Violence Risk Scale (VRS)
Users' Workbook

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The Violence Risk Scale (VRS)

The Violence Risk Scale (VRS; Wong & Gordon, 1999-2023), informed by the Risk, Need and Responsivity principles, is a dynamic violence risk assessment and treatment planning tool. The VRS was developed explicitly to integrate violence risk assessment and treatment services, and to assess risk change with appropriate interventions. VRS scores can inform service intensity, for example, those with higher VRS scores, i.e., higher risk individuals, should be provided with more intensive intervention and supervision services (risk principle). Ratings on the dynamic predictors inform priority areas for intervention (need principle), and ratings of stage of change (SOC) inform motivation or readiness for intervention (responsivity principle). The psychometric properties of the VRS were supported based on different research investigations. The VRS has been used internationally including Canada, USA, United Kingdom, Australia, New Zealand, China, Germany, and Austria.

Since its introduction, the use of the VRS has extended from the original criminal justice sample of adult males to a range of other samples and settings. Validations of the VRS have broadened from predicting community reoffending to linking risk change and subsequent violent and general reoffending. The utility of the VRS in samples such as incarcerated male and female persons, forensic psychiatric patients, ethnic minorities, and individuals with personality disorders such as psychopathy have been investigated in various research studies.

VRS manual

A second edition of the VRS manual, the Violence Risk Scale (VRS) - Second Edition (2023), is now available; it replaces the previous version of the VRS manual. For further information on obtaining a copy of the VRS manual, visit http://psynergy.ca. In the new edition, the rating descriptions for several static and dynamic predictors are clarified. Also included are key information that is provided in VRS trainings, such as the use of Offense Analogue and Offense Replacement Behaviors to inform the Stages of Change (SOC) ratings, together with enhanced rating and interview guidance. The revision also includes recent VRS research results including developments around risk communication.

Recent VRS research has provided further support for the psychometric properties of the VRS in diverse samples of criminal justice and forensic mental health service users. This research also includes the development of five (5) common language (CL) risk levels or categories to facilitate transparency and an empirically derived means of communicating VRS risk assessment findings (Olver et al., 2022); see Pg. 8 onwards for more information.

A VRS calculator has also been developed to integrate VRS risk and change scores using logistic regression modeling to generates measures of absolute risk (percentages of violent and non-violent recidivism) with 2, 3 and 5-year fixed follow up time in the community. Using the same study sample, percentile tables have been developed for VRS total, dynamic, static and change

scores. VRS percentile scores are measures of relative risk using percentile ranks, that is, the rank ordering of the VRS score of an individual compared to the scores of other individuals within a comparison sample. See Appendix A.

The purpose of the VRS Workbook is to bring together and summarize key VRS related research, developments, and recommendations, for the use of the tool in real-world applications. Information and instructions available in the VRS Manual are generally not repeated in the Workbook. An updated reference list for the VRS is available on the VRS website (an abbreviated reference is also included below, see Appendix G). The Workbook is an evolving document that will require periodic updates; the first page of the workbook(s) is date-stamped. The VRS Workbook can be downloaded at no cost at http://psynergy.ca/vrs.

Inaugural VRS study

The inaugural publication of the VRS (Wong & Gordon, 2006) provided a comprehensive overview of the tool, including its theoretical foundation, the predictors utilized to assess the propensity for violence and identify areas for treatment focus, the general guidelines for rating, the calculation of pre- and post-treatment total scores, the risk change assessment framework, based on a modified Stage of Change model, and the evaluation of various psychometric properties of the tool.

A sample of 918 male Canadian federal offenders (mean age 38.8; SD= 9.6) was used in the inaugural VRS study. These men were followed up for a mean of 4.4 years in the community after expiry of their sentences. Violent and non-violent recidivism were assessed using police records validated by fingerprinting to determine predictive validity of the VRS. VRS was rated based on a careful review of comprehensive file information that included police and court reports, case management reports and treatment reports where available.

The mean total VRS score is 42.9, *SD* = 16.4 for the total sample, a moderate risk group. The suggested cutoff scores to identify low, moderate, and high-risk groups are ≤35, >35 to ≤ 50, and > 50 respectively which represent approximate .5 *SD* below and above the mean for the low and high groups respectively. These cutoff scores to identify risk groups are now supplanted using 5 Risk Levels (Levels I to IV) that were empirically derived and validated and are discussed on Pg. 9.

AUCs measures were used to assess predictive validity, see below. Survival analyses using the low, moderate and high-risk groups confirmed the *AUC* results on predictive validity.

N =918 follow-up mean 4.4 yrs

Reoffense type	AUC	Base rates %
All	.74	50.98
Non-violent	.72	45.53
Violent	.75	31.26

All AUC significant at .001

Construct validity was assessed with Person's correlations of VRS total scores with other established risk assessment tools, see below.

Correlations Between the VRS, PCL–R, GSIR, and LSI–R

	PCL–R (n = 809)			GSIR (n = 918)	LSI–R (n = 30)
VRS	Factor 1	Factor 2	Total	total	total
Static	.32	.74	.61	−.71	.64
Dynamic	.66	.80	.83	−.55	.88
Total	.61	.83	.83	−.63	.83

Note. All correlations are significant at the 0.01 level. VRS = Violence Risk Scale; PCL–R = Psychopathy Checklist—Revised; GSIR = General Statistical Information for Recidivism; LSI–R = Level of Service Inventory—Revised.

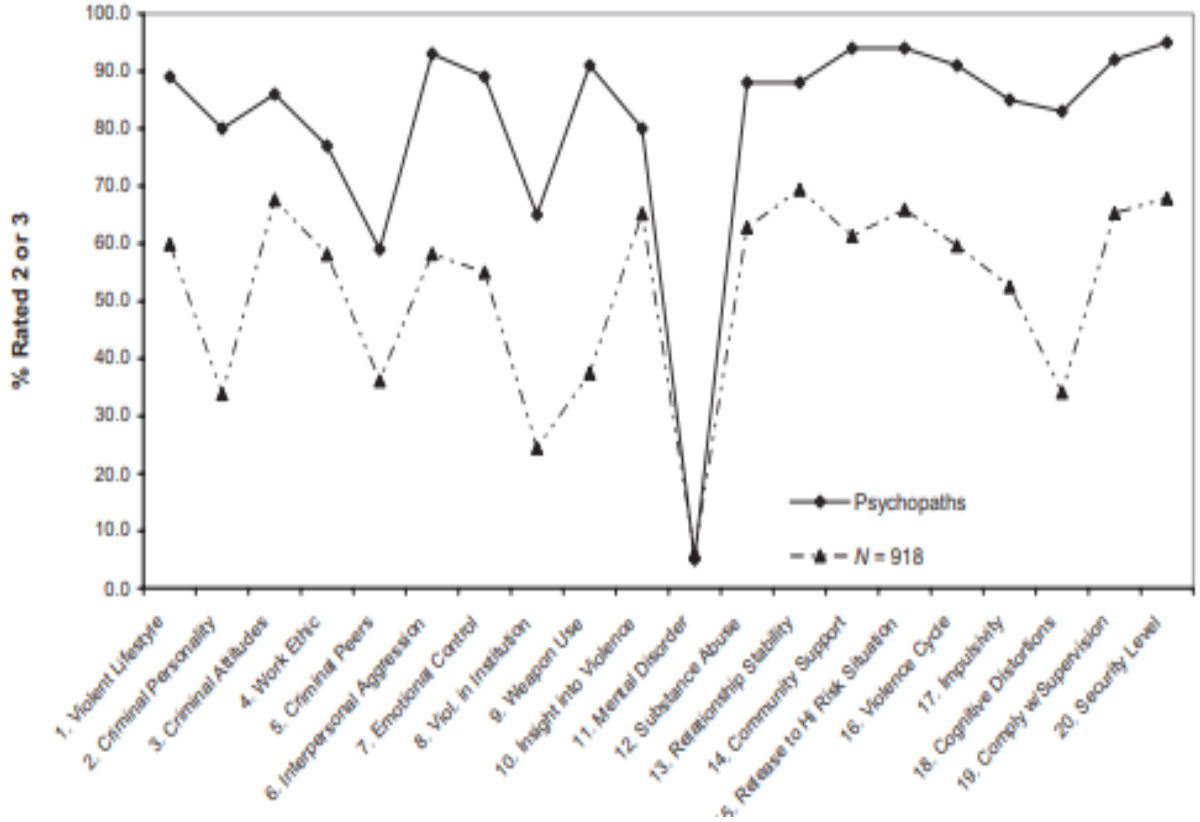
Interrater reliability of the VRS assessed using intra-class correlations (*ICC*) was obtained as in the following studies

