24	[0.84, 7.93]
Risk estimate (non-violent)	1.10	.54	5.81*	3.01	[1.21, 10.24]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.19. Penalized Cox Proportional Hazards Analysis of the Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV) for Harm to Others and Rule Violations

START:AV	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Violence					
Vulnerabilities	.07	.02	8.19**	1.07	[1.02, 1.12]
Strengths	-.06	.02	7.44**	0.94	[0.90, 0.98]
Risk estimate	.93	.25	17.30***	2.53	[1.61, 4.27]
Non-Violent Offenses					
Vulnerabilities	.11	.04	10.98***	1.12	[1.04, 1.21]
Strengths	-.09	.03	7.89**	0.92	[0.86, 0.98]
Risk estimate	1.35	.37	18.74***	3.85	[2.02, 8.51]
Substance Abuse					
Vulnerabilities	.10	.03	13.11***	1.11	[1.05, 1.18]
Strengths	-.05	.03	4.09*	0.95	[0.90, 1.00]
Risk estimate	1.22	.30	25.86***	3.39	[2.02, 6.58]
Unauthorized Absences					
Vulnerabilities	.09	.03	10.39**	1.10	[1.03, 1.17]
Strengths	-.08	.03	8.96**	0.92	[0.87, 0.97]
Risk estimate	1.01	.36	10.80**	2.75	[1.46, 6.05]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.20. Penalized Cox Proportional Hazards Analysis of the Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV) for Harm to the Adolescent

START:AV	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Suicide Attempt					
Vulnerabilities	.07	.05	2.00	1.07	[0.98, 1.21]
Strengths	-.06	.05	1.55	0.94	[0.84, 1.03]
Risk estimate	1.65	.53	10.94***	5.20	[1.98, 15.25]
Non-Suicidal Self-Injury					
Vulnerabilities	.06	.04	2.90	1.06	[0.99, 1.15]
Strengths	-.06	.04	3.33	0.94	[0.87, 1.00]
Risk estimate	.61	.37	3.37	1.85	[0.96, 4.11]
Victimization					
Vulnerabilities	.05	.02	3.58	1.05	[1.00, 1.10]
Strengths	-.05	.02	5.17*	0.95	[0.90, 0.99]
Risk estimate	-.31	.27	1.30	0.74	[0.43, 1.25]
Sexual Risk-Taking					
Vulnerabilities	.06	.05	1.66	1.06	[0.97, 1.17]
Strengths	-.05	.05	1.46	0.95	[0.86, 1.03]
Risk estimate	.31	.56	0.34	1.37	[0.49, 4.26]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR.

* $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.21. Penalized Cox Proportional Hazards Analysis of the Violence Risk Scale – Youth Version (VRS – YV) for Harm to Others and Rule Violations

VRS-YV	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Violence					
Static	.05	.06	0.70	1.05	[0.93, 1.19]
Dynamic	.04	.01	9.36**	1.04	[1.02, 1.07]
Total	.03	.01	7.79**	1.03	[1.01, 1.06]
Non-Violent Offenses					
Static	.21	.09	6.25*	1.24	[1.05, 1.48]
Dynamic	.07	.02	11.33***	1.07	[1.03, 1.12]
Total	.06	.02	11.62***	1.06	[1.02, 1.11]
Substance Abuse					
Static	.05	.07	0.43	1.05	[0.91, 1.20]
Dynamic	.03	.02	4.06*	1.03	[1.00, 1.07]
Total	.03	.01	3.44	1.03	[1.00, 1.06]
Unauthorized Absences					
Static	.14	.08	3.26	1.15	[0.99, 1.33]
Dynamic	.03	.02	4.14*	1.03	[1.00, 1.07]
Total	.03	.01	4.45*	1.03	[1.00, 1.06]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR
 * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Table 2.22. Penalized Cox Proportional Hazards Analysis of the Violence Risk Scale – Youth Version (VRS – YV) for Harm to the Adolescent

VRS-YV	Penalized Cox Proportional Hazards Model				
	<i>B</i>	<i>SE</i>	χ^2	HR	95% CI _{HR}
Suicide Attempt					
Static	.02	.13	0.01	1.02	[0.79, 1.32]
Dynamic	.02	.03	0.30	1.02	[0.96, 1.08]
Total	.01	.03	0.24	1.01	[0.96, 1.07]
Non-Suicidal Self-Injury					
Static	-.12	.10	1.44	0.89	[0.73, 1.08]
Dynamic	.01	.02	0.37	1.01	[0.97, 1.06]
Total	.01	.02	0.08	1.01	[0.97, 1.04]
Victimization					
Static	.07	.06	1.27	1.07	[0.95, 1.22]
Dynamic	.03	.01	4.29*	1.03	[1.00, 1.06]
Total	.02	.01	4.01*	1.03	[1.00, 1.05]
Sexual Risk-Taking					
Static	.10	.13	0.71	1.11	[0.88, 1.44]
Dynamic	.04	.03	2.34	1.04	[0.99, 1.11]
Total	.04	.03	2.21	1.04	[0.99, 1.10]

Note. *B* = regression coefficient; *SE* = standard error of *B*; HR = hazard ratio; CI_{HR} = confidence interval of the HR
 * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

Chapter 3. Assessing Change in Risk and Protective Factors: A Case Study and Examination of the SAVRY, START:AV, VRS-YV, and a Structured Professional Judgment Approach to Rating and Formulating Change

3.1. Abstract

The current study consisted of a multiple case study and examination of methods for reassessing risk for violence across three time-points (i.e., Baseline, Time 2, and Time 3) among two adolescents charged with a violent offence. Risk for violence was assessed using the Structured Assessment of Violence Risk in Youth (SAVRY), Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV), and Violence Risk Scale-Youth Version (VRS-YV), with each measure used to demonstrate an approach to the clinical assessment of change in risk. The pre-post change method with reliable change indices was applied to the SAVRY, the stages of change method represented by the VRS-YV, and a newly developed structured professional judgment (SPJ) framework for rating and formulating change in risk (described herein) being applied to the START:AV. Although findings of the study illustrate the capacity for each method/tool to detect change in dynamic factors across the follow-up periods, several meaningful differences emerged with various implications concerning the reassessment of violence risk among adolescents being discussed. In addition, challenges in study design and application of the risk assessment measures are highlighted, with recommendations for future research being provided.

Keywords: violence risk, reassessment, formulation, dynamic factors, adolescent, case study

3.2. Introduction

Within the realm of violence risk assessment there is an increasing emphasis being placed on the need to assess change in risk, whether caused by treatment gains or significant life events (e.g., marriage; Mills et al., 2011). Such an emphasis on assessing change in risk has garnered increased interest among researchers in recent years (e.g., Kroner & Yessine, 2013; Olver et al., 2014; Viljoen, Gray, Shaffer, Latzman, et al., 2017), with dynamic approaches being recommended when conducting adolescent risk assessments (see Viljoen et al., 2016). As adolescents assessed as high risk will not remain so indefinitely, identifying and capturing change in dynamic risk over time through reassessment is integral to the risk management process. Adolescence is a period characterized by constant developmental change, with youth being described as “moving targets” (Borum, 2000). It therefore stands to reason that an adolescent’s propensity to commit violence will fluctuate over time and that accounting for the ebbs and flows in risk will increase predictive accuracy and further enrich the risk assessment process, thereby generating a more realistic assessment and formulation of their current level of functioning while not simply binding them to their past (Douglas & Skeem, 2005).

3.2.1. The Nature of Dynamic Risk

Although risk assessment measures comprised of purely static (i.e., historical) risk factors may be of assistance in determining the required level of treatment/supervision intensity (Harris & Rice, 2003), overreliance on static risk factors can hinder the treatment and management of justice-involved adolescents given their relatively stable nature and lack of amenability to treatment (Andrews, 1989; Andrews & Bonta, 2010; Hart, 1998; Litwack, 2001). According to Douglas and Skeem (2005), risk assessments strictly utilizing static risk factors are considered an indicator of *risk status*, or simply, an indication of whether the individual poses a high risk for an adverse outcome (e.g., reoffending).

By virtue of their unchangeable nature, static risk factors cannot be considered targets for treatment; therefore, it has been argued that the primary focus of the risk assessment process should be an individual's *risk state* (Douglas & Skeem, 2005; Wong et al., 2009). Douglas and Skeem define risk state as “an individual’s propensity to become involved in violence at a given time, based on particular changes in biological, psychological, and social variables in his or her life” (p. 349) and argue that only through

the combination of static and dynamic risk factors can the variability in violence risk be accounted for. Indeed, Andrews (1989) considered the assessment of dynamic risk to be a “key consideration in the management and treatment of offenders” (p. 13).

Referred to as criminogenic needs by Don Andrews and his colleagues (e.g., Andrews, 1989; Andrews & Bonta, 2010; Andrews, Bonta, & Hoge, 1990), dynamic risk factors are those “that, when changed, are associated with changes in recidivism” (e.g., antisocial attitudes; Andrews et al., 1990, p. 31). It is this theoretical underpinning that the importance of dynamic risk factors in the assessment of violence risk is predicated upon (Douglas & Skeem, 2005; Mills et al., 2011). This has led to an increase in the number of empirical investigations involving structured risk assessment measures attempting to capture changes in dynamic risk factors over multiple time-point assessments, referred to as a measure’s *internal responsiveness*, and examining whether observed changes in risk are associated with changes in the rate of reoffending, referred to as a measure’s *external responsiveness* (Husted et al., 2000; Gray et al., 2019; Viljoen, Shaffer, et al., 2017).

Although the assessment of dynamic risk remains particularly salient given that adolescence is a time of rapid change and development, research examining change in dynamic risk among adolescents via structured risk assessment measures is still in its infancy. Adolescence is a period characterized by biological, physical, and neurological changes (e.g., onset of puberty, development of secondary sexual characteristics, changes in the prefrontal cortex; Best & Ban, 2021), with onset of mental illness peaking during this period (Lee et al., 2014). As neural circuitry is undergoing developmental changes during adolescence, emotional dysregulation is high with heightened reactivity and impulsivity in the presence of emotional cues (Best & Ban, 2021; Casey et al., 2019). Criminal behaviour has been found to peak during adolescence, with subsequent declines in antisocial behaviour observed in early adulthood explained by sociological and psychological changes (e.g., decreased exposure to antisocial peers and greater impulse control, respectively; Sweeten et al., 2013). As such, it is important that attempts be made to capture changes in risk among adolescents as they occur.

Thus far, research examining change in dynamic risk has primarily focused on adult offender samples and despite some promising preliminary evidence regarding internal responsiveness (e.g., Beggs & Grace, 2010; Brown et al., 2009; Lewis et al., 2013; Olver & Wong, 2011; Webster et al., 2000; Wilson et al., 2013), not all studies have found

evidence for the association between fluctuations in dynamic risk and reoffending (i.e., external responsiveness; Hanson et al., 2007; Morgan et al., 2013; see Viljoen, Gray, Shaffer, Bhanwer, et al., 2017, for a review). Studies that have examined the internal responsiveness of adolescent risk assessment measures such as the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV; Viljoen et al., 2014), and Violence Risk Scale-Youth Version (VRS-YV; Wong et al., 2004-2011) have found evidence for statistically significant, and in some cases reliable, change in dynamic risk over time (Baglivio & Jackowski, 2015; Hilterman et al., 2018; Koh et al., 2021; Sellers et al., 2017; Stockdale, 2008; Viljoen et al., 2012; Viljoen, Gray, Shaffer, Latzman, et al., 2017; Viljoen, Shaffer, et al., 2017).

Although these results lend partial support to the internal responsiveness of adolescent risk assessment measures, empirical investigations of external responsiveness conducted thus far have revealed that, by and large, the observed changes in dynamic risk are seemingly unrelated to reoffending. For instance, Viljoen, Gray, Shaffer, Latzman, et al. (2017) found neither change scores (i.e., improvement) nor the presence of reliable change on the Social/Contextual, Individual/Clinical, Protective Factors, or the Dynamic Risk Total score (i.e., a composite of the Social/Contextual and Individual/Clinical domains) of the SAVRY to be predictive of sexual, violent non-sexual, or any reoffending over an average follow-up period of approximately 8 years ($r_{pb} = -.07$ to $.08$). In a follow-up study, Viljoen, Shaffer, et al. (2017) found only changes on the Social/Contextual domain to be predictive of any reoffending (area under the curve [AUC] = $.64$) but not violent reoffending (AUC = $.57$) over a six-month follow-up period. Regarding the VRS-YV, Stockdale (2008) found among 22 justice-involved adolescents that change (i.e., improvement) was associated with a longer period violence free (i.e., time to first violent disposition; $r = .76$), whereas the relationship between change and any new violent dispositions produced a *positive* rather than negative effect, albeit the effect size was modest in magnitude and statistically non-significant ($r = .12$). In examining external responsiveness among a sample of 90 justice-involved adolescents undergoing violence prevention treatment, Koh et al. (2021) found that changes on the VRS-YV Dynamic and Total scores and only the SAVRY summary risk rating, and not those of the VRS-YV Static or SAVRY domain and total scores, were related to any reoffending (AUC = $.62$ for each), whereas changes on either measure were unrelated to violent reoffending over an

average follow-up period of approximately 7 years. Currently, there exist no published studies examining the external responsiveness of the START:AV.

Limited and not without their methodological limitations (e.g., low statistical power), these studies suggest that, despite the partial support for the internal responsiveness or the ability of some adolescent risk assessment measures to detect change, the observed changes in dynamic risk being captured “does not reflect the change process and its causal mechanisms” (Koh et al., 2021, p. 13) given the relative lack of association between change scores and relevant outcomes such as violence. Although other possible explanations may exist to account for the lack of external responsiveness of measures such as the SAVRY and VRS-YV (e.g., outcome definitions, context such as treatment vs. probation; Koh et al., 2021; Viljoen, Shaffer, et al., 2017), these sobering results highlight the need for further research and development to enhance the internal responsiveness of violence risk assessment measures commonly used with adolescent populations.

3.2.2. The Clinical Assessment of Change in Dynamic Risk: A Question of Methodology

Despite repeated recommendations to reassess risk among adolescents (e.g., Borum et al., 2006; Gray et al., 2019; Viljoen et al., 2016), relatively little guidance has been provided by tool developers as to the methodology in which change is to be measured clinically or what evidence it is to be based upon (Wong et al., 2009). This has resulted in the assessment of change at the clinical level failing to move beyond a test-retest methodology, and with no guidance on whether the observed change is relevant or clinically meaningful, assessors may be forced to rely on unstructured clinical judgment. Use of an unstructured approach when assessing change in dynamic risk has the potential to introduce increased error, whether it be the result of measurement error or simply an error in clinical judgment.

To disentangle true change from measurement error, researchers examining the internal responsiveness of adolescent risk assessment measures have looked at individual-level change to identify adolescents demonstrating reliable change over time. Statistics accounting for measurement error such as the reliable change index (RCI; Jacobson & Truax, 1991) and the minimally detectable change (MDC) index, or smallest real difference (Schuck & Zwingmann, 2003), have been applied to identify individual-level

change not due to chance while also providing estimates of the degree of change required to be considered true change (i.e., changes in scores falling outside a measure's error threshold; Viljoen, Shaffer, et al., 2017). Table 3.1 provides an overview of studies that have reported RCI and MDC values for the SAVRY, START:AV, and VRS-YV.

As reported in Table 3.1, when examining individual-level change among justice-involved youth, a slightly greater percentage demonstrate reliable decreases as opposed to increases in risk over time, with most adolescents displaying no reliable change. Research examining the SAVRY has suggested that a 5- to 7-point change in the risk total score would be required to signify that a reliable change has occurred. Although such an approach may be useful for guiding clinical decision-making regarding the degree to which an adolescent has changed, results such as those reported in Table 3.1 suggest that a substantial difference between pre-post scores is required before it can be considered meaningful. There are several disadvantages to applying these data to the clinical assessment of change: (a) empirical research is limited in the area; (b) timeframes in which change is evaluated differ across studies; (c) values required for identifying reliable change will undoubtedly continue to fluctuate; and (d) such an approach would not be sensitive to change in a single risk factor, even if such change were considered clinically meaningful.

In response to concerns regarding the use of unstructured test-retest methodology in assessing change in risk, Wong and colleagues have developed a family of risk assessment measures incorporating a modified version of the stages of change as outlined by Prochaska et al. (1992), referred to as the Violence Risk Scale and its various extensions (VRS; see Olver et al., 2007; Olver & Wong, 2021; Stockdale et al., 2013; Wong & Gordon, 2006; Wong et al., 2009). The developers of the VRS measures have argued that the incorporation of the transtheoretical model allows for a “coherent theoretical mechanism for conceptualizing and assessing changes in risk” (Wong et al., 2009, p. 113). Among the 19 dynamic items embedded within the VRS-YV, items with a rating of two or more (on a 4-point scale: 0, 1, 2, 3) are deemed targets for treatment and an adolescent's readiness for change on the items are rated as falling within the *precontemplation*, *contemplation*, *preparation*, *action*, or *maintenance* stage (for a review see Olver & Wong, 2021; Wong et al., 2009). Each stage determines the degree to which an adolescent has acknowledged the criminogenic need and attempted to implement behavioural changes. For example, adolescents within the precontemplation stage lack

insight and the intention to change, whereas those within the preparation stage acknowledge their problems and have initiated behavioural change in an attempt to overcome them. As an adolescent's risk level fluctuates over time, whether due to treatment or significant life events, the stages of change serve to systematically capture observed changes in risk. As adolescents progress through each stage there is a 0.5-point reduction in their rated level of risk for each criminogenic need, thus reflecting their improvement in the targeted area (Wong & Gordon, 2006). An exception to this is when moving from precontemplation (i.e., denial) to contemplation (i.e., no denial) to which there is no reduction in the risk rating. Adolescents may also show a post-treatment increase in risk on the VRS-YV wherein a score of 0.5 is added to the item score in the event of regression or deterioration from a higher to a lower stage of change (Stockdale et al., 2015).

Though the incorporation of the stages of change represents an advance in the field and may aid in systematically assessing change in dynamic risk, it remains a psychologically informed (i.e., individual-centric) approach and may not adequately capture change in areas that are beyond the control of the adolescent but are nevertheless important to their risk state (e.g., biological factors such as head injury and social changes such as removal from home; Douglas & Skeem, 2005). Furthermore, the stages of change as currently embedded within the VRS-YV do not account for change in protective factors, which are known to mitigate risk (Viljoen et al., 2016).

3.2.3. The Development of a Structured Approach to Rating and Formulating Change in Dynamic Risk and Protective Factors

Given the current state of the field, the question remains whether other structured approaches may improve upon the assessment and measurement of change in dynamic risk. Taking into consideration the limitations noted above, it was with this question in mind that led to the development of a structured professional judgement (SPJ) approach to the assessment of change in dynamic risk. Rather than develop an algorithm or statistical method for assessing change, the SPJ approach was selected given that it represents an evidence-based approach to risk assessment through the provision of structured guidelines for identifying and measuring risk factors while allowing for the assessor to make the final determination of risk based on a combination of the data collected and their professional judgment (Hart, 1998; Hart & Logan, 2011). An important clinical aspect of

the SPJ approach is its incorporation of idiosyncratic risk factors that are considered pertinent to the current clinical context (i.e., consideration of case-specific factors; Hart, 1998). Thus, the SPJ approach is a particularly promising model for assessing change in dynamic risk given that it provides some degree of structure while being flexible enough to tailor the assessment to the individual (Hart et al., 2016).

Initial development of the proposed framework for assessing change in dynamic risk was guided by existing models of case formulation (see Douglas et al., 2013; Gatner et al., 2021; Hart et al., 2003, 2016, 2011; Logan, 2014, 2016; Viljoen et al., 2014). This was followed by consultation with three developers of SPJ-based risk assessment tools (i.e., Jodi L. Viljoen, lead author of the START:AV; Tonia L. Nicholls, co-author on the START:AV and Short-Term Assessment of Risk and Treatability [START: Webster et al., 2009], lead author on the Jail Screening Assessment Tool [JSAT; Nicholls et al., 2005]); and Kevin S. Douglas, lead author on the HCR-20^{V3} [Douglas et al., 2003]), with revisions being made to the framework based on their feedback.

The proposed framework follows the general structure of assessing risk as outlined within the HCR-20^{V3} manual (i.e., information is gathered; items are rated; item relevance or whether an item is critical is determined; and the formulation of risk, risk scenarios or scenarios of concern, and risk management strategies are developed; Douglas et al., 2013). For the sake of brevity, however, several components of the general structure have been simplified or combined. Although steps related to risk formulation, scenario planning, and risk management can be found within existing manuals and worksheets developed for SPJ-based risk assessment measures (e.g., Douglas et al., 2013; Hart et al., 2003; Viljoen et al., 2014), existing procedures do not explicitly address how to incorporate changes in risk or hypotheses about change into the risk formulation. As such, the current framework is designed as a natural extension of the SPJ approach to violence risk assessment and was developed for use with any risk assessment measure that incorporates purportedly dynamic risk/protective factors. For comparative purposes, Table 3.2 provides an overview of recommendations for reassessing risk as outlined within the SAVRY, START:AV, and VRS-YV manuals.

Procedure for Assessing Change in Dynamic Risk

As has been recommended, whenever conducting a violence risk assessment it is important to gather information via multiple sources (e.g., interview, file review, collaterals,

post-treatment reports, etc.) and assess risk and protective factors using an evidence-based risk assessment measure (Douglas et al., 2013; Gray et al., 2019; Viljoen et al., 2016). Within the current framework, to assess for changes in dynamic risk requires an *initial* or pre-treatment risk assessment to have been conducted. This allows for the systematic comparison between the follow-up or post-treatment risk assessment and the initial or pre-treatment risk assessment. Below are the proposed steps for assessing change in dynamic risk, which can be conducted using the recording form provided in Supplemental Information. Prior to commencing this process, it is recommended that the initial or pre-treatment item ratings be recorded on the form for comparative purposes.

Various concepts and aspects of the proposed framework including trend ratings, activated factors, the structured categories for rating degree of change, and the two umbrella pathways for identifying mechanisms of change discussed below were developed by the current author based on existing concepts embedded within the SPJ model; however, many of these concepts have not been empirically tested (Lewis & Doyle, 2009).

Step 1: Reassess Risk/Protective Factors and Assess the Degree of Impact on Relevant (or Critical/Key) Factors

Within the first step, risk/protective factors are reassessed and compared to the early assessment ratings (i.e., initial assessment or pre-rating) via the rating form, with any trends in direction noted. Though changes in risk factors may be easily identifiable through movement in standard item ratings (e.g., from a High to Moderate rating), the addition of the trend column allows for any minute changes in risk to also be detected. This serves to increase the sensitivity of the assessment by highlighting (and quantifying) the areas in which *some* change is occurring but is not sufficient to warrant an overall change in the standard rating of the risk/protective factor (as outlined within the measure's manual). Trends relating to an increase, decrease, or relatively little change in the pre- to post-item ratings may be identified; however, within the current framework recorded trends may also differ from the standard item ratings as “[i]t is possible that an adolescent may show some changes, yet remain at the same rating” (Viljoen et al., 2014, p. 105). For instance, an adolescent who displays some improvement on a risk factor but does not meet the threshold for moving from a rating of High to Moderate may nevertheless be rated as decreasing with respect to their trend rating (i.e., moving towards or approaching a reduced rating in risk).

Furthermore, consideration must be made as to whether change has occurred with respect to the relevant factors identified during the initial assessment (i.e., risk/protective factors that have been prioritized). According to Douglas et al. (2013, p. 51), a risk factor is relevant to an individual's risk for violence if it:

1. Was a material contribution to past violence;
2. Is likely to influence the person's decision to act in a violent manner in the future;
3. Is likely to impair the individual's capacity to employ non-violent problem solving techniques or to engage in non-violent or non-confrontational interpersonal relations; or
4. It is crucial or critical to manage this factor in order to mitigate risk.

As careful attention must also be paid to factors which may have become active over time due to changes in the individual or their environment (e.g., onset of psychosis, loss of a parent), the term *activated factors* was introduced by the current author and incorporated into the proposed framework.

Within the current framework, activated factors represent an emergent factor that has been deemed relevant at the time of the reassessment based on the criteria as outlined by Douglas et al. (2013; see 2 to 4 above). An activated factor cannot by virtue of its nature be considered to have contributed to past violence but may be considered reflective of potential changes in offending trajectories making them relevant to future violence. For instance, an acquired brain injury occurring post-index offence that results in changes in personality accompanied by emotional dysregulation and low frustration tolerance may result in the activation of several otherwise dormant factors. Onset of certain mental health symptomatology (e.g., psychotic spectrum disorder) may also exacerbate factors previously identified as relevant, signaling the emergence of a newly formed gateway factor. Thus, despite not playing a contributing role to prior violence and having not been previously identified as relevant, rating emergent factors as relevant following reassessment (thus identifying activated factors) is important from a risk management perspective. As such, the current procedure places an emphasis on identifying factors that are relevant to past adverse outcomes and those which have

become activated in the interim and may now be considered critical to changes in trajectory and/or important from a risk management perspective.

Although Douglas et al. (2013) focused on risk factors for violence, these criteria can be applied to risk and protective factors associated with other adverse outcomes (see Viljoen et al., 2014). A further distinction can be made regarding the relevance of factors with respect to the functional role they may play in decisions to engage in violence (i.e., *motivators* or factors that increase the perceived benefits of violence, *disinhibitors* or factors that decrease the perceived costs of violence, and *destabilizers* or factors that negatively impact decision-making and are associated with disturbances in thinking and distorted perceptions of reality; see Douglas et al., 2013; Gatner et al., 2021; Hart et al., 2016; Logan, 2014, 2016). Likewise, factors may be considered relevant based on how they affect an individual's response to treatment (i.e., a risk factor may impede or dilute treatment gains, whereas a protective factor may enhance the impact of treatment).

Depending on the risk assessment measure being used, however, information contained within the manual for rating relevance of risk/protective factors may be limited or missing entirely. Under these circumstances, use of the rating system as outlined by Douglas et al. (2013) is recommended, with relevance ratings being based on a High (i.e., relevant), Moderate (i.e., possibly or partially relevant), or Low (i.e., no indication of relevance) rating system. For the purposes of the current approach, focus should be afforded to those factors initially rated as being partially or definitively relevant (i.e., moderate and high relevance) to the individual engaging in or experiencing an adverse outcome. Factors rated moderate or high on relevance would not only provide targets for intervention and/or management but would also serve as a focus for the assessment of change. Conversely, this approach brings factors that become moderately or highly relevant at follow-up into focus.

Step 2: Re-Examine Initial Risk Estimate, Formulation, Scenarios, and Risk Management Strategies

Within this step evaluators are encouraged to re-examine or re-visit their initial risk estimate, formulation, scenarios, and risk management strategies, taking into consideration potential changes in risk. When developing a formulation of risk, consideration is to be given to identifying those factors that are most salient to the case and require prioritization (i.e., create a risk/protective factor hierarchy; Douglas et al.,

2013; Viljoen et al., 2014). Equally important is identifying clusters of risk/protective factors (i.e., when several factors covary or cluster together suggesting a similar underlying area of concern or potential root cause; see Kroner, Mills, & Reddon, 2005) and factors that may serve as portal/gateway factors or those factors that, when triggered/activated, can cause a chain reaction that exacerbates other factors (or, in the event that a protective factor is identified as a portal/gateway factor, causes success in a number of other protective factors or areas). As an adolescent may reoffend violently or show improvements between assessments, aspects of the initial risk formulation (including scenarios) may be subject to change. For instance, incremental improvements in an adolescent's emotional regulation over time may be indicative of lower reactivity when confronted. This, in turn, may result in changes to the risk formulation (e.g., lower physical harm), though overall risk may remain the same. Moreover, reoffending, poor treatment response, and/or activation of certain factors may necessitate changes to risk management strategies (Viljoen et al., 2014).

Step 3: Rate Degree of Change in Dynamic Risk

During the development of the rating system, an important consideration was the need to account for an increase or decrease in the presence/relevance of dynamic risk/protective factors and how these changes may relate to the underlying risk formulation, risk scenarios, risk management strategies/intervention plan, and overall rating of risk (i.e., the structured risk rating or risk estimate). The incorporation of a rating system for determining the degree of change is a central feature of the proposed framework and is not found within existing SPJ approaches. It was within this framework that the following structured categories were created:

- **significant improvement:** Clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic factors across *multiple* domains and/or *substantial* change among relevant factor(s) that significantly alters the underlying risk formulation (via improvement in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of reduced risk.
- **moderate improvement:** Clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic factors across *few* domains and/or *moderate* change among relevant factor(s) that alters

the underlying risk formulation (via some improvement in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of reduced risk.

- **mild improvement:** Limited clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic risk factor(s) or rated decrease/increase observed in dynamic risk factor(s) not identified as relevant/critical that neither alters the underlying risk formulation nor signals a reduction in level of risk.
- **no change:** No rated increase or decrease observed in dynamic risk factor(s).
- **mild deterioration:** Limited clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic risk factor(s) or rated decrease/increase observed in dynamic risk factor(s) not identified as relevant/critical that neither alters the underlying risk formulation nor signals an increase in level of risk.
- **moderate deterioration:** Clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic factors across *few* domains and/or *moderate* change among relevant factor(s) that alters the underlying risk formulation (via some deterioration in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of increased risk.
- **significant deterioration:** Clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic factors across *several* domains and/or *substantial* change among relevant factor(s) that alters the underlying risk formulation (via deterioration in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of increased risk.

Step 4: Generate Hypotheses and Record Reason(s) for Improvement/Deterioration

An important step in the process of assessing change is identifying the underlying reasons or mechanisms of change for the observed improvement/deterioration and

generate hypotheses as to why the change may have occurred. Evaluators are encouraged to generate hypotheses and record reason(s) for improvement/deterioration. As an example, explanations underlying improvement or deterioration in an adolescent's risk can include development of a strong prosocial attachment or introduction of medication non-adherence, respectively. Two primary pathways, one internal and one external, that may lead to change are emphasized (i.e., Psychological/Biological and Social/Contextual change, respectively). Underlying the two pathways are potential mechanisms of change that can be non-intervention/non-sanction-based, intervention-based, and sanction-based (see Table 3.3 for examples). This explicit attention to the reasons for improvement and presentation of two possible umbrella pathways serves as another unique component of the proposed framework.

3.2.4. Current Study

Following initial development and consultation, the current study represents the third phase in the development of the proposed framework, with a multiple case study analysis being selected to pilot test the framework and evaluate its feasibility. With certain aspects not lending themselves well to quantitative analysis (e.g., risk formulation, narrative explanations for change), a case study approach was considered ideal given the depth and complexity of the proposed framework (Crowe et al., 2011). Moreover, case study analysis can be useful when introducing new developments and novel applications in assessment and research methodology (Drotar et al., 1995), having previously been used to demonstrate various approaches to violence risk assessment and formulation (e.g., Cook et al., 2014; Hilton, 2014; Logan, 2014, 2016; Storey et al., 2017), contrast assessment findings using differing procedures to assess psychopathy (e.g., Dawson et al., 2012), and to illustrate existing methods for reassessing risk (e.g., Olver & Wong, 2021; Wong et al., 2009). As such, the current study consisted of a multiple case study analysis and examination of methods for reassessing risk for violence across three time-points (i.e., Baseline, Time 2, and Time 3) using the SAVRY, START:AV, VRS-YV.