- *ICC* = .95–.98, Coupland & Olver, 2020a, 2020b),
- *ICC* = .94–.95 (Hogan & Olver, 2019)
- *ICC* = .82–.84 (Lewis et al., 2013).
- *ICC* = .93 (Wong & Parhar, 2011)

Dynamic risk profiles of two criminal justice samples

Criminal justice rehabilitation programs that are designed to reduce violent recidivism, especially those designed based on the *RNR* principles, must identify offenders' criminogenic needs linked to violence and target them for treatment purposes. Within the VRS, each dynamic item rated 2 or 3 indicates a criminogenic need linked to violence and thus a treatment target for violence reduction. The profile of percentages of individuals rated 2 or 3 for each VRS item provides an indication of the prevalence of a range of violence-linked criminogenic need in the sample and thus informs the appropriate type and level of interventions for the sample in question.

The figure below provides two profiles, one for the study sample and one for a sample of offenders with significant psychopathic personality features. Of note is that the profile of the psychopathic sample, although evidencing higher percentages of VRS identified needs, is broadly similar to the general criminal justice sample in terms of the types of treatment targets. As such, the treatment targets for the two samples should be quite similar, albeit a higher level of program intensity for the psychopathic sample is appropriate as that are at a higher risk than the comparison sample.



Additional VRS developments:

Based on the foundational principles of the VRS, subsequent versions of the scale were developed to address specific populations and contexts. The first was the VRS sexual offense version for adults (Olver et al., 2007), and a later version was developed for youths (Rojas & Olver, 2019). These versions were created taking into account the unique factors associated with sexual violence and incorporate relevant risk factors and assessment criteria specific to sexual offending within different age groups.

Additionally, the VRS Youth Version was developed to assess the risk of violence among young offenders (Stockdale et al., 2013). This adaptation takes into consideration the distinct developmental factors and risk markers relevant to this population. It allows for a more targeted and age-appropriate assessment of violence risk among young individuals involved in the criminal justice system.

These adaptations of the VRS, tailored to specific offender populations, enable professionals to assess and identify the risk of violence and treatment targets for different forensic/criminal justice populations. By building upon the foundational principles and guidelines outlined in the inaugural publication, these specialized versions provide valuable tools for risk assessment and intervention planning in the areas of sexual offending and youth violence.

The VRS screening tool (VRS-SV)

At times, there is a need to undertake a quick screen to distinguish between offenders/service-users at different levels of violence risk for reasons such as guiding referrals to applicable rehabilitation programs, a need to administer the more in-depth, full VRS assessment, or other assessments, and so forth. The VRS screening version (VRS-SV) is a short version of the tool with 5 VRS static items: S1 Current Age, S2 Age of 1st Violent Conviction, S3 Number of Pre-Adult Convictions, S4 Violence throughout lifespan, and S5 Breaches of Legally Mandated Conditions. The 5 static items can be rated using file information alone without interviewing the individual and take less time to complete than the full VRS. Research results with a sample of 479 Australian men showed moderate to large predictive efficacy for different types of violent recidivism with AUC between .65 and .70 (Ogloff et al., 2018).

Cut points are provided for risk screening purposes. Individuals scoring 0-6 out of the total of 15 points reoffend violently at 26.3% or less than half the base rate of 55.1%, those scoring 7-11 at about the base rate, and those scored 12 or higher reoffended at 73.8%. The score of 7 or more is useful for ruling out lower-risk individuals. Another useful cut score is 12 to identify higher risk individuals (see Table below). The VRS screening version can be useful for broad risk screening purposes; more in-depth assessments and analyses are needed for specific decision-making such as parole or transfer and/or treatment planning purposes.

The proposed risk categories of low, moderate, and high, the recidivism rates and relative risk values are shown in the table below.

	N (%)	Recidivism	RR (vs Low)	RR (vs Base Rate or Average)
VRS Static 5				
Base Rate (BR)	479 (100)	55.1%	-	-
Low (0-6)	95 (19.8)	26.3%	-	0.48
Moderate (7-11)	239 (49.9)	55.2%	2.10	1.00
High (12+)	145 (30.3)	73.8%	2.80	1.34

RR = Relative Risk; "Recidivism" represents the recidivism within the risk group; "Base Rate" or "BR" is the overall average rate of reoffending in the whole sample.

Development of common language risk levels, computation of absolute & relative recidivism rates, and assessing the association of risk change and recidivism of the VRS with diverse criminal justice and forensic mental health samples

The information below is derived from Olver, Mundt, Hogan, Coupland, Eggert, Higgs, Lewis, Contoni, Gordon, Morgan & Wong, (2022). Assessing Dynamic Violence Risk: Common Language Risk Levels and Recidivism Rates for the Violence Risk Scale. *Psychological Assessment.*

The VRS is designed to assess risk and risk change with effective risk reduction treatment or other effective change agents, such as correctional risk management programs. If risk change assessed with the VRS in treatment is a valid change indicator, the assessed positive change should have a close association with recidivism reduction in the community. The Olver et al. study used 6 different offender and forensic mental health samples that had received treatment to reduce reoffending risk, to test the association of risk change assessed with the VRS and violent and general recidivism in the community with 2-, 3- and 5-year follow up; the results support association between VRS risk change and recidivism over the follow-up periods.

Communication of risk assessment results to consumers of risk-assessment reports and decision makers requires a language and format that can be clearly articulated, easily understood, and empirically validated. The study results not only support the use of a 5-level common language descriptions of risk level with corresponding recidivism rates to improve risk communication, but they also demonstrated the differential association of VRS scores with percent recidivism (a measure of absolute risk), and with percentile ranks (a measure of relative risk). A VRS calculator (based on *Excel*©) was also developed based on the study sample to simplify computations to generate percent violent and general recidivism rates for both Pre-Tx/T1 and Post-Tx/T2, over 3- and 5-year follow-up periods, using VRS Total scores. For individuals who participate in rehabilitation or are re-assessed post-treatment, or at a later time, the Post-Tx/T2 total VRS score is subtracted from the Pre-Tx/T1 total score and the resultant change score can be inputted into the calculator to generate post-Tx risk estimates. Additional analyses re-validated the inter-rater reliability and predictive validity of the VRS. Findings of the study are summarized below.

Risk communication

The need for clear, easily understood and empirically derived approaches to communicate risk information is important for various forensic related decision-making purposes, such as referrals for treatment, parole, or probation. Absolute and relative risk are two metrics that can . be used to communicate an individual's risk characteristics. **Absolute risk** refers to the likelihood of committing the at-risk behaviors, such as violent or general reoffending, and can be indexed by the percent (%) of reoffending for a similar group of individuals. **Relative risk** refers to the ranking of a person's risk score relative to a cohort of similar individuals. Percentile rank is the usual metric used in this regard. A broadly demarcated **level of risk** provided in a more transparent and empirically based language can also provide a general characterization of a group of individuals sharing similar risk characteristics.