Each of the three measures was used to demonstrate an approach to the clinical assessment of change in risk, with the reliable change method applied to the SAVRY, the stages of change method represented by the VRS-YV, and the newly developed framework for rating and formulating change in risk (as described above) being applied to the START:AV. As the primary purpose was to explore the nature and functionality of the

newly developed framework and demonstrate differences in the methodologies currently available to clinicians for assessing change in dynamic risk (i.e., pre-post change scores, stages of change), including their strengths and limitations, the current study may be referred to as a *descriptive case study* (Yin, 2012).

3.3. Method

3.3.1. Overview

The following is a multiple case study analysis of two adolescent forensic psychiatric inpatients charged with a violent offence involving a weapon. Each adolescent, referred to by the pseudonyms Jack and Tyler, was placed under the jurisdiction of a provincial Review Board in Western Canada and their cases were reviewed on two separate occasions following admission to a designated inpatient program. Racial/ethnic composition of the two cases was of European Canadian descent, with each adolescent meeting diagnostic criteria for a Psychotic Disorder. Non-random selection of the two cases was based on their referral status (i.e., involuntary forensic referrals), number of hearings with the Review Board (i.e., each had two hearings after baseline), and availability of clinical documentation (described below). As adherence to the manualized instructions for rating the three measures was prioritized for the current study, a number of challenges arose when applying the SAVRY, START:AV, and VRS-YV to the current case analysis, which are described under Measures.

3.3.2. Measures

Structured Assessment of Violence Risk in Youth (SAVRY)

The SAVRY (Borum et al., 2006) is an adolescent risk assessment measure designed to assess risk for violence and assist in intervention planning/risk management. It is comprised of 24 risk factors grouped into three risk domains (i.e., *Historical Risk Factors*, *Social/Contextual Risk Factors*, and *Individual/Clinical Risk Factors*) and six protective factors representing a single protective domain (i.e., *Protective Factors*). Operational definitions and rating instructions for each of the 30 items are provided in the SAVRY manual. Risk factors are rated using a three-level coding structure (i.e., Low, Moderate, and High), with the protective factors being rated dichotomously (i.e.,

Present/Absent). Consistent with the SPJ model, evaluators generate a summary risk rating (SRR) of Low, Moderate, or High regarding an adolescent's risk to engage in violent reoffending. Given that the SAVRY lacks explicit instructions on reassessing risk, a primary strategy among researchers has been the application of the reliable change index (RCI) to pre-post change scores on the SAVRY. As such, total scores for the SAVRY were calculated by summing the 24 risk factors (representing the Risk Total Score) and six protective factors (representing the Protective Factors domain).

Scoring Challenges. Although reassessing risk using shorter-term intervals is possible with the SAVRY, several shortcomings were evident when rating the Protective Factors. Specifically, when scoring these factors on the SAVRY, ratings are made based on whether they have "been active or present during the preceding year" (p. 18). As such, reassessment timeframes shorter than one year cannot capture any downward changes (i.e., from presence to absence) in Protective Factors, which became evident in the current case analysis. Furthermore, it was noted that the scoring criteria as outlined within the SAVRY manual for rating Item 19, Substance-Use Difficulties, can also impact the detectability of change. Adolescents who have not engaged in substance use for a significant period of time but present with a history of substance use problems cannot receive a rating of Low on the item.

Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV)

The START:AV (Viljoen et al., 2014) is a SPJ guide designed to assess short-term risk of various adverse outcomes (e.g., violence, victimization, NSSI) among adolescents 12 to 18 years of age. It consists of 24 items organized into three clusters: *Individual Adolescent*, *Relationships and Environment*, and *Response to Interventions*. Items are rated as Low, Moderate, and High based on whether an adolescent demonstrated minimal, some, or substantial Strengths or Vulnerabilities on a factor within the past three months, respectively. Factors included on the START:AV are simultaneously rated as both a Strength and Vulnerability (e.g., presence of prosocial and antisocial peers; Viljoen et al., 2016). Evaluators then rate whether an adolescent has a prior (i.e., any time prior to the past three months) or recent history (i.e., within the past three months) of an adverse outcome, with a final Risk Estimate of Low, Moderate, or High being made for each adverse outcome. Further instructions are provided within the START:AV manual for

developing a case formulation, identifying scenarios of concern and improvement, and intervention planning.

Scoring Challenges. The recommended timeframes for reassessing risk as outlined within the START:AV manual (Viljoen et al., 2014; i.e., at minimum every three months, with a maximum of six months between assessments) limited its applicability to one of the case analyses (i.e., Tyler). This was due to an inability to control the reassessment timeframes as the day-to-day chart information required to score the measures at 3-month intervals (or shorter) was not available for the two cases, thus necessitating the use of the Review Board documents for rescoring the measures and making it not possible to isolate the information required to rerate the measures at each successive 3-month interval. As this resulted in the reassessment intervals being based on the hearing schedule of the Review Board, it was not possible to control the elapsed time between the reassessments. Although the elapsed time between Baseline and Time 2 for the two cases approximated the Reference Period (i.e., minimum of 3-months) required for reassessing risk on the START:AV, the Time 2 and Time 3 assessment phases for Tyler could not be linked given the elapsed time exceeding the Reference Period and the maximum allowable timeframe (i.e., six months) as recommended within the manual. As such, application of the START:AV and SPJ framework was limited to the Baseline to Time 2 pre-post assessment for one case.

Violence Risk Scale – Youth Version (VRS-YV)

The VRS-YV (Wong et al., 2004-2011) is a clinician rated violence risk assessment measure designed to systematically account for change in dynamic risk among adolescents undergoing treatment. It consists of 23-items organized into two domains: Static Factors and Dynamic Factors. Items are rated on a 4-point scale (0 to 3), with baseline item ratings being summed to produce Static, Dynamic, and Total scores (referred to as pre-treatment scores). Dynamic items receiving a rating of 2 or 3 are considered criminogenic needs for which treatment-related change is systematically rated post-treatment using an adapted form of Prochaska et al.'s (1992) transtheoretical model of change. Differences between the pre-post item ratings are calculated, with a final post-treatment score being generated for the VRS-YV Dynamic and Total scores.

Scoring Challenges. An unexpected finding resulting from the multi-wave nature of the case analysis pertained to changes on dynamic risk factors not previously identified

as criminogenic needs on the VRS-YV. As outlined within the VRS-YV manual (Wong et al., 2004-2011), raters are instructed to transfer pre-treatment item ratings on dynamic variables not identified as treatment targets (i.e., those scored as 0 or 1) at baseline to the post-treatment rating. As a result, changes in risk factors not originally identified as criminogenic needs were not captured by the VRS-YV at Time 2 for either case, which became problematic as the post-treatment ratings from Time 2 formed the basis of the pre-treatment ratings at Time 3. In addition, despite the VRS-YV manual noting that dynamic variables rated as 1 due to a decrease in risk over time are to be monitored on an ongoing basis, with the SOC rating being completed to reflect current level of treatment readiness, no explanation is provided as to whether the score should be deducted any further (i.e., below 1). Although this latter finding was not directly applicable to the current case analysis, it was noted that some of the post-treatment item ratings did go as low as 1.5 by Time 3.

3.3.3. Procedure

Data collection for the current study was part of a larger study examining the predictive validity of the SAVRY, START:AV, and VRS-YV (see Chapter 2), with research approval granted by the Office of Research Ethics of Simon Fraser University and the Applied Practice Research and Learning Branch of the Ministry of Children and Family Development of British Columbia, Canada. Scoring of the SAVRY, START:AV, and VRS-YV was completed by the current author in accordance with the instructions as outlined within their respective manuals. Records contained within the adolescents' closed medical files were used to score the items, with the Baseline assessments being based on official documents (e.g., police reports, Reasons for Judgment) and forensic assessment reports available at or following intake into the inpatient program (e.g., case management and psychological/psychiatric reports, including Fitness/NCRMD Assessment reports). Scoring of items at Time 2 and Time 3 was achieved using the standard reports submitted in preparation for each adolescent's Review Board hearing (i.e., the Psychiatrist's Report to the Review Board and the Case Management Report to the Review Board) and, if available, the Review Board's Reasons for Disposition. From these reports, relevant information for each timeframe was recorded onto a file coding protocol organized into various risk domains (e.g., history of violence, substance abuse, mental health/cognitive state, leisure), with item ratings for the three measures being based on this information.

Given the focus of the current study on risk formulation, a five-day foundational workshop on violence risk assessment and management was completed by the primary author (who has clinical experience conducting violence risk assessments), in addition to a one-and-a-half day workshop on the SAVRY and two one day workshops on the START:AV and VRS-YV (all delivered by one of the developers of the measure). As recommended by the American Psychological Association (APA; 2020) and in accordance with ethical guidelines of the Canadian Psychological Association (2017) and specialty guidelines for forensic psychologists (APA, 2013), pseudonyms were used and much of the case information withheld to protect confidentiality (e.g., age, location, specific psychiatric diagnoses, details regarding the index offence).

3.4. Results

3.4.1. Case 1 (Jack): Reassessment and Analysis of Change in Risk

Jack is an adolescent male who was involuntarily admitted to an inpatient facility following the commission of a violent offence. Duration of his stay exceeded 6 months, with the elapsed time between the baseline assessment (*Baseline*) and initial Review Board hearing (*Time 2*) and the initial and second Review Board hearings (*Time 3*) being 94 days and 108 days, respectively. Based on the clinical reports submitted to the Review Board, the documented pattern of change was suggestive of continued engagement in violent behaviour accompanied by slight improvements in his circumstances and functioning by Time 2 (e.g., increased involvement of his mother, attempts to socialize with peers and staff, seeking out techniques for self-soothing), followed by a period of significant psychiatric decompensation with increased anger/agitation and violent outbursts; however, following an adjustment in medication, Jack stabilized and his medication adherence improved, with no aggressive behaviour being noted in the three to four weeks preceding the final Review Board hearing (Time 3).

Pre-Post Reliable Change with the SAVRY

Although the SAVRY manual lacks explicit instructions on reassessing risk, a primary strategy that some authors have proposed is the reliable change index (RCI). As such, the total scores at each timepoint were calculated to determine if they would meet the threshold for reliable change. Table 3.4 provides item ratings for Jack across the three

timeframes (Baseline to Time 2 = 94 days; Time 2 to Time 3 = 108 days). Based on changes in item ratings reported in Table 3.4, the calculated SAVRY risk total score for Jack at baseline was 29 (Baseline: Historical Factors = 8, Social/Contextual Factors = 9, Individual/Clinical Factors = 12), which decreased to 24 by the initial Review Board hearing (Time 2: Historical Factors = 8, Social/Contextual Factors = 7, Individual/Clinical Factors = 9) and to 22 by the second hearing (Time 3: Historical Factors = 8, Social/Contextual Factors = 5, Individual/Clinical Factors = 9). Although the 5-point difference in Jack's SAVRY risk total score between Baseline and Time 2 met the threshold for minimally detectable change based on research conducted by Koh et al. (2021), such a difference would not be considered reliable based on research conducted by Viljoen, Shaffer, et al. (2017; see Table 3.1). Using the same criteria, the degree of change detected when comparing Jack's SAVRY risk total scores between Time 2 and 3 would not be considered anything more than random measurement error. That said, the degree of change observed in Jack's SAVRY risk total score from Baseline to Time 3 would meet criteria for minimally detectable change regardless of the study referenced. Furthermore, there was evidence of reliable change occurring on the protective domain from Baseline to Time 2 (Protective Factors = 1 and 3, respectively), with no change in scores observed between Time 2 and 3.

Stages of Change with the VRS-YV

As per the VRS-YV, the general method for rating change in dynamic risk factors consists of a modified version of the stages of change model. Item ratings for Jack on the VRS-YV at Baseline, Time 2, and Time 3 are provided in Table 3.5. Rating Jack on the VRS-YV at pre-treatment resulted in a total score of 49 (Baseline: Static = 4, Dynamic = 45; Table 5), placing him in the moderate-risk category using cutoff values (i.e., 35 to 49) reported by Stockdale et al. (2014). For each of the items identified as criminogenic (i.e., rated as 2 or 3), Jack was rated as being within the precontemplation or contemplation stage. When information from Time 2 was evaluated and applied using the stages of change, the resulting post-treatment total score for Jack on the VRS-YV was 42 (Time 2: Static = 4; Dynamic = 38), indicating that his VRS-YV score had changed by 7 points with Jack moving to the preparation stage on 10 criminogenic needs. In addition, he moved from precontemplation to action on D12 (Substance Abuse), whereas he displayed no movement on the two remaining criminogenic needs (i.e., Antisocial Peers and Violence During Institutionalization). Jack's post-treatment total on the VRS-YV was 40.5 by the

final time interval (Time 3: Static = 4, Dynamic = 36.5), indicating that his VRS-YV score had changed a further 1.5 points relative to Time 2. As displayed in Table 3.5, movement to a new stage of change was evident for two criminogenic needs at Time 3 (i.e., Antisocial Peers and Family Stress), whereas no further movement was detected for the remaining dynamic factors previously rated on the stages of change. Regarding risk category, Jack's VRS-YV score remained in the moderate-risk category across the three intervals. Rescoring of Item D4 (Negative Attitude toward Education) would have resulted in a 1-point increase to the VRS-YV post-treatment total score at Time 3.

A Structured Approach to Rating and Formulating Change with the START:AV

To demonstrate the utility of the proposed framework, it was combined with the START:AV for the current case analysis. As such, Jack was rated on the START:AV at Baseline, Time 2, and Time 3 (Table 3.6). For illustrative purposes, violence was selected as the primary outcome of concern on the START:AV with only the violence risk estimate and a repeat scenario of concern being provided for the current case analysis. As several of the strategies for examining change in risk outlined within the START:AV manual overlap to some degree with those of the proposed framework (i.e., methods for identifying change, including direct comparisons of item ratings and risk estimates, recording changes in a narrative fashion; see Table 3.2); these steps were excluded from the current case analysis to reduce redundancy with the proposed framework.

Baseline START:AV Item Ratings, Risk Estimate, and Risk Formulation. Baseline item ratings for the START:AV are provided in Table 3.6. Using the START:AV, Jack was initially rated as High Risk for Violence over the next three months. His violent behaviours involved intense anger, irritability, and/or hostility (Item 9: Mental/Cognitive State) and have occurred within the context of psychosis (Item 9: Mental/Cognitive State); possibly drug-induced (Item 3: Substance Use). There was limited parental supervision at the time of the index offence, with substances being provided by his father (Item 15: Parenting). Medication refusal following admission (Item 23: Medication Adherence) resulted in Jack decompensating and his inability to connect with others and deficits in social skills (Item 12: Social Skills) further contributed to his aggressive and sexually intrusive behaviour. Jack's medication refusal may serve to interfere with his response to treatment and be considered a gateway factor, leading to further psychiatric decompensation. Although his mental/cognitive state was considered the root cause of

his violent behaviour and was deemed to have had a destabilizing effect on his decisions to engage in violence, the need for emotional release/expression appeared to be a motivating factor and the alienation he experienced due to deficits in social skills likely had a disinhibiting effect. Regarding Key Strengths, given Jack's history of engaging in prosocial activities in the community and recent attempts at engaging peers and staff (Item 2: Recreation), encouraging him to become involved in extracurricular activities may serve to build on his social skills, thus reducing his degree of alienation from others and his subsequent feelings of isolation and frustration/anger. His ability to abide by the conditions of his release while on bail (Item 5: Conduct) was also identified as a Key Strength.

Scenario of Concern. Jack is likely to experience worsening psychotic symptoms when not adhering to his prescribed medication, resulting in him becoming agitated and increasingly angry/irritable; thus, making him susceptible to engaging in violence when provoked.

Step 1: Reassess Risk/Protective Factors and Assess the Degree of Impact on Relevant (or Critical/Key) Factors. Standard item ratings of Low, Moderate, and High for Jack on the START:AV at Time 2 and Time 3 are provided in Table 3.6. At Time 2, increases in the standard item ratings were evident for six of the Strengths factors, whereas ratings for five of the Vulnerabilities decreased and one increased. Despite not warranting a change in the standard item rating from Low to Moderate, slight changes in two Strengths factors (i.e., Self-Care and Emotional State) was captured by the trend ratings. Apart from Item 15 (Parenting), there were no changes noted among the Key/Critical factors and no factors appeared to have become active since Baseline. All remaining pre-post ratings at Time 2 displayed relatively little change in terms of directional trends. From Time 2 to Time 3, standard item ratings increased for five of the Strengths factors, whereas standard ratings for six Vulnerabilities decreased and one increased. Directional trends were consistent with the observed changes in standard ratings (i.e., no other change was captured), with all remaining pre-post ratings displaying relatively little change.

Step 2: Re-Examine Initial Risk Estimate, Formulation, Scenarios, and Risk Management Strategies. Jack's estimated risk for violence over the next three months remained High from Baseline to Time 2 and was reduced to Moderate by Time 3. There were no noted changes to his underlying case formulation or scenario of concern.

Step 3: Rate Degree of Change in Dynamic Risk. Despite not altering the underlying risk formulation or estimate of violence risk, the degree of change in Jack's dynamic risk was representative of *Mild Improvement* at Time 2 given increases in several Strengths and decreases in some Vulnerabilities (with Parenting being rated as Critical at Baseline). From Time 2 to Time 3, however, Jack demonstrated *Moderate Improvement* given the reduction in his violence risk estimate, increase in one of his Key Strengths, and further decreases in some of his Vulnerabilities (including Medication Adherence which was rated as Critical at Baseline).

Step 4: Generate Hypotheses and Record Reason(s) for Improvement/Deterioration. It was hypothesized that the underlying reasons for Jack's observed changes in risk were related to a reduction in poor parental supervision/engagement (due to his mother increasing her level of support and his father, who was deemed a negative influence, becoming less involved), increased engagement in prosocial activities through the inpatient program, and decreased ambivalence toward his medication. The observed changes in Jack's risk were considered to fall under Psychological/Biological and Social/Contextual Change, with intervention-based factors and non-intervention/non-sanction based factors representing the underlying mechanisms of change, respectively.

3.4.2. Case 2 (Tyler): Reassessment and Analysis of Change in Risk

Tyler is an adolescent male who was involuntarily admitted to an inpatient facility following the commission of a violent offence. Duration of his stay exceeded 6 months, with the elapsed time between the baseline assessment and initial Review Board hearing and the initial and second Review Board hearings being 94 days and 259 days, respectively. In contrast to Jack, the pattern of change documented in the clinical reports submitted to the Review Board was suggestive of significant emotional and behavioural deterioration by Time 2 (e.g., was physically violent toward peers and staff, accessing violent/sexual material, and encouraging another peer to act out), followed by a period of progressive stabilization and improvement from Time 2 to Time 3 (e.g., psychiatric symptoms in remission, no evidence of aggressive behaviour, psychosocial gains such as attending social skills group, school, and part-time employment).

Pre-Post Change with the SAVRY

Table 3.6 provides item ratings for Tyler across the three timeframes (Baseline to Time 2 = 94 days; Time 2 to Time 3 = 259 days). Tyler's calculated SAVRY risk total score at baseline was 17 (Baseline: Historical Factors = 7, Social/Contextual Factors = 4, Individual/Clinical Factors = 6), which increased to 22 by the initial Review Board hearing (Time 2: Historical Factors = 10, Social/Contextual Factors = 3, Individual/Clinical Factors = 9) and decreased to 14 by the second hearing (Time 3: Historical Factors = 10, Social/Contextual Factors = 2, Individual/Clinical Factors = 2). Again, the 5-point difference in SAVRY risk total score between Baseline and Time 2 met criteria for minimally detectable change based on the results of Koh et al. (2021) but not those of Viljoen, Shaffer, et al. (2017); however, the degree of change in Tyler's SAVRY risk total score between Time 2 and Time 3 would be considered reliable based on MDC values reported by either study. Although there was evidence of reliable change occurring at various points in time during Tyler's stay in the program, the 3-point difference between his Baseline and Time 3 SAVRY risk total score would not be interpreted as reliable. With respect to protective factors, reliable increases were evident at each of the three time-points (Protective Factors = 1, 3, and 6, respectively), exceeding RCI and MDC values reported in Table 3.1.

Stages of Change with the VRS-YV

Item ratings for Tyler on the VRS-YV at Baseline, Time 2, and Time 3 are provided in Table 3.8. Rating Tyler on the VRS-YV at pre-treatment resulted in a total score of 28 (Baseline: Static = 3, Dynamic = 25), placing him in the low-risk category using cutoff values (i.e., < 35) reported by Stockdale et al. (2014). For six of the items identified as criminogenic (i.e., rated as 2 or 3) Tyler was rated as being within the precontemplation or contemplation stage, whereas he was rated as being within the preparation stage for the remaining four criminogenic needs. When information from Time 2 was evaluated and applied using the stages of change, the resulting post-treatment total score for Tyler on the VRS-YV was 26.5 (Time 2: Static = 3; Dynamic = 23.5), indicating that his VRS-YV score had changed by 1.5 points with Tyler moving to the preparation and action stage on four and one criminogenic need, respectively. Moreover, Tyler displayed an increase in risk on D1 (Violent Lifestyle) and D6 (Interpersonal Aggression), with no movement being noted for D11 (Mental Disorder). Tyler's post-treatment total on the VRS-YV was 22 by the final time interval (Time 3: Static = 3, Dynamic = 19), indicating that his VRS-YV score

had changed a further 4.5 points relative to Time 2. As displayed in Table 8, movement to a new stage of change was evident for six criminogenic needs at Time 3 (i.e., Violent Lifestyle, Interpersonal Aggression, Weapon Use, Mental Disorder, Impulsivity/Attention Deficits, and Family Stress), whereas no further movement was detected for the remaining dynamic factors previously rated on the stages of change. Regarding risk category, Tyler's VRS-YV score remained in the low-risk category across the three intervals.

Despite not being identified as criminogenic needs at Baseline, by Time 2 Tyler had engaged in a single non-violent antisocial act and multiple acts of violence committed against peers and staff. In addition, he began exhibiting increased criminal attitudes and callous/unemotional traits. Although this information may have resulted in an increase in his VRS-YV score (via Items S2: Criminality, D2: Callous and Unemotional, D3: Criminal Attitudes, and D8: Violence During Institutionalization), it was not accounted for due to post-treatment ratings from Baseline to Time 2 being used as the pre-treatment ratings at Time 2 to Time 3.

A Structured Approach to Rating and Formulating Change with the START:AV

To demonstrate the utility of the proposed framework, it was again combined with the START:AV for the current case analysis. However, given that the START:AV is designed to monitor an adolescent's short-term progress, with items being rated based on the past three months (or less depending on the Reference Period), it was not possible to link the Time 2 and Time 3 assessments due to the elapsed time between the first and second Review Board hearings exceeding the three month Reference Period (and suggested maximum six month timeframe) as recommended within the START:AV manual (Viljoen et al., 2014). As such, Tyler was only rated on the START:AV at Baseline and Time 2 (Table 3.9). Again, for illustrative purposes, when making the risk estimate on the START:AV violence was selected as the primary outcome of concern, with only a repeat scenario of concern being provided for the current case analysis.

Baseline START:AV Item Ratings and Case Formulation. Using the START:AV, Tyler was rated as Moderate Risk for Violence over the next three months. As Tyler was experiencing command hallucinations and had become paranoid regarding the victim, he became increasingly agitated and distressed leading up to the index offence (Item 10: Emotional State). This, combined with his inability to cope and reluctance to

disclose his mental state/emotional distress (Item 7: Coping) resulted in him engaging in a sudden and unprovoked attack on the victim (Item 8: Impulse Control). His mental/cognitive state was considered the root cause of his violent behaviour and, in combination with his poor impulse control, had a destabilizing effect on his decision to engage in violence. Moreover, Tyler's motivation for engaging in violence stemmed from a desire to defend or protect himself (because of his perceptual disturbances and delusional beliefs), and his emotional distress at the time may have contributed to a sense of nihilism which, in turn, had a disinhibiting effect thus lowering the perceived costs of engaging in violence. Tyler's close relationship with his parents (Item 13a: Relationships with Caregivers and Other Adults) and the love and support he received from them (Item 15: Parenting) were identified as his Key Strengths.

Scenario of Concern. Tyler may develop command hallucinations and/or a delusional belief system involving someone close to him, becoming increasingly paranoid and fixated on the individual. His inability to cope with the resulting fear and emotional distress may cause him to impulsively act out violently.

Step 1: Reassess Risk/Protective Factors and Assess the Degree of Impact on Relevant (or Critical/Key) Factors. Standard item ratings of Low, Moderate, and High for Tyler on the START:AV at Time 2 are provided in Table 3.9. At Time 2, increases and decreases in the standard item ratings were evident for six and seven of the Strengths factors, respectively, whereas standard ratings for two Vulnerabilities decreased while six increased. Directional trends were consistent with the observed changes in standard ratings (i.e., no other change was captured), with all remaining pre-post ratings displaying relatively little change. As there was evidence that Tyler was developing more pronounced antisocial/violent attitudes (Item 11: Attitudes) since Baseline, this possibly represents an *activated* factor that may have implications regarding treatment responsiveness.

Step 2: Re-Examine Initial Risk Estimate, Formulation, Scenarios, and Risk Management Strategies. Tyler's estimated risk for violence over the next three months increased from Moderate to High by Time 2. There were no noted changes to his underlying case formulation or scenario of concern.

Step 3: Rate Degree of Change in Dynamic Risk. Despite not altering the underlying risk formulation, the degree of change in Tyler's dynamic risk was

representative of *Moderate Deterioration* at Time 2 given the increase in his violence risk estimate and rated increase in multiple Vulnerabilities (with Impulse Control being rated as Critical at Baseline) and decreases in multiple Strengths.

Step 4: Generate Hypotheses and Record Reason(s) for Improvement/Deterioration. It was hypothesized that the underlying reasons for Tyler's observed changes in risk related to increases in impulsivity due to emotional/psychiatric decompensation and adoption of more pronounced antisocial/violent attitudes, possibly due to negative peer exposure. As these appear to represent aspects of internalized changes, Tyler's primary pathway of change was considered to fall under Psychological/Biological Change, with Non-Intervention/Non-Sanction-based factors representing the underlying mechanism of change.

3.5. Discussion

The current study consisted of a case study analysis and examination of current methods and tools available to clinicians for reassessing risk of violence in adolescents across time. Using a three-wave, multiple case study design, items on the SAVRY, START:AV, and VRS-YV were rated at three distinct time-points (i.e., Baseline, Time 2, and Time 3) using archival data. A specific method for evaluating change in dynamic risk was represented by each measure, with the pre-post reliable change method applied to the SAVRY, the stages of change method represented by the VRS-YV, and the newly developed SPJ framework applied to the START:AV. Although the capacity for each method/tool to detect change in dynamic factors across the various follow-up periods was supported for the two cases, there are several potentially important implications concerning the results of the current case analysis.

3.5.1. Primary Findings

Findings of the current case study analysis yielded some consistencies, with each adolescent exhibiting change in dynamic risk across the three measures. Several unique and meaningful differences emerged, however, when examining the various approaches to clinically assessing change in risk. For instance, when examining change in Jack's SAVRY scores over the three intervals he was deemed to have exhibited reliable change only between Baseline and Time 2 (using results from only one study), despite a further

reduction in his total risk score by Time 3. Changes in Tyler's scores across the three intervals was deemed to be reliable for Baseline/Time 2 and Time 2/Time 3; however, the reliable change for Baseline to Time 2 was found using results from only one study. Interpretation of these findings remains difficult as changes in risk may be meaningful at a clinical level despite not meeting the threshold for reliable change, whereas, conversely, observed changes in risk may not be reflective of true change and are rather the result of measurement error. On the VRS-YV, the stages of change were successful in capturing changes (i.e., increases and decreases) in individual risk factors across the time intervals for each adolescent, with changes in item ratings being reflected within the total scores; however, the risk category remained unchanged for each adolescent across the three intervals.

Application of the proposed framework to the START:AV yielded a number of interesting findings, with some of the potential limitations of the above approaches being addressed. First, the addition of the seven-category rating system within Step 3 has important clinical and research implications as it provides a systematic way for communicating change in risk with greater room for movement relative to the overarching estimate of low, moderate, or high risk found among the risk categories of the VRS-YV and risk estimates of the SAVRY and START:AV. Second, although only applicable to two items for one case, trend ratings have the potential to capture change in dynamic factors even when altering the standard rating is unwarranted. Third, while neither the SAVRY nor VRS-YV provide much explanation regarding the underlying cause of change, the proposed framework encourages evaluators to generate hypotheses and record reasons for improvement/deterioration in a narrative fashion. Although aspects of this are included within the manual, the presentation of two possible umbrella pathways relating to Psychological/Biological and Social/Contextual mechanisms of change separates the step within the proposed framework from that of the START:AV. As these aspects are unique to the proposed framework, its application has the potential for enhancing an existing risk assessment measure's sensitivity to change (i.e., internal responsiveness). Based on Viljoen, Shaffer, et al.'s (2017) suggested strategies, the proposed framework may enhance internal and external responsiveness through the provision of a structured approach to evaluating changes in dynamic factors, potential for increasing and capturing variability in items through the recording of directional trends, and by providing a rating system for determining an adolescent's overall level of change.

Nonetheless, several limitations concerning the proposed framework became apparent when applied to the two cases. Due to limitations in the data and the amount of clinical detail that would be required, determining the underlying cause or mechanism of change proved difficult. This may have resulted in the observed stability of the risk formulations, with trend ratings also potentially being affected. Although the findings of the current case analysis are preliminary, they remain promising and provide insights into the feasibility of the proposed framework while supporting its use within the context of pre-post or multi-wave study designs. Application of the proposed framework may also have important clinical implications given its structure and the information provided. Commonalities between the general structure of assessing risk as outlined within the HCR-20^{V3} manual make the framework easily adaptable for use with other SPJ-based risk assessment measures such as the SAVRY and START:AV. In addition, the degree of overlap in strategies for reassessing risk as described by Viljoen et al. (2014) with those of the proposed framework suggests that the additional workload generated by its use would not place an undue burden on clinical staff. Feasibility remains an important area of consideration when implementing a risk assessment measure or procedure into clinical practice, with administration time being among the most common concerns raised by staff (De Beuf et al., 2019, 2020). This has important implications for the reassessment of risk as poor feasibility can negatively impact perceived acceptability of a risk assessment measure during the implementation process. It was with these considerations in mind that the framework was developed for use with existing risk assessment measures, as opposed to developing a new assessment measure entirely.