Consider using both absolute and relative risk measures and the constructs of risk levels, as preferred means to communicate risk information.

Risk levels or categories

The 3-levels or categories of risk (low, moderate, and high) have been used by many risk assessment tools, including the VRS, to describe and communicate the degree of risk. Such usage can be quite subjective both in the interpretation of their meaning and in the generation of risk categories using, at times, quite arbitrary cut-off points. Cut-off points, such as one used to designate high risk, are generated with reference to the distribution of scores of a specific risk assessment tool. What is meant by the term 'high risk' for one tool is likely different from that of another tool and thus can become a possible source of confusion for consumers of risk assessments. Further, designating someone as high risk, a potentially stigmatizing terminology, can lead to suboptimal or even harmful applications of risk information. For example, for a low base rate violent event, such as a workplace shooting, a person's risk relative to similar at-risk individuals, i.e. his relative risk, could be quite high, but the absolute risk or percent recidivism could still be low. A common language risk communication strategy that is less pejorative, less biased, more transparent and is empirically derived, should be an improvement and preferrable to the existing H, M, L, risk category approach.

The Council of State Governments (CSG) has advocated for a common language (CL) to classify risk levels for different offender groups (e.g., sexual vs. violent), across different risk instruments (e.g., LSI-R, VRS, Static-99R, etc.) and with respect to different outcomes (e.g., sexual vs. violent vs. general recidivism). The language is both less stigmatizing and involves non-arbitrary application of nominal labels to communicate risk.

Following Council of State Government Guidelines (Hanson et al., 2016), a 5-risk levels (I to V) metric was used to reflect 5 levels of risk in the VRS as indicated below (adapted from Olver et al., 2022).

- Level I (very low risk, non-offending profile), generally comprises the bottom 5% of the distribution of correctional samples, who are at no greater risk for recidivism than the general population.
- Level II (below average risk, vulnerable prosocial profile) comprises approximately 20% of correctional samples and is characterized by a few isolated areas of criminogenic need, meriting targeted low-intensity rehabilitation services.
- Level III (average risk, average offending profile) is a middle band comprising the largest proportion of correctional cases (approximately 50%), with several criminogenic need areas, meriting moderate intensity treatment services.
- Level IV (above average risk, persistent offending profile), representing approximately the next 20% of the distribution, with multiple criminogenic needs (some chronic, some severe).
- Level V (well above average risk, entrenched criminal profile) represents the top 5% riskiest individuals with multiple severe and chronic criminogenic needs across psychological and lifestyle domains (adapted from Olver et al., 2022).

The ranges of VRS total scores that map onto the 5 risk levels are shown in Table 1, with the associated mean and *SD* of VRS total, static and dynamic scores, and their respectively violent and general recidivism rates at 2-, 3- and 5-year community recidivism outcomes. The underpinning research to develop VRS CL risk levels, absolute and relative risk measures is presented below.

Study samples

Descriptions of the 6 adult mostly male samples used in the Olver et al. study include four criminal justice and two forensic mental health samples from Canada and the US. See Appendix B for a detailed description of the individual samples. A total sample of n= 1100 cases were included in the study but not all participants were included in all the analyses. Participants included in the analyses to assess risk change and recidivism (n= 472) must have had at least 5 years of follow up in the community to provide an 'at-risk' period, and also had received VRS assessments at two time points, i.e., Pre-treatment or Time 1/T1 and Post-treatment or Time 2/T2. Additional details such as sample sizes, number of males and females in the samples, lengths of follow-up, characteristics of treatment programs, additional assessment tools used for different samples, outcome measures and other sample characteristics are also provided in Appendix B or in the text.

VRS descriptive statistics, scores, percent recidivism and additional sample details

Descriptive statistical, % recidivism etc., for the samples used to assess risk change and recidivism (top panel), as well as development of the calculator (bottom panel) are provided in Appendix C (reproduced from Olver et al., 2022). The VRS risk classification information (extreme right-hand column in Appendix C), based on the 3-group cut points of low, moderate, and high, correspond to 0 to ≤35, >35 to ≤ 50, and > 50 respectively, is presented to provide readers with a link to previous VRS risk group designations.

Predictive validity of the VRS scores and VRS change scores over 3 follow-up periods.

The predictive validity for VRS and change scores were assessed using AUC with *95% CI* for violent and general recidivism over 2-, 3- and 5-year follow-up in the community (see Appendix D). The magnitude of the prediction varies from moderate to large (.64-.80, $p < .001$) except for the change scores (.50-.65, $p < .05$).

Assessing the association of VRS risk change and recidivism

Logistic regression was used to model the predictive efficacies of the VRS change score after controlling for VRS pre-treatment total scores for both violent and non-violent recidivism for 2-, 3- and 5-year follow up in the community. VRS risk change scores were significantly associated with violent and non-volent recidivism in all analyses (see Appendix E).

Prediction of violent and general recidivism of the VRS total scores and change scores using Cox-regression survival model

Logistic regression model truncates follow up times to exactly 2, 3 and 5 years for the analyses. Cases with follow up times shorter than 2 years or follow up times in between 2 to 3 or 3 to 5 years or beyond 5 years were excluded; these approaches can reduce statistical power but do allow recidivism analyses for specific durations of follow up time. With the Cox-regression survival

model, participants are not limited to a specific follow up time, all participants belong to a specific group irrespective of follow up time can be included and thus increase the statistical power of the analyses.

Cox-regression survival models were used to test for the prediction of violent and non-violent recidivism for: a) VRS change scores after controlling for pre-treatment total scores (models 1 and 2 respectively), and b) for the prediction of violent and general recidivism for VRS total scores (models 3 and 4 respectively). All conditions were significant at the < .001 levels. The results provide further support for the association of VRS change scores as well as VRS total scores and subsequent violent and general recidivism, see Appendix F.

The ranges of VRS scores and associated recidivism rates for different change scores for the 5 Risk Levels are provided below (See Table 1).

There are several points of note:

- Higher risk levels with higher VRS scores are associated with higher % violent & general recidivism.
- Larger change scores are associated with lower recidivism in all cases, which further validates the change metric based on using the VRS SOC framework to index recidivism reduction.
- Change scores for Levels I and II are broadly lower than that of Levels III, IV and V but the latter 3 levels are not significantly different from each other. That is, higher risk individuals show more change than lower risk individuals, and the changes are linked to lower recidivism.