3.5.2. Clinical and Research Implications for Reassessing Risk with the SAVRY, START:AV, and VRS-YV

Consistent with the empirical literature (e.g., Viljoen, Shaffer, et al., 2017), results of the current case study support the ability of the SAVRY to detect reliable changes in violence risk across time. Despite the SAVRY having the largest research base examining reliable change, the results highlight the clinical shortcomings of methodologies such as the use of RCIs. Issues related to high thresholds in detecting reliable change and inconsistencies across reliable change estimates were evident among research studies reviewed (Table 3.1), with an approximate 2-point difference between MDCs for the SAVRY risk total score. Although such differences may seem inconsequential, a 2-point difference across studies could have a sizeable impact on the interpretation of change as

most of the change in risk scores, though potentially meaningful, is likely to be relatively small and determining which study results to use may prove difficult (though studies with greater inter-rater reliability may produce more precise estimates). Within the current case analysis, not all change exhibited by the two cases could be considered reliable (i.e., not due to random measurement error). For instance, despite the presence of reliable fluctuations in violence risk over time (based on the SAVRY), were Tyler to be assessed at only Baseline and Time 3 he would not have been identified as having exhibited reliable change.

Although adaptable to the various follow-up intervals among the two cases (regardless of elapsed time), some issues concerning sensitivity to change arose when examining the rating procedures as outlined within the manual of certain SAVRY items (see Borum et al., 2006, p. 18). Specifically, current rating procedures for the Protective Factors of the SAVRY limit its ability to detect decreases in protective factors when the reassessment timeframe is less than a year. For example, an adolescent who chooses to no longer play hockey three months after his initial assessment would still be rated as having Prosocial Involvement at his six-month reassessment despite no longer engaging in the activity. It would not be until a full year had elapsed that Prosocial Involvement would be rated as absent, thus limiting the dynamic nature of the Protective Factors on the SAVRY. Likewise, rating criteria for other items, such as Substance-Use Difficulties, do not currently allow for an adolescent to move below a certain item rating, regardless of the amount of change they may have exhibited between reassessments. Unfortunately, the resulting “floor effect” for these dynamic items can be in effect for a year or permanently, with the latter more closely resembling a static risk factor (Harris & Rice, 2003).

To help monitor changes in dynamic risk, the START:AV manual includes a number of steps for reassessing risk and identifying change. Despite this, application of the START:AV to reassessment studies using archival, file-based scoring and/or retrospective study designs may be limited by the timeframes for reassessing risk as outlined within the manual (Viljoen et al., 2014). Although consecutive 3-month timeframes have been successfully applied in prior research examining changes in risk using file-based ratings on the adult START (Wilson et al., 2013), this required the use of all chart information contained within the hospital records of the patients. Due to the nature of the archival data within the current study, however, reassessment intervals became bound to the hearing schedule of the Review Board, making it not possible to control the elapsed

time between the reassessments. This limitation in study design had the unfortunate effect of restricting one case analysis using the START:AV.

Regarding the VRS-YV, primary among its strengths is the incorporation of a modified version of the transtheoretical model's stages of change. Emerging from a multitude of psychotherapeutic and behavioural change theories, the transtheoretical model lends itself well to the reassessment of violence risk and is accompanied by nearly four decades of theoretical development and empirical investigation (Prochaska et al., 2015). This application of the stages of change to the VRS-YV provides a comprehensive method for rating change in dynamic risk factors using constructs that are theoretically and empirically robust. Yet, despite the VRS-YV being representative of new developments in adolescent risk assessment (Gray et al., 2019), the application of the system in its current form presents with its own set of unique challenges.

Despite being well-suited to identifying treatment targets and monitoring pre-post treatment-related change, scoring procedures for the stages of change as conceptualized by Wong et al. (2004-2011) and currently incorporated into the VRS-YV do not appear to lend themselves easily to multi-wave analysis. Given that the VRS-YV is primarily designed to measure treatment-related changes, the scoring system only accounts for increases/decreases on dynamic risk factors that are under observation during treatment (i.e., items rated as 2 or above). As per the VRS-YV manual, ratings on factors falling below the threshold for criminogenic need at pre-treatment are subsequently transferred and used as the post-treatment ratings. However, items omitted during the pre-treatment assessment are an exception to this, with omitted items being re-rated post-treatment should new information arise. As a result, when examining multi-wave assessments, unless reassessing all items included on the VRS-YV, using the post-treatment scores from the most recent assessment as pre-treatment scores for the subsequent assessment introduces the potential for any changes occurring to be missed on the dynamic risk factors rated as 0 or 1 at pre-treatment. This issue in linkage across multiple time-point assessments renders the post-treatment scores from a previous assessment stale and necessitates rescoreing of all items not previously identified as criminogenic needs at subsequent follow-up.

3.5.3. Limitations and Future Directions

It has been argued that case study designs have many potential advantages, such as providing meaningful insights into assessment/treatment and increasing the clinical relevance of research (Drotar et al., 1995). However, despite findings of the current study contributing to research on assessing change in violence risk, case study analysis provides a “weak basis for drawing inferences” given its methodological limitations (e.g., reliance on anecdotal information, inability to control for other plausible explanations, issues related to generalizability; Kazdin, 2003, p. 269). Whereas the inclusion of two cases increases the generalizability of the findings to some extent, the non-random selection of the two cases and their characteristics (i.e., adolescent male inpatients charged with a serious violent offence) restricts the findings to individuals fitting these criteria.

Due to the lack of inter-rater reliability analysis, it is unknown whether bias may have been inadvertently introduced into the findings given the use of a single rater for scoring measure items, developing risk formulations and scenarios of concern, and for rating change (Dawson et al., 2012; Drotar et al., 1995). Research examining the reliability of SPJ-based measures has primarily focused on item ratings and risk estimates, with very few studies examining other components of the SPJ process due to their complexity (e.g., risk formulations, scenarios). For instance, to examine the inter-rater reliability of risk scenarios, Sea and Hart (2021) asked evaluators to develop their risk scenarios (i.e., repeat and escalation) using a fixed format (i.e., ordinal scales); however, as noted by the authors, using a fixed or “forced-choice method” has its limitations and is not reflective of the recommended format of some SPJ-based measures (p. 1441). Investigations into the inter-rater reliability of the various steps within the proposed framework represents a particularly important area for future research and examining whether risk formulations remain stable or are subject to change over time will have practical and theoretical implications for reassessing risk. When compared to incidents of sexual reoffending, Darjee et al. (2016) found that various aspects of the risk scenarios generated using an SPJ-based measure matched certain characteristics of the reoffences (e.g., gender of the victim and victim relationship were matched for 96.2% and 69.2% of offences, respectively). It is, therefore, possible that substantive changes in risk formulation are rare and may only occur in the face of changes in offending trajectory; however, as a first step,

outcome research will be required to determine the accuracy of risk formulation/scenarios and whether they remain stable over time.

As the current study's archival, file-based approach may have resulted in the two cases demonstrating less change due to missing information and/or influence of recording practices of staff at the facility (Nicholls et al., 1999), future research could examine the proposed framework using a multi-wave prospective study design. This would allow for greater control of the reassessment timeframes and may provide richer clinical data (e.g., greater detail for case formulation via clinical interview plus file review and collateral information). Use of larger samples would also permit statistical analysis, such as inter-rater reliability and predictive validity analysis. Such research would assist in further refining the framework and help inform any revisions.

Another important area for future research more broadly includes the re-examination and revision of rating criteria and procedures for existing risk assessment measures (e.g., SAVRY) to ensure items are sufficiently dynamic and sensitive to change. Similarly, revisions to reassessment procedures may enhance existing measures such as the VRS-YV, making them more applicable to multi-wave study designs. As investigations into the external responsiveness of dynamic risk factors included in measures such as the SAVRY and VRS-YV have produced mixed results (e.g., Koh et al., 2021; Viljoen, Gray, Shaffer, Latzman, et al., 2017; Viljoen, Shaffer, et al., 2017), more research and refinement around internal responsiveness may be required before external responsiveness is achieved. Further examination of reliable change indices and whether trend ratings increase a measure's internal responsiveness relative to changes in the standard item ratings warrants further investigation, though it remains to be seen whether increasing the internal responsiveness of a measure comes at the expense of its external responsiveness (i.e., whether increased sensitivity to change is unrelated to reoffending outcomes). In addition, it will be important for researchers to examine the association between the rating system (as outlined within Step 3 of the framework) and the reliable change index as a possible way to explore and account for measurement error.

Future research on external responsiveness could examine and contrast the three approaches across various timeframes (e.g., short- and long-term changes in risk), contexts (e.g., probation vs. treatment settings), and outcome definitions (e.g., dichotomous vs. count data, changes in offending trajectories, or harm reduction). It may

be that detecting the association between changes in risk and subsequent adverse outcomes may be heightened by greater detail in outcome coding. This may include comparing prior reoffending (e.g., index offences) to subsequent reoffending and determining whether the reoffence is a repeat of the index, an escalation/de-escalation in the severity of the index, or a change in trajectory (e.g., violent index to non-violent reoffence, change in victim type, or type of violent offence [sexual to non-sexual violence]). Such an approach may prove to be more sensitive to changes in reoffending behaviours that would otherwise go undetected when examining dichotomous outcomes and number of charges/convictions.

Lastly, as the current iteration of the proposed framework has not undergone empirical testing and remains in the early stages of development, pilot-testing within clinical contexts combined with statistical examination is required before adopting it for clinical use. Incorporating other elements unique to the risk assessment process into the framework (e.g., early warning signals or signature risk signs that trigger the need for reassessment; Nicholls et al., 2021) and eliciting feedback from various stakeholders (i.e., clinicians, researchers, and other experts in the field) will also be an important component of the revision/refinement process. In the interim, however, evaluators tasked with reassessing an adolescent's risk for violence may opt to select from available measures specifically designed to monitor and measure changes in dynamic risk (i.e., START:AV and VRS-YV).

3.5.4. Summary

Like other SPJ measures, it may be argued that the current framework provides structure to the reassessment of violence risk and helps guide clinical decision-making (Webster et al., 2000, p. 139). Although providing structure and guidance to the various stages required to assess and manage violence risk has been linked with improved outcomes among adolescents (Viljoen et al., 2019), it remains to be seen whether the introduction of this framework will further advance the field. As aptly noted by Webster et al. (2000):

The measurement of attitudinal and behavioural change, during treatment or as a result of planned intervention, is a major challenge for mental health professionals. Unless positive changes are detected, individuals are obliged to live under conditions of undue restrictions (and, by the same

token, unless negative changes are discernable, members of society are placed at unnecessary risk). (p. 139)

It is the current author's hope that the development of this framework (and the preliminary examination of its functionality) will not only be of interest to clinicians and researchers but may eventually aid in detecting meaningful changes in risk when they occur and, that by doing so, undue restrictions and unnecessary risk may be avoided.

3.6. References

- American Psychological Association. (2013). Specialty guidelines for forensic psychology. *American Psychologist*, 68(1), 7-19. <https://doi.org/10.1037/a0029889>
- American Psychological Association. (2020). *Publication Manual of the American Psychological Association* (7th ed.). <https://doi.org/10.1037/0000165-000>
- Andrews, D. A. (1989). Recidivism is predictable and can be influenced: Using risk assessments to reduce recidivism. *Forum on Corrections Research*, 1(2), 11-17.
- Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct* (5th ed.). Anderson Publishing.
- Andrews, D. A., Bonta, J., & Hoge, R. D. (1990). Classification for effective rehabilitation: Rediscovering Psychology. *Criminal Justice and Behavior*, 17(1), 19-52. <https://doi.org/10.1177/0093854890017001004>
- Baglivio, M., & Jackowski, K. (2015). Evaluating the effectiveness of a victim impact intervention through the examination of changes in dynamic risk scores. *Criminal Justice Policy Review*, 26(1), 7-28. <https://doi.org/10.1177/0887403413489706>
- Beggs, S. M., & Grace, R. C. (2010). Assessment of dynamic risk factors: An independent validation study of the Violence Risk Scale: Sexual Offender Version. *Sexual Abuse: A Journal of Research and Treatment*, 22(2), 234-251. <https://doi.org/10.1177/1079063210369014>
- Best, O., & Ban, S. (2021). Adolescence: Physical changes and neurological development. *British Journal of Nursing*, 30(5), 272-275. <https://doi.org/10.12968/bjon.2021.30.5.272>
- Bevan, M. (2015). Desistance from crime: A review of the literature. *Practice: The New Zealand Corrections Journal*, 3(1), 5-9. https://www.corrections.govt.nz/resources/newsletters_and_brochures/journal/volume_3_issue_1_april_2015_desistance/desistance_from_crime_a_review_of_the_literature

- Borum, R. (2000). Assessing violence risk among youth. *Journal of Clinical Psychology*, 56(10), 1263-1288. [https://doi.org/10.1002/1097-4679\(200010\)56:10<1263::AID-JCLP3>3.0.CO;2-D](https://doi.org/10.1002/1097-4679(200010)56:10<1263::AID-JCLP3>3.0.CO;2-D)
- Borum, R., Bartel, P., & Forth, A. (2006). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY)*. Psychological Assessment Resources.
- Briggs, E. C., Greeson, J. K. P., Layne, C. M., Fairbank, J. A., Knoverek, A. M., & Pynoos, R. S. (2012). Trauma exposure, psychosocial functioning, and treatment needs of youth in residential care: Preliminary findings from the NCTSN Core Data Set. *Journal of Child & Adolescent Trauma*, 5, 1-15. <https://doi.org/10.1080/19361521.2012.646413>
- Brown, S. L., Amond, M. D. S., & Zamble, E. (2009). The dynamic prediction of criminal recidivism: A three-wave prospective study. *Law and Human Behavior*, 33(1), 25-45. <https://doi.org/10.1007/s10979-008-9139-7>
- Canadian Psychological Association. (2017). *Canadian code of ethics for psychologists: Fourth edition*. https://cpa.ca/docs/File/Ethics/CPA_Code_2017_4thEd.pdf
- Casey, B. J., Heller, A. S., Gee, D. G., & Cohen, A. O. (2019). Development of the emotional brain. *Neuroscience Letters*, 693, 29-34. <https://doi.org/10.1016/j.neulet.2017.11.055>
- Cook, A., N., Murray, A. A., Amat, G., & Hart, S. D. (2014). Using structured professional judgment guidelines in threat assessment and management: Presentation, analysis, and formulation of a case of serial intimate partner violence. *Journal of Threat Assessment and Management*, 1(2), 67-86. <https://doi.org/10.1037/tam0000011>
- Darjee, R., Russell, K., Forrest, L., Milton, E., Savoie, V., Baron, E., Kirkland, J., & Stobie, S. (2016). *Risk for Sexual Violence Protocol: A real world study of the reliability, validity and utility of a structured professional judgment instrument in the assessment and management of sexual offenders in South East Scotland*. Retrieved September 2021, from https://www.rma.scot/wp-content/uploads/2018/04/Risk_for_Sexual_Violence_Protocol_-_RSVP.pdf
- Dawson, S., McCuish, E., Hart, S. D., & Corrado, R. R. (2012). Critical issues in the assessment of adolescent psychopathy: An illustration using two case studies. - *International Journal of Forensic Mental Health*, 11, 63-79. <https://doi.org/10.1080/14999013.2012.676149>
- De Beuf, T. L. F., de Ruiter, C., de Vogel, V. (2020). Staff perceptions on the implementation of structured risk assessment with the START:AV: Identifying barriers and facilitators in a residential youth care setting. *International Journal of*

- Forensic Mental Health*, 19(3), 297-314.
<https://doi.org/10.1080/14999013.2020.1756994>
- De Beuf, T. L. F., de Vogel, V., & de Ruiter, C. (2019). Implementing the START:AV in a Dutch residential youth facility: Outcomes of success. *Translational Issues in Psychological Science*, 5(2), 193-205. <https://doi.org/10.1037/tps0000193>
- Douglas, K. S., Hart, S. D., Webster, C. D., & Belfrage, H. (2013). *HCR-20^{V3}: Assessing Risk for Violence: User Guide*. Mental Health, Law and Policy Institute, Simon Fraser University.
- Douglas, K. S., & Skeem, J. L. (2005). Violence risk assessment: Getting specific about being dynamic. *Psychology, Public Policy, and Law*, 11(3), 347-383. <https://doi.org/10.1037/1076-8971.11.3.347>
- Drotar, D., La Greca, A. M., Lemanek, K., & Kazak, A. (1995). Case reports in pediatric psychology: Uses and guidelines for authors and reviewers. *Journal of Pediatric Psychology*, 20(5), 549-565. <https://doi.org/10.1093/jpepsy/20.5.549>
- Gatner, D. T., Douglas, K. S., Hart, S. D., & Kropp, P. R. (2021). Structured professional judgment (SPJ) violence risk case formulation and psychopathic personality disorder. *International Journal of Forensic Mental Health*. Advance online publication. <https://doi.org/10.1080/14999013.2021.1895378>
- Gray, A. L., Shaffer, C. S., Viljoen, J. L., Muir, N. M., & Nicholls, T. L. (2019). Assessing violence risk in youth. In J. L. Ireland, C. A. Ireland, & P. Birch (Eds.), *Violent and sexual offenders: Assessment, treatment and management* (2nd ed., pp. 92-113). Routledge.
- Hanson, R. K., Harris, A. J. R., Scott, T., & Helmus, L. (2007). *Assessing the risk of sexual offenders on community supervision: The Dynamic Supervision Project* (User Report No. 2007-05). Ottawa, Ontario: Public Safety Canada.
- Hart, S. D. (1998). The role of psychopathy in assessing risk for violence: Conceptual and methodological issues. *Legal and Criminological Psychology*, 3(1), 121-137. <https://doi.org/10.2217/NPY.12.61>
- Hart, S. D., Douglas, K. S., & Guy, L. S. (2016). The structured professional judgement approach to violence risk assessment: Origins, nature, and advances. In L. A. Craig & M. Rettenberger (Eds.), *The Wiley handbook on the theories, assessment, and treatment of sexual offending: Volume II: Assessment* (pp. 643-666). John Wiley & Sons. <https://doi.org/10.1002/9781118574003.wattso030>
- Hart, S. D., & Logan, C. (2011). Formulation of violence risk using evidence-based assessments: The structured professional judgment approach. In P. Sturmey & M. McMurrin (Eds.), *Forensic case formulation*. Wiley-Blackwell.

- Hart, S., Sturmey, P., Logan, C., & McMurrin, M. (2011). Forensic case formulation. *International Journal of Forensic Mental Health, 10*(2), 118-126. <https://doi.org/10.1080/14999013.2011.577137>
- Hilterman, E. L. B., Bongers, I. L., Nicholls, T. L., & van Nieuwenhuizen, C. (2018). Supervision trajectories of male juvenile offenders: Growth mixture modelling on SAVRY risk assessments. *Child and Adolescent Psychiatry and Mental Health, 12*(1), Article 15. <https://doi.org/10.1186/s13034-018-0222-7>
- Hilton, N. Z. (2014). Actuarial assessment in serial intimate partner violence: Comment on Cook, Murray, Amat, and Hart. *Journal of Threat Assessment and Management, 1*(2), 87-92. <https://doi.org/10.1037/tam0000013>
- Husted, J. A., Cook, R. J., Farewell, V. T., & Gladman, D. D. (2000). Methods for assessing responsiveness: A critical review and recommendations. *Journal of Clinical Epidemiology, 53*(5), 459-468. [https://doi.org/10.1016/S0895-4356\(99\)00206-1](https://doi.org/10.1016/S0895-4356(99)00206-1)
- Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Methodological Issues and Strategies in Clinical Research, 59*(1), 631-648. <https://doi.org/10.1037/10109-042>
- Kazdin, A. E. (2003). *Research design in clinical psychology* (4th ed.). Allyn & Bacon.
- Koh, L. L., Day, A., Klettke, B., Daffern, M., & Chu, C. M. (2021). Youth violence assessment instruments: Are they sensitive to change and are changes related to recidivism? *Psychology, Crime & Law*. Advance online publication. <https://doi.org/10.1080/1068316X.2021.1909019>
- Kroner, D. G., & Yessine, A. K. (2013). Changing risk factors that impact recidivism: In search of mechanisms of change. *Law and Human Behavior, 37*(5), 321-336. <https://doi.org/10.1037/lhb0000022>
- Lee, F. S., Heimer, H., Giedd, J. N., Lein, E. S., Šestan, N., Weinberger, D. R., & Casey, B. J. (2014). Adolescent mental health – Opportunity and obligation: Emerging neuroscience offers hope for treatments. *Science, 346*(6209), 547-549. <https://doi.org/10.1126/science.1260497>
- Lewis, G., & Doyle, M. (2009). Risk formulation: What are we doing and why? *International Journal of Forensic Mental Health, 8*(4), 286-292. <https://doi.org/10.1080/14999011003635696>
- Lewis, K., Olver, M. E., & Wong, S. C. P. (2013). The Violence Risk Scale: Predictive validity and linking changes with violent recidivism in a sample of high-risk offenders with psychopathic traits. *Assessment, 20*(2), 150-164. <https://doi.org/10.1177/1073191112441242>

- Litwack, T. R. (2001). Actuarial versus clinical assessments of dangerousness. *Psychology, Public Policy, and Law*, 7(2), 409-443. <https://doi.org/10.1037//1076-8971.7.2.409>
- Logan, C. (2014). The HCR-20 Version 3: A case study in risk formulation. *International Journal of Forensic Mental Health*, 13(2), 172-180. <https://doi.org/10.1080/14999013.2014.906516>
- Logan, C. (2016). Structured professional judgment: Applications to sexual offender risk assessment and management. In A. Phenix & H. M. Hoberman (Eds.), *Sexual offending: Predisposing antecedents, assessments and management* (pp. 571-588). Springer. https://doi.org/10.1007/978-1-4939-2416-5_26
- Mills, J. F., Kroner, D. K., & Morgan, R. D. (2011). *Clinician's guide to violence risk assessment*. The Guildford Press.
- Morgan, R. D., Kroner, D. G., Mills, J. F., Serna, C., & McDonald, B. (2013). Dynamic risk assessment: A validation study. *Journal of Criminal Justice*, 41(2), 115-124. <https://doi.org/10.1016/j.jcrimjus.2012.11.004>
- Mulvey, E. P., Steinberg, L., Fagan, J., Cauffman, E., Piquero, A. R., Chassin, L., Knight, G. P., Brame, R., Schubert, C. A., Hecker, T., & Losoya, S. H. (2004). Theory and research on desistance from antisocial activity among serious adolescent offenders. *Youth Violence and Juvenile Justice*, 2(3), 213-236. <https://doi.org/10.1177/1541204004265864>
- Nicholls, T. L., Brink, J., Greaves, C., Lussier, P., Verdun-Jones, S. (1999). Forensic psychiatric inpatients and aggression: An exploration of incidence, prevalence, severity, and interventions by gender. *International Journal of Law and Psychiatry*, 32(1), 23-30. <https://doi.org/10.1016/j.ijlp.2008.11.007>
- Nicholls, T. L., Petersen, K., Almond, M., & Geddes, C. (2021). Short-Term Assessment of Risk and Treatability (START): Rationale, application, and empirical overview. In K. Douglas & R. Otto (Eds.), *Handbook of violence risk assessment* (2nd ed., pp. 359-388). Routledge.
- Nicholls, T. L., Roesch, R., Olley, M., Ogloff, J. R. P., & Hemphill, J. (2005). *Jail Screening Assessment Tool (JSAT): A guide for conducting mental health screening in jails and pretrial centres*. Mental Health, Law, and Policy Institute, Simon Fraser University.
- Olver, M. E., Beggs Christofferson, S. M., Grace, R. C., & Wong, S. C. P. (2014). Incorporating change information into sexual offender risk assessments using the Violence Risk Scale-Sexual Offender Version. *Sexual Abuse: A Journal of Research and Treatment*, 26(5), 472-499. <https://doi.org/10.1177/1079063213502679>

- Olver, M. E., & Wong, S. C. P. (2011). A comparison of static and dynamic assessment of sexual offender risk and need in a treatment context. *Criminal Justice and Behavior*, 38(2), 113-126. <https://doi.org/10.1177/0093854810389534>
- Olver, M. E., & Wong, S. C. P. (2021). Two treatment and change-oriented risk assessment tools: The Violence Risk Scale (VRS) and Violence Risk Scale-Sexual Offense Version (VRS-SO). In K. Douglas & R. Otto (Eds.), *Handbook of violence risk assessment* (2nd ed., pp. 206-223). Routledge.
- Olver, M. E., Wong, S. C. P., Nicholaichuk, T., & Gordon, A. (2007). The validity and reliability of the Violence Risk Scale-Sexual Offender Version: Assessing sex offender risk and evaluating therapeutic change. *Psychological Assessment*, 19(3), 318-329. <https://doi.org/10.1037/1040-3590.19.3.318>
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change: Applications to the addictive behaviors. *Addictions Nursing Network*, 5(1), 2-16. <https://doi.org/10.3109/10884609309149692>
- Prochaska, J. O., Redding, C. A., & Evers, K. E. (2015). The transtheoretical model and stages of change. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health behavior: Theory, research, and practice* (5th ed., pp. 125-148). Jossey-Bass.
- Schuck, P., & Zwingmann, C. (2003). The 'smallest real difference' as a measure of sensitivity to change: A critical analysis. *International Journal of Rehabilitation Research*, 26(2), 85-91. <https://doi.org/10.1097/01.mrr.0000070759.63544.65>
- Sea, J., & Hart, S. D. (2021). Interrater reliability and concurrent validity of the Risk for Sexual Violence Protocol for Korean sexual offenders: A field study. *International Journal of Offender Therapy and Comparative Criminology*, 65(13-14), 1423-1445. <https://doi.org/10.1177/0306624X20967969>
- Sellers, B. G., Desmarais, S. L., & Hanger, M. W. (2017). Measurement of change in dynamic risk factors using the START:AV. *Journal of Forensic Psychology Research and Practice*, 17(3), 198-215. <https://doi.org/10.1080/24732850.2017.1317560>
- Stockdale, K. C. (2008). *The validity and reliability of the Violence Risk Scale – Youth Version (VRS-YV)* [Unpublished doctoral dissertation]. University of Saskatchewan.
- Stockdale, K. C., Olver, M. E., & Wong, C. P. (2014). The validity of the Violence Risk Scale-Youth Version in a diverse sample of violent young offenders. *Criminal Justice and Behavior*, 41(1), 114-138. <https://doi.org/10.1177/0093854813496999>
- Storey, J. E., Hart, S. D., & Lim, Y. L. (2017). Serial stalking of mental health professionals: Case presentation, analysis, and formulation using the Guidelines for Stalking

- Assessment and Management (SAM). *Journal of Threat Assessment and Management*, 4(3), 122–143. <https://doi.org/10.1037/tam0000087>
- Sweeten, G., Piquero, A. R., & Steinberg, L. (2013). Age and the explanation of crime, revisited. *Journal of Youth and Adolescence*, 42(6), 921-938. <https://doi.org/10.1007/s10964-013-9926-4>
- U.S. Department of Health & Human Services (n.d.). *Guidance Regarding Methods for De-identification of Protected Health Information in Accordance with the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule*. <https://www.hhs.gov/hipaa/for-professionals/privacy/special-topics/de-identification/index.html#guidancedetermination>
- Van der Put, C. E., Deković, M., Stams, G. J. J. M., Van der Laan, P. H., Hoeve, M., & Amelsfort, L. van. (2011). Changes in risk factors during adolescence: Implications for risk assessment. *Criminal Justice and Behavior*, 38(3), 248-262. <https://doi.org/10.1177/0093854810391757>
- Van der Put, C. E., Stams, G. J. J. M., Hoeve, M., Deković, M., Spanjaard, H. J. M., Van der Laan, P. H., & Barnoski, R. P. (2012). Changes in the relative importance of dynamic risk factors for recidivism during adolescence. *International Journal of Offender Therapy and Comparative Criminology*, 56(2), 296-316. <https://doi.org/10.1177/0306624X11398462>
- Viljoen, J. L., Beneteau, J. L., Gulbransen, E., Brodersen, E., Desmarais, S. L., Nicholls, T. L., & Cruise, K. R. (2012). Assessment of multiple risk outcomes, strengths, and change with the START:AV: A short-term prospective study with adolescent offenders. *International Journal of Forensic Mental Health*, 11(3), 165-180. <https://doi.org/10.1080/14999013.2012.737407>
- Viljoen, J. L., Gray, A. L., & Barone, C. (2016). Assessing risk for violence and offending in adolescents. In R. Jackson and R. Roesch (Eds.), *Learning forensic assessment: Research and practice* (2nd ed., pp. 357-388). Routledge/Taylor & Francis Group.
- Viljoen, J. L., Gray, A. L., Shaffer, C., Bhanwer, A., Tafreshi, D., & Douglas, K. S. (2017). Does reassessment of risk improve predictions? A framework and examination of the SAVRY and YLS/CMI. *Psychological Assessment*, 29(9), 1096-1110. <https://doi.org/10.1037/pas0000402>
- Viljoen, J. L., Gray, A. L., Shaffer, C., Latzman, N. E., Scalora, M. J., & Ulman, D. (2017). Changes in J-SOAP-II and SAVRY scores over the course of residential, cognitive-behavioral treatment for adolescent sexual offending. *Sexual Abuse: A Journal of Research and Treatment*, 29(4), 342-374. <https://doi.org/10.1177/1079063215595404>

- Viljoen, J. L., Nicholls, T. L., Cruise, K. R., Desmarais, S. L., & Webster, C. D. (2014). *Short-Term Assessment of Risk and Treatability: Adolescent Version: START:AV user guide*. Mental Health, Law and Policy Institute, Simon Fraser University.
- Viljoen, J. L., Shaffer, C. S., Gray, A. L., & Douglas, K. S. (2017). Are adolescent risk assessment tools sensitive to change? A framework and examination of the SAVRY and the YLS/CMI. *Law and Human Behavior, 41*(3), 244-257. <https://doi.org/10.1037/lhb0000238>
- Viljoen, J. L., Shaffer, C. S., Muir, N. M., Cochrane, D. M., & Brodersen, E. M. (2019). Improving case plans and interventions for adolescents on probation: The implementation of the SAVRY and a structured case planning form. *Criminal Justice and Behavior, 46*(1), 42-62. <https://doi.org/10.1177/0093854818799379>
- Webster, C. D., Douglas, K. S., Belfrage, H., & Link, B. G. (2000). Capturing change: An approach to managing violence and improving mental health. In S. Hodgins (Ed.), *Violence among the mentally ill: Effective treatments and management strategies* (pp. 119-144). Springer.
- Webster, C. D., Martin, M. L., Brink, J., Nicholls, T. L., & Desmarais, S. (2009). *Manual for the Short-Term Assessment of Risk and Treatability (START)* (Version 1.1). Forensic Psychiatric Services Commission, St. Joseph's Healthcare.
- Webster, C. D., Douglas, K. S., Eaves, D., & Hart, S. D. (1997). *HCR-20: Assessing risk for violence, version 2*. Mental Health, Law, and Policy Institute, Simon Fraser University.
- Wilson, C. M., Desmarais, S. L., Nicholls, T. L., Hart, S. D., & Brink, J. (2013). Predictive validity of dynamic factors: Assessing violence risk in forensic psychiatric inpatients. *Law and Human Behavior, 37*(6), 377-388. <https://doi.org/10.1037/lhb0000025>
- Wong, S. C. P., & Gordon, A. (2006). The validity and reliability of the Violence Risk Scale: A treatment-friendly violence risk assessment tool. *Psychology, Public Policy, and Law, 12*(3), 279-309. <https://doi.org/10.1037/1076-8971.12.3.279>
- Wong, S. C. P., Lewis, K., Stockdale, K., & Gordon, A. (2004-2011). *The Violence Risk Scale: Youth Version (VRS: YV)*. University of Saskatchewan.
- Wong, S. C. P., Olver, M. E., & Stockdale, K. C. (2009). The utility of dynamic and static factors in risk assessment, prediction, and treatment. In J. T. Andrade (Ed.), *Handbook of violence risk assessment and treatment: New approaches for mental health professionals* (pp. 83-120). Springer.
- Yin, R. K. (2012). Case study methods. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in*

psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological (pp. 141–155). American Psychological Association. <https://doi.org/10.1037/13620-009>