Table 1.
Evidence Based Risk Categories for VRS Scores

Measure	VRS CL Risk Level				
	Level I	Level II	Level III	Level IV	Level V
VRS metric					
Range (potential)	0-19.9	20-34.9	35-49.9	50-59.9	60-78
Range (actual)	2.5-19.8	20.0-	35.0-	50.0-	60.0-
Frequency (n, %)	136	280	400	306	216
Static (M, SD)	3.8	6.6	10.2	12.8	15.5
Dynamic (M, SD)	10.0	21.8	32.5	42.1	48.3
Change (pre-post M,	1.6	2.9	4.4	6.1	4.6
Total (M, SD)	13.5	27.9	42.3	54.9	64.3
Violent recidivism 2-					
No change (0.0)	1.4	4.1	10.5	20.9	41.1
Midpoint/baseline	1.1	3.4	8.8	17.8	36.5
Average (5.0)	0.9	2.8	7.3	15.1	32.2
+1 SD (9.0)	0.7	2.1	5.4	11.4	25.8
Violent recidivism 3-					
No change (0.0)	1.4	5.0	14.5	30.3	56.9
Midpoint/baseline	1.1	4.0	11.7	25.4	50.9
Average (5.0)	0.9	3.1	9.4	21.0	45.0
+1 SD (9.0)	0.6	2.1	6.5	15.1	35.8
Recommended range	**0.0-2.9**	**3.0-6.9**	**7.0-18.9**	**19.0-**	**34.0+**
Violent recidivism 5-					
No change (0.0)	2.7	9.4	24.6	45.8	71.5
Midpoint/baseline	2.2	7.8	21.1	40.8	67.3
Average (5.0)	1.8	6.4	17.9	36.0	62.9
+1 SD (9.0)	1.3	4.7	13.7	28.9	55.3
Recommended range	**0.0-4.9**	**5.0-13.9**	**14.0-**	**32.0-**	**50.0+**
General recidivism 2-					
No change (0.0)	5.9	14.2	28.0	43.8	64.6
Midpoint/baseline	5.1	12.3	24.7	39.8	59.9
Average (5.0)	4.3	10.7	21.8	35.9	55.9
+1 SD (9.0)	3.4	8.4	17.8	30.1	49.5
General recidivism 3-					
No change (0.0)	5.2	16.1	36.4	58.6	79.8
Midpoint/baseline	4.1	12.1	30.9	52.5	75.6
Average (5.0)	3.2	10.5	25.9	46.3	70.9
+1 SD (9.0)	2.2	7.3	19.1	36.8	62.3
General recidivism 5-					
No change (0.0)	5.3	20.4	48.9	74.6	91.0
Midpoint/baseline	4.1	16.3	42.2	69.0	88.5
Average (5.0)	3.1	12.8	35.7	62.7	85.3
+1 SD (9.0)	2.0	8.6	26.4	51.9	79.0

Note: Results of Tukey beta multiple comparisons on VRS change: [a] = significantly different from Level V, [b] = significantly different from Level IV, [c] = significantly different from Level III. All group differences significant on VRS static, dynamic, and total scores. Dynamic and total scores are harmonized mean between pre and post for illustrative purposes. Change ns: Level I (19), II (107), III (215), IV (224), V (196); all other *n*s in frequency row. Violent and general recidivism percentages represent the average of all possible scores within a given risk level. Recommended ranges for 3 and 5-year violent recidivism rates for each risk level are based on VRS calculator generated estimates from the full range of scores within a given risk level and are presented in bold font.

A summary of the ranges of VRS scores for the 5 Levels, their descriptions, recidivism rates & change scores.

Broadly speaking, the earlier VRS designation of low-risk maps roughly onto Levels I and II, moderate-risk maps onto Level III, and high-risk maps onto Levels IV and V (see Table 1a).

Table 1a

VRS CL Category	VRS total Score: proposed range	VRS total Score: Actual range	Mean Dynamic total score (M, SD)	Mean Static total score (M, SD)	Mean % Violent Recidivism 5-year	Mean Change scores
Level I: Very low risk	0-19.9	2.5-19.8	10.0 (4.1)	3.8 (2.3)	2.7	1.6 (1.9)
Level II Below average risk	20-34.9	20.0-34.8	21.8 (4.5)	6.6 (3.3)	9.4	2.9 (3.7)
Level III: Average risk	35.0-49.9	35.0-49.97	32.5 (4.6)	10.2 (3.3)	24.6	4.4 (3.9)
Level IV: Above average risk	50.0-59.9	50.0-59.9	42.1 (3.3)	12.8 (2.9)	45.8	6.1 (4.0)
Level V: Well above average risk	60-78	60.0-74.6	48.3 (3.5)	12.8 (2.9)	71.5	4.6 (3.7)

Construct validity for VRS Common Language Levels

The construct validity in psychometrics is used to indicate if an assessment tool can measure a concept or theoretical entity that it is supposed to measure. The construct in question is the proposed 5 CL risk levels and their association with 5 different VRS means and range scores. The construct validity of the 5 CL risk levels was assessed by using two established risk assessment tools to determine if the 5 risk levels also differentiate 5 different groups for these two tools, the Psychopathy Checklist-revised (PCL-R), a widely used tool for assessing risk and psychopathy as well as the SIR Scale, a validated tool used extensively for assessing offenders' risk. An acceptable level of construct validity can be inferred if the mean scores of the tools in each of the 5 levels differ from one another. All individuals in the analyses were assessed with the VRS, PCL-R and the SIR tools. The mean scores for the PCL-R total, the two factors, and four facets are significantly different from one another in the 5 levels (see Table 2). As well, the percentages of individuals with high PCL-R cutoff scores (≥ 25 and ≥ 30) are much higher in Levels IV and V, the two highest risk levels, than levels I, II and III as would be expected. Similarly, mean scores for the SIR scale in the 5 levels are also different from one another, although not as distinct as the PCL-R (also see Table 2). The SIR scale has reversed scoring with lower scores indicating higher recidivism risk. The results provide quite robust support for the construct validity of the 5 CL risk levels.

Table 2. *Construct Validity Indicators for VRS Common Language Risk Levels*

		VRS CL Risk Level [*M (SD)/%(n)*]					
Measure	N	Level I	Level II	Level III	Level IV	Level V	F/χ^2
PCL-R							
Interpersonal	706	0.6 (1.1)[a,b,c,d]	1.2 (1.8)[a,b,c]	1.8 (1.9)[a,b]	2.9 (2.1)[a]	3.8 (1.9)	57.28
Affective	706	1.0 (1.4)[a,b,c,d]	2.2 (2.0)[a,b,c]	3.7 (1.9)[a,b]	5.0 (1.9)[a]	6.1 (1.4)	156.07
Lifestyle	700	2.0 (1.8)[a,b,c,d]	3.7 (2.3)[a,b,c]	5.3 (2.2)[a,b]	6.9 (1.6)[a]	7.5 (1.3)	164.70
Antisocial	698	1.2 (1.6)[a,b,c,d]	3.3 (1.9)[a,b,c]	5.3 (1.7)[a,b]	7.1 (1.5)[a]	8.6 (1.3)	386.06
Factor 1	709	1.6 (2.2)[a,b,c,d]	3.5 (3.4)[a,b,c]	5.5 (3.2)[a,b]	7.8 (3.5)[a]	9.9 (2.8)	132.78
Factor 2	709	2.8 (2.2)[a,b,c,d]	6.0 (3.0)[a,b,c]	9.3 (3.0)[a,b]	12.4 (2.1)[a]	14.3 (1.8)	391.10
Total	745	5.2 (3.8)[a,b,c,d]	11.2 (5.3)[a,b,c]	17.1 (5.4)[a,b]	24.0 (5.0)[a]	27.8 (4.2)	444.92
Total ≥ 25	745	0.0 (0/108)	2.4 (4/167)	11.4 (22/193)	45.0 (68/151)	77.0 (97/126)	309.12
Total ≥ 30	745	0.0 (0/108)	0.6 (1/167)	1.0 (2/193)	15.9 (24/151)	38.9 (49/126)	165.31
SIR scale	425	5.4 (10.6)[a,b,c,d]	-0.8 (9.1)[a,b]	-4.7 (9.5)[a]	-7.1 (9.0)[a]	-12.2 (7.8)	25.77

Note: $p < .001$ for all F (continuous test scores) and χ^2 (categorical cut scores) tests. Individual cell *n*s for continuous variables not presented due to space limitations. Results of Tukey beta multiple comparisons: [a] = significantly different from Level V, [b] = significantly different from Level IV, [c] = significantly different from Level III, [d] = significantly different from Level II. PCL-R = Psychopathy Checklist-Revised; SIR = Statistical Information on Recidivism scale

The VRS Calculator

Absolute risk refers to the rates of recidivism associated with test scores, a form of criterion-referenced testing, in which test scores are interpreted based on their association with a meaningful criterion or outcome variable, such as percent recidivism. As detailed in Olver et al. (2022), Dr. James C. Mundt developed an *Excel©*-based VRS calculator which uses a log linking function generated from the data to compute estimated rates of violent and general recidivism over 3 and 5-year follow-up periods associated with specific VRS scores for the referenced samples of criminal justice and forensic mental health service users. The recidivism percentages are group estimates generated from an aggregate sample. The calculator also provides 90% and 95% confidence intervals along with one and two tailed estimates for users who wish to incorporate this information.