3.7. Tables for Chapter 3

Table 3.1. Studies Reporting RCI and MDC values for the SAVRY, START:AV, and VRS-YV

Measure and study	Timeframe	Domain	Statistic	n	Percentage of Sample Showing Reliable Change		
					Decrease	Increase	No change
SAVRY							
Viljoen et al. (2017) ^a	> 30 days	Social/contextual	RCI = 4	163	14.7	0.0	85.3
		Individual/clinical	RCI = 5	163	38.7	0.0	61.3
		Protective factors	RCI = 2	163	0.0	8.0	92.0
		Dynamic risk total score	RCI = 8	163	31.3	0.0	68.7
Viljoen et al. (2017) ^b	12 months	Historical	MDC = 4.39	113	0.0	3.5	96.5
		Social/contextual	MDC = 3.03	95	6.3	0.0	93.7
		Individual/clinical	MDC = 3.25	99	16.2	6.1	77.8
		Protective factors	MDC = 2.37	106	0.9	3.8	95.3
		Risk total score	MDC = 6.96	101	12.9	8.9	78.2
Koh et al. (2021) ^c	≈ 6 to 8 months	Historical	MDC = 3.09	90	0.0	2.2	97.8
		Social/contextual	MDC = 2.67	90	31.1	2.2	66.7
		Individual/clinical	MDC = 3.39	90	36.7	0.0	63.3
		Protective factors	MDC = 2.47	90	14.4	1.1	84.4
		Risk total score	MDC = 4.73	90	23.3	2.2	74.4
START:AV							
Viljoen et al. (2012)	3 months	Vulnerabilities	RCI = 8.58	63	4.7	1.6	93.8
		Strengths	RCI = 5.94	63	4.8	6.3	88.9
Sellers et al. (2017)	3 months	Vulnerabilities	RCI = 7.80	55	13.0	3.7	83.3
		Strengths	RCI = 8.23	55	3.6	7.3	89.1

Measure and study	Timeframe	Domain	Statistic	n	Percentage of Sample Showing Reliable Change		
					Decrease	Increase	No change
VRS-YV							
Koh et al. (2021) ^c	≈ 6 to 8 months	Static	MDC = 2.80	90	0.0	2.2	97.8
		Dynamic	MDC = 5.45	90	21.1	2.2	76.7
		Total score	MDC = 5.98	90	6.7	2.2	91.1

Note. Timeframe is the elapsed time between baseline and follow-up assessment. RCI = Reliable change index; MDC = Minimally detectable change. ^a Viljoen, Gray, Shaffer, Latzman, et al. (2017). ^b Viljoen, Shaffer, et al. (2017). ^c Values reported from Koh et al. (2021) for the percentage of sample showing reliable increase and decrease are reversed from those reported in Table 2 of their study (p. 10) as the original values were inadvertently reversed during the advance online publication process (L. L. Koh, personal communication, October 3, 2021).

Table 3.2. Recommendations for Reassessing Risk as Outlined within the SAVRY, START:AV, and VRS-YV Manuals

Measure	Recommended timeframe	When risk is to be reassessed	Methods for reassessing risk
SAVRY	<ul style="list-style-type: none"> None provided. 	<ul style="list-style-type: none"> Regular intervals, particularly for high-risk adolescents. Preceding transitional stages (e.g., transfer to community, “or when there are changes from close to minimal supervision” (p. 15). 	<ul style="list-style-type: none"> None provided.
START:AV	<ul style="list-style-type: none"> Three months or less, maximum six months. 	<ul style="list-style-type: none"> Minimum of every three months or in anticipation of/following a major life event (i.e., discharge/release, and/or occurrence of an adverse outcome). 	<ul style="list-style-type: none"> Reassess risk using all procedures for rating the START:AV. Directly compare pre-post assessments, visually plot changes using the START:AV Profile Form, and/or describe change and the underlying reasons for it using a narrative approach. Describe reasons for change (e.g., developmental maturation). Examine whether item ratings or risk estimates have changed, with particular attention paid to Key Strengths and Critical Vulnerabilities. Refine intervention plan accordingly.
VRS-YV	<ul style="list-style-type: none"> None provided. 	<ul style="list-style-type: none"> Following treatment (i.e., post-treatment). 	<ul style="list-style-type: none"> Re-rate items identified as criminogenic needs at pre-treatment (i.e., rated as 2 or 3) on the VRS-YV using a modified version of the stages of change model.

Note. SAVRY = Structured Assessment of Violence Risk in Youth; START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version; VRS-YV = Violence Risk Scale-Youth Version.

Table 3.3. Possible Reasons for Improvement/Deterioration

Area	Type	Examples
Psychological/Biological Change	Non-Intervention/Non-Sanction-based	Maturation/puberty, increased personal agency/autonomy, anger arousal, onset of MH symptoms (e.g., depression, psychotic episode), head injury/TBI, spirituality/religion
	Intervention-based	Motivation, medication (non)adherence, increased/reduced MH symptoms, positive attitudes/beliefs, increased/decreased substance use
	Sanction-based	Increased MH symptoms due to imprisonment/involuntary placement, adoption of antisocial attitudes/beliefs through exposure to antisocial peers, learned helplessness, loss of autonomy
Social/Contextual Change	Non-Intervention/Non-Sanction-based	School/employment, loss/gain prosocial/antisocial peer/adult, recent abuse/trauma, attachment/relationship with parents, secure/insecure romantic relationship, parenthood
	Intervention-based	Skills-based programming (e.g., educational, vocational), RNR-based programming, cognitive-behavioural treatment, psychotherapy
	Sanction-based	Monitoring/supervision, no contact order, victim safety plan, removal from home/negative environment, imprisonment, involuntary placement into residential program

Note. TBI = traumatic brain injury; MH = mental health; RNR = risk-need-responsivity. Examples provided are derived from Bevan (2015) and Mulvey et al. (2004).

Table 3.4. Case 1 (Jack): SAVRY Item Ratings at Baseline, Time 2, and Time 3

SAVRY	Baseline	Time 2	Time 3
Historical Risk Factors			
History of violence	●	●	●
History of nonviolent offending	●	●	●
Early initiation of violence	○	○	○
Past supervision/intervention failures	○	○	○
History of self-harm or suicide attempts	○	○	○
Exposure to violence in the home	○	○	○
Childhood history of maltreatment	○	○	○
Parental/caregiver criminality	○	○	○
Early caregiver disruption	○	○	○
Poor school achievement	●	●	●
Social/Contextual Risk Factors			
Peer delinquency	○	○	○
Peer rejection	●	●	○
Stress and poor coping	●	●	●
Poor parental management	●	○	○
Lack of personal/social support	●	○	○
Community disorganization	○	○	○
Individual/Clinical Risk Factors			
Negative attitudes	○	○	○
Risk taking/impulsivity	●	○	●
Substance-use difficulties	●	○	○
Anger management problems	●	●	●
Low empathy/remorse	○	○	○
Attention deficit/hyperactivity difficulties	●	○	○
Poor compliance	●	○	○
Low interest/commitment to school	○	○	○
Protective Factors			
Prosocial involvement	✓	✓	✓
Strong social support	∅	✓	✓
Strong attachments and bonds	∅	✓	✓
Positive attitudes toward intervention and authority	∅	∅	∅
Strong commitment to school	∅	∅	∅
Resilient personality traits	∅	∅	∅

Note. SAVRY = Structured Assessment of Violence Risk in Youth; ● = High, ○ = Moderate, ○ = Low, ✓ = Present, ∅ = Absent. Time 2 ≈ 3 months after baseline (i.e., at 94 days). Time 3 ≈ 3.5 months after Time 2 (i.e., at 108 days).

Table 3.5. Case 1 (Jack): Pre- and Post-Treatment VRS-YV Item Ratings at Baseline to Time 2 and Time 2 to Time 3

VRS-YV	Baseline to Time 2			Time 2 to Time 3		
	Rating	SOC	Rating	Rating	SOC	Rating
Static Factors						
Early onset of serious antisocial behaviors	0	-	0	0	-	0
Criminality	3	-	3	3	-	3
Instability of family upbringing	1	-	1	1	-	1
Exposure to antisocial behavior in the family	0	-	0	0	-	0
Dynamic Factors						
Violent lifestyle	3	P/C → P	2.5	2.5	P → P	2.5
Callous and unemotional	1	N/A	1	1	N/A	1
Criminal attitudes	3	P/C → P	2.5	2.5	P → P	2.5
Negative attitude toward education	0	N/A	0	0	N/A	0
Antisocial peers	2	P/C → P/C	2	2	P/C → P	1.5
Interpersonal aggression	3	P/C → P	2.5	2.5	P → P	2.5
Poor emotional control	3	P/C → P	2.5	2.5	P → P	2.5
Violence during institutionalization	3	P/C → P/C	3	3	P/C → P/C	3
Weapon use	3	P/C → P	2.5	2.5	P → P	2.5
Lack of insight into cause of violence	3	P/C → P	2.5	2.5	P → P	2.5
Mental disorder	3	P/C → P	2.5	2.5	P → P	2.5
Substance abuse	3	P → A	2	2	A → A	2
Impulsivity/attention deficits	3	P/C → P/C	3	3	P/C → P/C	3
Cognitive distortions	2	P/C → P	1.5	1.5	(P → P)	1.5
Poor parent-child interaction	2	P/C → P	1.5	1.5	(P → A)	1
Family stress	3	P/C → P	2.5	2.5	P → A	2
Social isolation	3	P/C → P	2.5	2.5	P → P	2.5
Community disorganization	0	N/A	0	0	N/A	0
Poor compliance	2	P → A	1.5	1.5	(P → P)	1.5

Note. VRS-YV = Violence Risk Scale – Youth Version; SOC = Stages of Change; N/A = Not applicable; P/C = Precontemplation/Contemplation; P = Preparation; A = Action; M = Maintenance. Bolded letters indicate rated stage of change. Stages of change in parentheses are indicative of dynamic factors that have decreased but require ongoing monitoring. Time 2 ≈ 3.5 months after baseline (i.e., at 94 days). Time 3 ≈ 3.5 months after Time 2 (i.e., at 108 days).

Table 3.6. Case 1 (Jack): START:AV Item Ratings at Baseline, Time 2, and Time 3

START:AV	Baseline		Time 2		Time 3	
	Strengths	Vulnerabilities	Strengths	Vulnerabilities	Strengths	Vulnerabilities
Individual Adolescent						
School and work	○	○	○	○	○	○
Recreation	○	○	○	○	○	○
Substance use	●	○	●	○	●	○
Rule adherence	○	●	○	●	○	●
Conduct	○	●	○	●	○	●
Self-care	○	●	○	●	○	●
Coping	○	●	○	●	○	●
Impulse control	○	●	○	○	○	●
Mental/cognitive state	○	●	○	●	○	●
Emotional state	○	●	○	●	○	●
Attitudes	○	●	○	○	●	○
Social skills	○	●	○	●	○	●
Relationships and Environment						
Relationships – Caregivers/adults	○	○	●	○	●	○
Relationships – Peers	○	○	○	●	○	●
Social support – Adults	●	○	●	○	●	○
Social support – Peers	○	●	○	●	○	●
Parenting	○	●	○	○	○	○
Parental functioning	○	○	○	○	●	○
Peers	○	●	○	●	○	●
Material resources	●	○	●	○	●	○
Community	○	○	○	○	○	○
External triggers	○	●	●	●	●	○
Response to Interventions						

START:AV	Baseline		Time 2		Time 3	
	Strengths	Vulnerabilities	Strengths	Vulnerabilities	Strengths	Vulnerabilities
Insight	○	●	○	○	○	○
Plans	○	○	●	○	●	○
Medication adherence	○	●	○	●	○	○
Treatability	○	○	○	○	○	○

Note. START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version; ● = High, ○ = Moderate, ○ = Low. Time 2 ≈ 3 months after baseline (i.e., at 94 days). Time 3 ≈ 3.5 months after Time 2 (i.e., at 108 days).

Table 3.7. Case 2 (Tyler): SAVRY Item Ratings at Baseline, Time 2, and Time 3

SAVRY	Baseline	Time 2	Time 3
Historical Risk Factors			
History of violence	○	●	●
History of nonviolent offending	○	○	○
Early initiation of violence	●	●	●
Past supervision/intervention failures	○	○	○
History of self-harm or suicide attempts	●	●	●
Exposure to violence in the home	○	○	○
Childhood history of maltreatment	○	○	○
Parental/caregiver criminality	○	○	○
Early caregiver disruption	○	○	○
Poor school achievement	●	●	●
Social/Contextual Risk Factors			
Peer delinquency	○	○	○
Peer rejection	●	○	○
Stress and poor coping	●	●	○
Poor parental management	○	○	○
Lack of personal/social support	○	○	○
Community disorganization	○	○	○
Individual/Clinical Risk Factors			
Negative attitudes	●	●	○
Risk taking/impulsivity	○	●	○
Substance-use difficulties	○	○	○
Anger management problems	○	●	○
Low empathy/remorse	○	○	○
Attention deficit/hyperactivity difficulties	○	○	○
Poor compliance	○	○	○
Low interest/commitment to school	○	○	○
Protective Factors			
Prosocial involvement	∅	∅	✓
Strong social support	∅	✓	✓
Strong attachments and bonds	✓	✓	✓
Positive attitudes toward intervention and authority	∅	∅	✓
Strong commitment to school	∅	✓	✓
Resilient personality traits	∅	∅	✓

Note. SAVRY = Structured Assessment of Violence Risk in Youth; ● = High, ○ = Moderate, ○ = Low, ✓ = Present, ∅ = Absent. Time 2 ≈ 3 months after baseline (i.e., at 94 days). Time 3 ≈ 8.5 months after Time 2 (i.e., at 259 days).