The logic behind using the pretreatment dynamic score in tandem with the change score to generate a recidivism risk estimate is based on earlier research (Olver et al., 2018) showing more stability of predicted outcome using pre-treatment and change score rather than pre- and post-treatment scores.

Computation of violent and general recidivism risk using the calculator

We recommend generating a change score using the difference between Pre-treatment/T1 total score (after pro-rating as applicable) ***minus*** Post-treatment/T2 total scores (after pro-rating as applicable). Although change scores could be computed by summing all change scores denoted under column (*b*) on the VRS score sheet, there are exceptions that can result in differences between the two approaches. For example, if a Pre-Tx dynamic predictor was not considered as treatment target, or was omitted due to a lack of information, then the corresponding SOC would not be rated. However, if over the course of treatment, or time, new information became available to indicate that the predictor is now considered a treatment target, or a previously omitted item could now be rated, then a risk rating for the applicable dynamic predictor(s) would be generated at

Post-Tx. However, without having a Pre- and Post- SOC rating, no change score can be generated. Further, in the 2nd Edition of the VRS Manual, no SOC rating is required for D20. VRS Post-Tx total score from the VRS Pre-Tx total score (or pro-rated total scores, as applicable). As such, subtracting the Post-Tx/T2 total score from Pre-Tx/T1 total score is the approach that should be used to calculate the change score.

How to use the VRS Calculator

For those who require a pre-treatment or Time 1 and then a subsequent (e.g., post-treatment or Time 2) assessment(s) of risk.

1. Boot up the calculator and Click 'Home' if you don't see the word 'HOME' under column A.
2. Click the type of recidivism (violent or general) and the associated follow up time (3 or 5 years), which will take you to another page.
3. Enter the exact score, include decimals if prorated, into the designated spaces for risk (under 'B' column) and the change score[1] (under the 'C' column).
4. Click anywhere on the page to generate the predicted recidivism value and the one and two-tailed confidence interval.

For those who require a 'Time 1 only' assessment

1. Repeat steps 1. and 2. above, enter the exact score, include decimals if prorated, into the designated spaces for risk (under 'B' column).
2. A change score of 2.5 is pre-entered for you.
3. Click anywhere on the page to generate the predicted recidivism value and the one and two-tailed confidence interval.

Note: the calculator is built using a sample of treated criminal justice or forensic mental health service users. The change score of 2.5 is half of the average change score of 5 for the study sample (Olver et al., 2022).

The 'Time 1 only' model in the calculator incorporates a default 2.5 change score. Use the 'Time 1 only' model for individuals who may have participated in offense-reduction interventions and did not repeatedly fail to complete such interventions. If the individual has not previously been offered the opportunity to participate in offense-reduction intervention(s) but the individual is not currently resistant to participate in recommended interventions, also use the 'Time 1 only' model. In both of such scenarios, the individuals are currently likely to be in either the Contemplation or a more advanced SOC.

Note: If the failure to complete past interventions was due to the presence of a neurodevelopmental or major mental disorder, such as an intellectual disability or a psychotic disorder, use the 'Time 1 only' model if the individual is not currently resistant to re-engage in offense-focused intervention(s).

For individuals who have participated but repeatedly failed to complete offense-reduction interventions and are currently resistant to participate in recommended interventions, e.g., those who currently are likely in the Precontemplation SOC, use any one of the other recidivism rate models and insert '0' for change score. If the individual has not previously been offered the opportunity to participate in offense-reduction intervention(s) but is currently resistant to participate in recommended interventions, e.g., in Precontemplation SOC, also insert '0' for the change score.

Also refer to the VRS Manual's section on the Instructions to use the VRS calculator.

Absolute risk: its measurement and utility

The absolute risk indicating the percent (%) violent or general recidivism is the percentage of a group of individuals with a specific VRS score that will likely recidivate violently or generally after the specified follow-up time in the community. For example, a VRS score of 'X' with an absolute risk of 40% violence recidivism and 5-year follow up, means that 40% of the study group of service users with a VRS score of 'X' have recidivated in the community within the 5-year follow up.

A measurement of absolute risk in %recidivism provides a clearer, better defined and more easily interpretable assessment of risk compared to using terms such as low, moderate, or high risk.

Relative Risk: its measurement and utility

Relative risk indexed by percentile ranks is the rank ordering of a person's risk score against risk scores of his/her cohorts within the same study sample, taking into account tie scores (see Hanson, Lloyd, Helmus, and Thornton, 2012). A limitation of percentile ranks is that they may indicate the 'unusualness' of scores in a reference group that may not have the equivalent meaning as absolute risk. Percentile ranks can vary from 0.1 to 99.9. For VRS scores, a percentile of 90 means the score is higher than 90% of that cohort and lower than 10% (100 - 90) of the reference group. A percentile of 50 means the score is at the mid-point of the cohort: higher or lower than 50% of the cohort.

Percentile ranks of VRS total (static + dynamic), static only, dynamic only and change scores for the study sample (Olver et al., 2022) are provided in the corresponding percentile tables below – See Appendix A.

Interpretations of relative risk using VRS percentile scores

1. The percentile scores for the VRS total, static, and dynamic scores are usually quite highly correlated since the raw total, static and dynamic scores are also quite highly correlated. However, there are exceptions, see numbers 2 and 3 below. Percentile or relative risk scores can be interpreted separately for VRS total, static, dynamic, and change scores to provide useful information for the assessor.
2. With effective risk reduction treatment, the absolute risks of VRS total scores are expected to decrease and so will the relative risk or percentile scores. Unlike VRS dynamic scores, which are expected to decrease with effective treatment, VRS static scores are much less likely to change and so are their percentile scores due to the largely static nature of all but two of the VRS static predictors (i.e., Current Age and Prior Breaches of Legally Mandated Conditions). Separate readings of the VRS total, static and dynamic scores, allow the assessor to make differential interpretations of the relative contributions of static and dynamic predictors to the person's overall risk profile.
3. As VRS ratings are based on both adjudicated and non-adjudicated violence. A <u>high</u> dynamic percentile score in conjunction with a relatively <u>low</u> static percentile score may signal an individual with many dynamic risk areas but who has somehow avoided contact with the criminal justice system. In contrast, a <u>low</u> dynamic percentile score with a relatively <u>high</u>

static percentile score signals an individual who had a troubled past but may have since made positive changes and many dynamic risk areas are now well managed.

4. The percentile of the change score can provide a useful index of the degree of change and treatment performance relative to the comparison sample. This information cannot be easily extracted from measures of absolute risk. For example, all else being equal, a person with a change score at 80%ile shows a much larger degree of change (e.g., by working harder and applying relevant learnings to manage their risk areas) compared to the rest of the cohort, such as those with an average performance at the 50%ile.
5. A caveat for 4) is the presence of an acceptable level of inter-rater reliability for change ratings. For example, a rater who consistently produces substantially higher than the mean ratings of change may need to pause and check his/her level of inter-rater reliability and consult others as well as VRS manual rating instructions.

Table 3 provides a summary of the mean or median (as indicated) VRS total score for various VRS rated samples in the literature, mapped on to the 5 CL risk levels.

The VRS total scores and their location within the 5 risk levels are broadly as expected. The lowest risk groups (Level 1) the university students non-offender sample (M = 6.6), followed quite closely by the non-forensic non-violent mentally disordered samples (M = 13.56). Highest risk group (Level 5) comprised those with moderately high scores on the PCL-R scores (M = 26 to 28). Most of the other studies have samples located in Level 3, where the majority of criminal justice and forensic populations are expected to occupy. All treated samples have lower scores than untreated samples. In summary, all the samples are broadly located at the risk levels where they are expected to be.

Table 3.

Offender Type	Level I	Level II	Level III	Level IV	Level V	Reference
VRS proposed ranges	*0-19.9*	*20-34.9*	*35-49.9*	*50-59.9*	*60-78*	
[1]Fed off norm sample, Can			41.9			Wong & Gordon, 2006
[2]Fed off risk reduct tx, RPC				58.3/**53.4**		Coupland & Olver 2020a, b
[3]Fed off risk reduct tx, CSC			**49.7**	57.6		Higgs et al., 2020
[4]Fed paroled off, Can		32.0				Wong & Parhar, 2011
[5]Forensic Hospital, Can		34.2/**33.3**				Hogan & Olver, 2019
[6]Med. secure MD, UK (M)			41.0			Doland, 2007
≥1violent episode			44.6			as above
No violent episode			36.8			as above
[7]Multi-secure MD, USA			39.3/**35.9**			Eggert et al., 2020
[8]Non-forensic MD/nv UK	13.56					Doyle et al., 2011/acute men. health
Same sample as (8)/ v UK		21.83				as above
[9]Female Off, Can.		25.2				Stewart, 2011
[10]Female 'violent' off, Aus			47.74			Gower et al., 2022a, n=157
[10]Male 'violent' off, Aus			45.12			Gower et al., 2022a, n=70
[11]Female Viol off, Aus (median score)						Gower et al., 2022b, n=115, nab +ab
Non-aboriginal			43.0			
Aboriginal				54.0		
[11]Male 'violent' off, Aus (median score)						Gower et al., 2022b; n=30, nab +ab
Non-aboriginal				51.5		
Aboriginal				52.5		
[12]Recidivists, Can			40.3			Valliant et al., 2003; n=12
[12]Non-recidivists, Can		21.6				Valliant et al., 2003; n=12
[12]U. students non-off, Can	6.6					Valliant et al., 2003; n=15
[13]Psychopathic (PCL-R) Can ($\bar{X}$ PCL-R=26)				**57.1**	62.0	Lewis et al., 2012
[13]Psychopathic (PCL-R) UK ($\bar{X}$ PCL-R =28)					61.0	Kirkpatrick et al., 2009
Bolded =Post-Tx score						

1. A male offender sample all serving sentences of 2 years or more in Correctional Services of Canada (CSC) facilities.
2. Similar to (1) and have participated in risk reduction treatment programs at the Regional Psychiatric Centre (RPC).
3. Similar to (2) except treatment was organized Centrally under the direction of Correctional Services of Canada.
4. A sample of male federal Canadian offenders newly paroled to the community.
5. A male forensic mental health sample in the community in Canada.
6. A male forensic mental health sample from a medium secured NHS facility in UK, the majority of the sample were transferred from prisons.
7. A largely male multilevel forensic mental health sample.
8. A largely male non-forensic mental health sample in an acute care facility in UK with or without violent episodes (v/nv respectively) while in care.
9. A randomly selected sample of federally sentenced women in Correctional Services of Canada.
10. Australian male and female offenders. Female offenders were deemed prone to violence.
11. Australian male aboriginal/female aboriginal/male non-aboriginal/female non-aboriginal offenders
12. Provincial prison samples of male recidivists & non-recidivists & a male university undergraduate sample in Canada.
13. Canadian male federal offenders assessed with the PCL-R and had undergone treatment to reduce violent risk.
14. Participants of the Dangerous and Severe Personality Disordered programme in the UK.

Applications and interpretation of absolute risk, relative risk, CL risk levels, and their associations with VRS scores

Risk Management and Case Planning based on CL risk levels and VRS ratings.

The CL risk levels with the associated VRS total scores inform the risk potential for violent recidivism. The information can be used to determine the appropriate intensity of risk management services such as treatment, supervision, and monitoring required to reduce future acts of violence and antisocial behaviors.

It follows that the higher the level of risk (e.g., Level IV or V), the higher the intensity of services required, and the lower the level of risk (e.g., Level I or II), the lower the required services to safely manage risk. Those in Level I will likely require minimal, if any, service. Those in Level III, the most populous category, likely require a moderate level of services, and those in Levels IV and V would require a high intensity of both intervention and supervision.

VRS Dynamic items rated 2 or 3 should be prioritized for services in contrast with items with 0 or 1 ratings, which require little or no service as they represent low risk areas and/or potential strengths. For example, a rating of 0 or 1 on D14 'Community Support' would indicate, respectively, an established and effective support network that the individual uses to mitigate their risk, or that previous lack of community support has been rectified. Patterns of item ratings such as those related to community support and functioning (e.g., Work Ethic, Community Support, Release to High-Risk Situations and Compliance with Community Supervision) can be discussed as a related group of variables.

Although an item may not be criminogenic for violent offending specifically, it may still be a general treatment target. For instance, an individual's substance use is not associated at all with offending behaviors, but it may contribute to problems in other areas such as work, relationships, and health. Thus, substance use would not be rated as a criminogenic need but should be treated to improve overall health, life-satisfaction and social functioning, with the understanding that substance abuse treatment would likely not reduce the individual's offending risk.

Using risk and the SOC (treatment readiness) rubric to inform case supervision intensity and contact frequency.

The Stages of Change rubric broadly captures the individual's treatment readiness or motivation to change. The 5 VRS SOCs and their associated characteristics are covered in detail in the VRS manual and thus will not be repeated here.

The SOC concept together with the VRS 5 CL risk levels can be used to inform the intensity and frequency of the supervision of service users in the community. Obviously, appropriate services and interventions should also be provided during contact sessions[1]. Higher risk individuals are usually provided with a more intensive level of supervision, but those who are predominantly in the pre-contemplation SOC will likely reject or attempt to circumvent supervision, as usually they do not acknowledge any need for such services. As such, supervisors may wish to consider more frequent face-to-face (F2F) contacts and monitoring in view of these challenges. In contrast, those in the

[1] In addition to supervision intensity and contact frequency, the characteristics of the various Stages of Change can also be used to inform additional risk management strategies that match with an individual's SOC (e.g. Wong, S. & Gordon, A. (2004). A Risk-Readiness Model of Post-treatment Risk Management. *Issues in Forensic Psychology*, 5, 152-163.

Contemplation or Preparation SOC are likely more willing to work with supervisors and to take some steps toward mitigating their risk. That said, as those in the Pre-Contemplation and Contemplation SOCs are not yet implementing relevant skills/strategies to manage their risk, and, erring on the conservative side, we suggest the same contact/intensity approach for both. However, adjustments can make as appropriate. These suggestions are particularly relevant for the higher risk individuals in Levels III, IV and V. Taking both the risk and treatment readiness or SOC dimensions into account can be helpful in formulating appropriate community supervision strategies (see Table below).