Table 3.8. Case 2 (Tyler): Pre- and Post-Treatment VRS-YV Item Ratings at Baseline to Time 2 and Time 2 to Time 3

VRS-YV	Baseline to Time 2			Time 2 to Time 3		
	Rating	SOC	Rating	Rating	SOC	Rating
Static Factors						
Early onset of serious antisocial behaviors	1	-	1	1	-	1
Criminality	2	-	2	2	-	2
Instability of family upbringing	0	-	0	0	-	0
Exposure to antisocial behavior in the family	0	-	0	0	-	0
Dynamic Factors						
Violent lifestyle	2	P → P/C	2.5	2.5	P/C → A	1.5
Callous and unemotional	0	N/A	0	0	N/A	0
Criminal attitudes	0	N/A	0	0	N/A	0
Negative attitude toward education	0	N/A	0	0	N/A	0
Antisocial peers	0	N/A	0	0	N/A	0
Interpersonal aggression	2	P → P/C	2.5	2.5	P/C → P	2
Poor emotional control	1	N/A	1	1	N/A	1
Violence during institutionalization	0	N/A	0	0	N/A	0
Weapon use	2	P/C → P/C	2	2	P/C → A	1
Lack of insight into cause of violence	2	P/C → P	1.5	1.5	(P → P)	1.5
Mental disorder	3	P → P	3	3	P → A	2.5
Substance abuse	0	N/A	0	0	N/A	0
Impulsivity/attention deficits	2	P/C → P/C	2	2	P/C → A	1
Cognitive distortions	1	N/A	1	1	N/A	1
Poor parent-child interaction	2	P → A	1.5	1.5	(A → A)	1.5
Family stress	3	P/C → P	2.5	2.5	P → A	2
Social isolation	3	P/C → P	2.5	2.5	P → P	2.5
Community disorganization	0	N/A	0	0	N/A	0
Poor compliance	2	P/C → P	1.5	1.5	(P → P)	1.5

Note. VRS-YV = Violence Risk Scale – Youth Version; SOC = Stages of Change; N/A = Not applicable; P/C = Precontemplation/Contemplation; P = Preparation; A = Action; M = Maintenance. Bolded letters indicate rated stage of change. Stages of change in parentheses are indicative of dynamic factors that have decreased but require ongoing monitoring. Time 2 ≈ 3 months after baseline (i.e., at 94 days). Time 3 ≈ 8.5 months after Time 2 (i.e., at 259 days).

Table 3.9. Case 2 (Tyler): START:AV Item Ratings at Baseline and Time 2

START:AV	Baseline		Time 2	
	Strengths	Vulnerabilities	Strengths	Vulnerabilities
Individual Adolescent				
School and work	●	○	●	○
Recreation	○	○	○	○
Substance use	●	○	●	○
Rule adherence	○	○	○	●
Conduct	○	○	○	●
Self-care	●	○	○	○
Coping	○	●	○	●
Impulse control	○	○	○	●
Mental/cognitive state	○	●	○	●
Emotional state	○	●	○	●
Attitudes	○	○	○	●
Social skills	○	●	○	●
Relationships and Environment				
Relationships – Caregivers/adults	○	○	○	●
Relationships – Peers	○	○	○	●
Social support – Adults	●	○	●	○
Social support – Peers	○	●	○	○
Parenting	●	○	○	○
Parental functioning	●	○	●	○
Peers	○	○	○	○
Material resources	●	○	●	○
Community	●	○	○	○
External triggers	○	●	●	●

START:AV	Baseline		Time 2	
	Strengths	Vulnerabilities	Strengths	Vulnerabilities
Response to Interventions				
Insight	○	○	○	○
Plans	○	○	○	●
Medication adherence	○	○	○	○
Treatability	○	○	○	○

Note. START:AV = Short-Term Assessment of Risk and Treatability: Adolescent Version; ● = High, ○ = Moderate, ○ = Low. Time 2 ≈ 3 months after baseline (i.e., at 94 days). Time 3 ≈ 8.5 months after Time 2 (i.e., at 259 days).

3.8. Supplemental Information: Recording Form for Assessing Change in Dynamic Risk

The following framework was developed for the purpose of assessing change in dynamic risk and can be used with SPJ-based risk assessment measures (e.g., HCR-20^{V3}, SAVRY, START:AV). The current form has been adapted for use with the START:AV.

3.8.1. Step 1: Reassess Risk/Protective Factors and Assess the Degree of Impact on Relevant (or Critical/Key) Factors

- Reassess Strengths and Vulnerabilities as outlined within the START:AV manual and enter pre-post item ratings below.
- Under the trend column, record whether there has been an increase (↑), decrease (↓), or relatively little change (≈) on the item. Trend ratings may differ from the standard item ratings as an adolescent may show improvement/deterioration in an area despite not warranting a change in the item rating.
- Key Strengths and Critical Vulnerabilities previously identified as relevant to past behaviour are to be entered under the Key and Critical columns, respectively. Items or factors that have become *activated* since the initial assessment that are considered relevant to future behaviour may be identified under the Activated columns.

Strengths						Vulnerabilities				
Post-rating			Pre-rating			Pre-rating		Post-rating		
Trend	Activated	Rating	Key	Rating	Item	Rating	Critical	Rating	Activated	Trend
↑ ≈ ↓	○	H M L	○	H M L	1. School and work	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	2. Recreation	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	3. Substance use	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	4. Rule adherence	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	5. Conduct	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	6. Self-care	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	7. Coping	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	8. Impulse control	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	9. Mental/cognitive state	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	H M L	○	H M L	10. Emotional state	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	11. Attitudes	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	12. Social skills	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	13. Relationships – Caregivers/adults	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	14. Relationships – Peers	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	15. Social support – Adults	L M H	○	L M H	○	↑ ≈ ↓

Strengths						Vulnerabilities				
Post-rating			Pre-rating			Pre-rating		Post-rating		
Trend	Activated	Rating	Key	Rating	Item	Rating	Critical	Rating	Activated	Trend
↑ ≈ ↓	○	L M H	○	L M H	16. Social support – Peers	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	17. Parenting	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	18. Parental functioning	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	19. Peers	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	20. Material resources	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	21. Community	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	22. External triggers	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	23. Insight	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	24. Plans	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	25. Medication adherence	L M H	○	L M H	○	↑ ≈ ↓
↑ ≈ ↓	○	L M H	○	L M H	26. Treatability	L M H	○	L M H	○	↑ ≈ ↓

3.8.3. Step 3: Rate Degree of Change in Dynamic Risk.

□	Significant Improvement	Clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic factors across <i>multiple</i> domains and/or <i>substantial</i> change among relevant factor(s) that significantly alters the underlying risk formulation (via improvement in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of reduced risk.
□	Moderate Improvement	Clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic factors across <i>some</i> domains and/or <i>moderate</i> change among relevant factor(s) that alters the underlying risk formulation (via some improvement in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of reduced risk.
□	Mild Improvement	<i>Limited</i> clinically meaningful change (i.e., rated increase in protective factors/decrease in risk factors, or both) observed in dynamic risk factor(s) or rated decrease/increase observed in dynamic risk factor(s) not identified as relevant/critical that neither alters the underlying risk formulation nor signals a reduction in level of risk.
□	No Change	No rated increase or decrease observed in dynamic risk factor(s).
□	Mild Deterioration	<i>Limited</i> clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic risk factor(s) or rated decrease/increase observed in dynamic risk factor(s) not identified as relevant/critical that neither alters the underlying risk formulation nor signals an increase in level of risk.
□	Moderate Deterioration	Clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic factors across <i>some</i> domains and/or <i>moderate</i> change among relevant factor(s) that alters the underlying risk formulation (via some deterioration in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of increased risk.
□	Significant Deterioration	Clinically meaningful change (i.e., rated increase in risk factors/decrease in protective factors, or both) observed in dynamic factors across <i>several</i> domains and/or <i>substantial</i> change among relevant factor(s) that alters the underlying risk formulation (via deterioration in risk scenarios vis-à-vis reduction/increase in presence of portal/gateway or causal factor[s]), thus signaling a period of increased risk.

□	Psychological/Biological Change	□	Non-Intervention/Non-Sanction-based	Maturation/puberty, increased personal agency/autonomy, anger arousal, onset of MH symptoms (e.g., depression, psychotic episode), head injury/TBI, spirituality/religion Other:
		□	Intervention-based	Motivation, medication (non)adherence, increased/reduced MH symptoms, positive attitudes/beliefs, increased/decreased substance use Other:
		□	Sanction-based	Increased MH symptoms due to imprisonment/involuntary placement, exposure to antisocial attitudes/beliefs, learned helplessness, loss of autonomy Other:
□	Social/Contextual Change	□	Non-Intervention/Non-Sanction-based	School/employment, loss/gain prosocial/antisocial peer/adult, recent abuse/trauma, attachment/relationship with parents, secure/insecure romantic relationship, parenthood Other:
		□	Intervention-based	Skills-based programming (e.g., educational, vocational), RNR-based programming, cognitive-behavioural treatment, psychotherapy Other:
		□	Sanction-based	Monitoring/supervision, no contact order, victim safety plan, removal from home/negative environment, imprisonment, or involuntary placement into residential program Other:

Note. TBI = traumatic brain injury; MH = mental health; RNR = risk-need-responsivity.

Chapter 4. Conclusions

Despite ongoing advancements in the field of adolescent risk assessment, there remain several important areas requiring further research and development. First, as research on adolescent risk assessment has largely focused on risk for violence and general reoffending (Menon, 2013; Viljoen et al., 2012), few studies have investigated the validity of structured risk assessment measures in predicting other pertinent adverse outcomes common among adolescent populations (e.g., self-injury, health neglect, victimization; Viljoen et al., 2016). Second, as adolescence is a period characterized by rapid developmental change (Best & Ban, 2021), accounting for changes in dynamic risk among adolescents using structured formats has become an increasingly important area of research (Gray et al., 2019). Although some advances have been made in the area (e.g., Viljoen et al., 2014; Wong et al., 2009), limitations with existing approaches remain.

The purpose of the current dissertation was to address these various gaps in the literature by first examining the short-term predictive validity of the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), the Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV; Viljoen et al., 2014), and the Violence Risk Scale-Youth Version (VRS-YV; Wong et al., 2004-2011) among a sample of 87 male and female adolescents (Chapter 2). This was followed by a second study (Chapter 3) which outlined the development of a structured framework for rating and formulating change in dynamic risk and examined its feasibility using a multiple case study design. Building upon existing assessment procedures and contributing to the growing body of evidence concerning adolescent risk assessment, results of this dissertation support the need to account for multiple adverse outcomes when assessing risk among adolescents and provides preliminary evidence for the feasibility of the proposed framework in guiding the reassessment of dynamic risk. As the respective results, limitations, and conclusions of each study were detailed in the preceding chapters, the following is a brief discussion of the primary results with recommendations for future research.

4.1. Assessing Risk for Adverse Outcomes

As evidenced by the results of Chapter 2, prevalence rates for various adverse outcomes were particularly high among the sample (e.g., health neglect, victimization), and a large percentage had engaged in suicidal and self-injurious behaviour prior to admission. Having a history of violence was also common, despite less than a quarter of the sample being charged with a violent offence. Despite being slightly lower, moderate prevalence rates were found post-baseline for outcomes such as violence and substance use. The short-term predictive validity of the three measures was supported to varying degrees across the measures (i.e., START:AV demonstrated greater consistency across outcome domains while the SAVRY and VRS-YV were less consistent in predicting outcomes related to harm to the adolescent). Using novel statistical approaches to examine the timeframe for optimal predictive validity and recurrent events involving violence and suicidal/non-suicidal self-injury, analyses revealed that the predictive accuracy of the SAVRY, START:AV, and VRS-YV peaked within the first three months and that dynamic risk factors were superior to static/historical factors in predicting repeated events involving violence. Only the START:AV was found to be predictive of repeated events involving suicidal/non-suicidal self-injury.

Although these results support the need for assessing adverse outcomes beyond violence and general reoffending and provide preliminary evidence for the applicability of the SAVRY, START:AV, and VRS-YV in assessing risk among adolescents with complex mental health needs, research examining the reliability and validity of the three measures using a prospective study design is needed. Accounting for other methodological factors such as setting, sources for outcome coding, and variation in follow-up time will be important to increase generalizability of the findings while more closely approximating the clinical realities related to assessing and managing risk in adolescents.

4.2. Assessing Change in Risk and Protective Factors

Building upon previous advances in reassessing change in dynamic risk, Chapter 3 provided an overview of the development and pilot testing of a structured framework for rating and formulating change in dynamic risk. To pilot test the framework and examine existing methods for reassessing risk, a multi-wave case study analysis was conducted with two adolescents charged with a violent offence. With the SAVRY, START:AV, and

VRS-YV, representing a specific approach to reassessing risk (i.e., reliable change, the newly developed framework, and the stages of change method, respectively), the capacity for each method/tool to detect changes in dynamic risk was demonstrated. Emerging from this analysis, however, were several meaningful differences reflected in the various measures used and approaches applied, with the newly developed framework addressing some of the limitations identified in existing methods (e.g., increased sensitivity to change, provision of a categorical rating system, and guidelines for identifying the underlying mechanism of change).

Despite its promise, due to challenges in study design and data limitations, the generalizability of these results is uncertain, and it is unknown at this time whether the newly developed framework will aid in reassessing dynamic risk in adolescents. To build upon these preliminary results, future research could examine the proposed framework using a multi-wave prospective study design and provide further refinement/revisions. Application of greater methodological and statistical rigor to the examination of change in dynamic risk will be beneficial in increasing our understanding of the underlying processes or mechanisms of change. This will have far reaching implications concerning research and clinical practice by contributing to the management of adolescents at risk for adverse outcomes.

4.3. Final Conclusions

In summary, the current dissertation speaks to the importance of expanding adolescent risk assessment beyond violence and general reoffending. Accounting for multiple adverse outcomes when assessing an adolescent's risk provides a more comprehensive clinical picture of the individual, leading to improved resource allocation and greater quality of life for the client through appropriate matching with evidence-based interventions and risk management strategies. Similarly, despite the importance of reassessing dynamic risk being reiterated throughout the literature, very little guidance has been provided as to how change in risk is to be assessed. As such, the development and pilot testing of a structured approach to the assessment and formulation of change in dynamic risk was undertaken with the intention of addressing gaps within the literature, with the hope that the framework will ultimately aid in the detection of clinically meaningful change.

4.4. References

- Best, O., & Ban, S. (2021). Adolescence: Physical changes and neurological development. *British Journal of Nursing*, 30(5), 272-275. <https://doi.org/10.12968/bjon.2021.30.5.272>
- Borum, R., Bartel, P., & Forth, A. (2006). *Manual for the Structured Assessment of Violence Risk in Youth (SAVRY)*. Psychological Assessment Resources.
- Gray, A. L., Shaffer, C. S., Viljoen, J. L., Muir, N. M., & Nicholls, T. L. (2019). Assessing violence risk in youth. In J. L. Ireland, C. A. Ireland, & P. Birch (Eds.), *Violent and sexual offenders: Assessment, treatment and management* (2nd ed., pp. 92-113). Routledge.
- Menon, V. (2013). Suicide risk assessment and formulation: An update. *Asian Journal of Psychiatry*, 6(5), 430-435. <https://doi.org/10.1016/j.ajp.2013.07.005>
- Viljoen, J. L., Cruise, K. R., Nicholls, T. L., Desmarais, S. L., & Webster, C. D. (2012). Taking stock and taking steps: The case for an adolescent version of the Short-Term Assessment of Risk and Treatability. *International Journal of Forensic Mental Health*, 11(3), 135-149. <https://doi.org/10.1080/14999013.2012.737406>
- Viljoen, J. L., Gray, A. L., & Barone, C. (2016). Assessing risk for violence and offending in adolescents. In R. Jackson and R. Roesch (Eds.), *Learning forensic assessment: Research and practice* (2nd ed., pp. 357-388). Routledge/Taylor & Francis Group.
- Viljoen, J. L., Nicholls, T. L., Cruise, K. R., Desmarais, S. L., & Webster, C. D. (2014). *Short-Term Assessment of Risk and Treatability: Adolescent Version: START:AV User Guide*. Mental Health, Law and Policy Institute, Simon Fraser University.
- Wong, S. C. P., Lewis, K., Stockdale, K., & Gordon, A. (2004-2011). *The Violence Risk Scale: Youth Version (VRS: YV)*. Department of Psychology, University of Saskatchewan.
- Wong, S. C. P., Olver, M. E., & Stockdale, K. C. (2009). The utility of dynamic and static factors in risk assessment, prediction, and treatment. In J. T. Andrade (Ed.), *Handbook of violence risk assessment and treatment: New approaches for mental health professionals* (pp. 83-120). Springer.