CL Risk Levels	Level I	Level II	Level III	Level IV	Level V
SOC					
Pre-contemplation	Minimal to no supervision	Occasional F2F + remote check-in	Periodic F2F + remote check-in/med freq.	F2F mod/high freq. + remote check-in	F2F high freq. + remote check-in/hi freq.
Contemplation	Minimal to no supervision	Occasional F2F + remote check-in	Periodic F2F + remote check-in/med freq.	F2F mod/high freq. + remote check-in	F2F high freq. + remote check-in/hi freq.
Preparation	Minimal to no supervision	Remote check-in, mod freq.	Occasional F2F + remote check-in/med freq.	F2F mod/high freq. + remote check-in	F2F high freq. + remote check-in/hi freq.
Action	Minimal to no supervision	Remote check-in, low freq.	Remote check-in/med freq.	Occasional F2F + remote check-in/med freq.	F2F mod freq. + remote check-in/mod freq.
Maintenance	Minimal to no supervision	Minimal supervision	Minimal supervision	Remote check-in/low freq.	Remote check-in/med freq.

F2F = Face to Face Mod = moderate Hi = high
Remote check-in denotes non-F2F contact

The terms minimal, occasional, periodic, moderate, and high, indicate a graduated increase in contact frequency, rather than a suggestion that a specific number of contacts hours are required.

Risk formulation

Broadly speaking, case formulation involves the gathering of case relevant information pertaining to factors that may be relevant to the understanding of the origin, current status, and maintenance of the presenting challenges, along with relevant treatment planning to address the challenges. Hypotheses as to how the factors come together to form the current presentations can be generated and used to guide treatment.

Risk formulation uses an approach that is analogous to case formulation to understanding of the origin, current status and maintenance of at-risk behaviors, including risk change with treatment. An example (Joe) is used to illustrate the use the VRS assessment of risk, and the

concepts of absolute, relative risk and the 5 risk levels construct to undertake a risk formulation exercise.

The table below shows the Joe's absolute, relative risk, and the 5 CL risk levels generated using the Calculator, percentile tables and risk scores for the 5 risk levels.

VRS scores for Joe		**Percent violent/general recidivism obtained from calculator**				**VRS scores percentiles From Percentile tables**	**Risk Levels based on pre-post-VRS scores**
		3-yr general	3-yr violent	5-yr general	5-yr violent		
Pre-tx total	**64**	**69.1**	**41.3**	**84.2**	**59.0**	**92.3**	**V**
Post-tx total	56.5	57.5	29.9	75.2	48.9	76.1	IV
Pre-tx Static	**16**	**/**	**/**	**/**	**/**	**88.3**	**≈V**
Post-tx Static	16	/	/	/	/	88.3	≈V
Pre-tx Dynamic	**48**	**/**	**/**	**/**	**/**	**89.8**	**≈V**
Post-tx Dynamic	40.5	/	/	/	/	66.1	≈IV
Change score	7.5	/	/	/	/	79.6	/

Pre-treatment/T1 risk formulation and treatment recommendations

Joe's T1/Pre-treatment VRS risk assessment results put him at **risk Level V**, the highest of the 5 VRS risk levels that characterizes individuals as being well above average in risk, with an entrenched criminal profile and quite severe and chronic criminogenic needs across psychological and lifestyle domains. This is consistent with his total VRS score which is higher than 92.3% of his cohort. *The 5-risk levels provide a broad indication of the individual's level of risk with associated descriptors of service user characteristics and suggested intensity of intervention.*

Joe's **5-year violent recidivism rate** is about 59.0% based on a recent study of VRS assessment and recidivism. Even at this high level of risk, about 41.0% of his cohort did not violently recidivate over the 5-yr fixed follow up time in the community. *This is a measure of Joe's **absolute risk** for violent recidivism with 5-year follow-up. Additional information on his 3- or 5-year general or violent recidivism can be generated if required.*

Joe's **static risk score** of 16 is higher than 88.3% (**percentile score**) of his cohort. The high percentile score suggests the presence of an extensive history of antisocial and/or offending behaviors in his past. Joe's static risk domain contributes to his overall risk and will remain mostly unchangeable over time. *A perusal of his static risk factors would inform past events that contributed to his high static scores such as* a *dysfunctional upbring and family instability, as well as a long and serious criminal history.*

Similarly, and as expected, his **dynamic risk score** of 48, that is, the ratings of his potentially changeable problem areas linked to violent offending, is higher than 89.8% (**percentile score**) of his cohort. *Joe's criminogenic factors rated 2 or 3 can be used to highlight what constitutes his at-risk areas. His criminogenic factors rated 0 or 1 are potential areas of strength and/or resiliency especially those that were problems in the past but are now well managed, that is, dynamic factor(s) ratings of one (1). To reduce reoffending risk, Joe will likely require high intensity treatment directed at his endorsed criminogenic factors. Can also discuss Joe's presenting **Offense Analogue Behaviors (OABs)** and potential or emerging **Offense Reduction Behaviors (ORBs)** can be used to indicate risk change in treatment.*

Joe's overall recidivism rate is based on a combination of his static and dynamic risk scores. While his static risks cannot change to any significant extent, his dynamic risk can change if Joe chooses to engage with targeted risk reduction focused interventions.

*Use Joe's **SOC ratings** to highlight his overall motivation and engagement towards interventions, and further discussions especially if there are differences in his level of motivation towards interventions for different dynamic risk factors and reasons for non-engagement.*

The amount of risk change associated with risk reduction will depend on Joe's engagement in intervention, as well as the **violence reduction efficacy of the interventions**. *Can discuss the empirical evidence of the efficacy of the treatment program Joe is participating in.*

The above statements of Joe's risk are based on comparisons of his risk scores to a combined sample of 472 adults in institutional settings in Canada and the US. *A statement of the applications and limitations of the evidence underpinning the risk formulation.*

Post-treatment or T2 risk formulation and the impact of treatment

Joe showed a high level of positive change at the end of the treatment program. Joe's change score is higher than about 80% of the comparison group, **79.6%** (**Percentile score**) to be exact. *Such substantial changes are likely associated with his high motivation and active engagement in treatment and applying appropriate skills and risk-management strategies to manage his risk areas. Can provide examples of Joe's engagement in treatment, where appropriate, as indicated by his SOC and what had sustained his level of motivation.*

His overall risk at post-treatment is now at **Level IV, the above average level vs Level V, well above average** before treatment. *Highlight the fact that any change takes time and a trajectory of downward movement of risk level is what could be expected even with effective risk reduction treatment. A continuation of the downward trajectory requires further support and encouragement.*

His **dynamic risk score at post-treatment is 40.5 vs 48 at pre-treatment**. The corresponding **%tile scores are 66.1** post-treatment vs **89.8 pre-treatment**, a 23.7%tile reduction which is substantial. *Highlight the criminogenic factors that have changed the most and the least using corresponding OABs and ORBs as supporting evidence. Discuss which, if any, criminogenic factors are refractive to change and the reasons why. Discuss any broad personal, mental health, family or organizational issues that may have impeded or facilitated his progress especially if such issues have specific impact on any criminogenic factors. What could be done differently going forward.*

In contrast, Joe's **Static risk score**, which is higher than **88.3% (percentile score)** of his cohorts will continue to cast a long shadow that will contribute to his overall post-treatment risk since static risk doesn't typically change[2] ; this is Joe's 'baggage' from the past. *Over time, his static risk is expected to have a decreasing impact on Joe's risk-related function should his positive progress continue. However, there is no research that can speak to this issue.*

His estimated 5-year violent recidivism rate is now **48.9% compared to 59.0% before treatment, a 10.1% reduction in absolute risk. The corresponding percentile rank is 76.1%tile post- vs 92.3%tile pre-**

[2] Static Factors S1 (Current Age) can change if the individual's age category changes between the Pre-Tx/T1 and Post-Tx/T2 assessment, and S5 (Breaches of Legally Mandated Conditions) can change should the individual incur breaches or additional breaches between the Pre-Tx/T1 and Post-Tx/T2 ratings.

treatment, a 16.2 reduction in %tile rank. *Joe's percent recidivism and his risk ranking among the comparison group have both decreased quite substantially.*

Joe's treatment improvement is likely attributable to efforts he made in treatment but highlight areas of treatment he should give particular attention to. Should Joe continue with his treatment involvement and progress, it is expected that all his various risk indicators of violence recidivism should continue to decrease.

Summary

The VRS Workbook summarizes a selection of research studies and applications of the VRS with an emphasis on recent developments such as risk communication, absolute and relative risks etc. The Workbook should be read in conjunction with the VRS Manual that covers important concepts not included in the Workbook. For example, concepts such as Offense Analogue Behaviors (OABs) and Offense Reduction Behaviors (ORBs) are not covered in the Workbook but are detailed in the Manual. Further, OAB/ORB concepts are related closely with the VRS Stage of Change framework used to assess change over time and/or treatment, which is also described in detail within the manual. Both the OAB/ORB and SOC frameworks guide the assessment of the extent and stability of violence-risk changes (or lack thereof), over time or treatment. As such, these are important concepts that serve to inform violence risk assessment, as well as to guide the type and focus of treatment interventions, aimed at achieving the ultimate goal of violence-risk reduction.

It is hoped that the Workbook can be a useful adjunct for VRS users. We endeavor to include further developments of the VRS and related issues in future versions of the Workbook, which will be available for free downloading from our website.

Appendix A
Percentile Tables

VRS Total (Static + Dynamic) Score Percentiles

Score	Below	Same	Higher	Percentile	Score	Below	Same	Higher	Percentile
0-2.5	0	0.1	99.9	0.1	17	7.1	0.6	92.3	7.4
3	0.1	0.1	99.8	0.2	17.5	7.7	0.1	92.2	7.8
3.5	0.1	0.0	99.8	0.2	18	7.8	0.7	91.5	8.2
4	0.2	0.1	99.7	0.3	18.5	8.6	0.3	91.1	8.8
4.5	0.2	0.0	99.7	0.3	19	8.9	0.4	90.7	9.1
5	0.3	0.3	99.4	0.4	19.5	9.3	0.4	90.3	9.5
5.5	0.3	0.0	99.4	0.4	20	9.7	1.0	89.3	10.2
6	0.6	0.1	99.3	0.7	20.5	10.7	0.4	88.9	10.9
6.5	0.7	0.1	99.2	0.8	21	11.1	0.7	88.2	11.5
7	0.7	0.4	98.9	0.9	21.5	11.1	0.7	88.2	11.5
7.5	1.1	0.1	98.8	1.2	22	11.8	0.8	87.4	12.2
8	1.2	0.3	98.5	1.3	22.5	12.6	0.3	87.1	12.8
8.5	1.5	0.1	98.4	1.6	23	12.9	1.0	86.1	13.4
9	1.6	0.2	98.2	1.7	23.5	13.9	0.3	85.8	14.1
9.5	1.9	0.1	98.0	2.0	24	14.2	0.7	85.1	14.5
10	2.0	0.4	97.6	2.2	24.5	14.9	0.2	84.9	15.0
10.5	2.5	0.2	97.3	2.6	25	15.1	0.9	84.0	15.5
11	2.7	0.4	96.9	2.9	25.5	16.0	0.4	83.6	16.2
11.5	2.7	0.0	96.9	2.9	26	16.4	1.4	82.2	17.1
12	3.1	0.6	96.3	3.4	26.5	17.9	0.2	81.9	18.0
12.5	3.1	0.0	96.3	3.4	27	18.1	1.2	80.7	18.7
13	3.7	0.8	95.5	4.1	27.5	19.3	0.4	80.3	19.5
13.5	4.6	0.2	95.2	4.7	28	19.7	0.9	79.4	20.2
14	4.8	0.7	94.5	5.1	28.5	20.6	0.5	78.9	20.9
14.5	5.5	0.2	94.3	5.6	29	21.1	1.3	77.6	21.8
15	5.7	0.4	93.9	5.9	29.5	22.3	0.7	77.0	22.7
15.5	6.1	0.2	93.7	6.2	30	23.0	1.0	76.0	23.5
16	6.4	0.7	92.9	6.8	30.5	24.1	0.3	75.6	24.3
16.5	6.4	0.0	92.9	6.8	31	24.4	1.2	74.4	25.0

VRS Total (Static + Dynamic) Score Percentiles (continued)

Score	Below	Same	Higher	Percentile	Score	Below	Same	Higher	Percentile
31.5	25.6	0.4	74.0	25.8	46	52.6	1.3	46.1	53.3
32	26.0	1.3	72.7	26.7	46.5	54.0	0.7	45.3	54.4
32.5	27.4	0.4	72.2	27.6	47	54.7	1.6	43.7	55.5
33	27.8	1.1	71.1	28.4	47.5	56.3	0.5	43.2	56.6
33.5	28.9	0.2	70.9	29.0	48	56.8	1.0	42.2	57.3
34	29.1	1.3	69.6	29.8	48.5	57.8	0.8	41.4	58.2
34.5	30.5	0.4	69.1	30.7	49	58.7	1.1	40.2	59.3
35	30.9	1.3	67.8	31.5	49.5	59.8	0.7	39.5	60.2
35.5	32.1	0.5	67.4	32.4	50	60.5	1.7	37.8	61.4
36	32.7	1.3	66.0	33.4	50.5	62.2	0.7	37.1	62.6
36.5	33.9	0.6	65.5	34.2	51	62.9	1.0	36.1	63.4
37	34.5	1.0	64.5	35.0	51.5	64.0	0.7	35.3	64.4
37.5	35.6	0.3	64.1	35.8	52	64.7	1.0	34.3	65.2
38	35.9	1.3	62.8	36.6	52.5	65.7	1.2	33.1	66.3
38.5	37.2	0.9	61.9	37.7	53	66.9	1.8	31.3	67.8
39	38.1	1.6	60.3	38.9	53.5	68.7	0.6	30.7	69.0
39.5	39.8	0.7	59.5	40.2	54	69.3	1.9	28.8	70.3
40	40.4	1.9	57.7	41.4	54.5	71.2	1.3	27.5	71.9
40.5	42.4	0.4	57.2	42.6	55	72.4	1.4	26.2	73.1
41	42.8	1.0	56.2	43.3	55.5	73.8	0.9	25.3	74.3
41.5	43.9	0.7	55.4	44.3	56	74.7	0.9	24.4	75.2
42	44.5	1.6	53.9	45.3	56.5	75.6	0.9	23.5	76.1
42.5	46.2	0.7	53.1	46.6	57	76.5	1.3	22.2	77.2
43	46.7	1.6	51.7	47.5	57.5	77.8	0.8	21.4	78.2
43.5	48.1	0.5	51.4	48.4	58	78.6	1.1	20.3	79.1
44	48.7	1.4	49.9	49.4	58.5	79.7	1.1	19.2	80.3
44.5	50.3	0.5	49.2	50.6	59	80.9	0.8	18.3	81.3
45	50.8	1.4	47.8	51.5	59.5	81.7	1.4	16.9	82.4
45.5	52.2	0.4	47.4	52.4	60	83.1	1.4	15.5	83.8

VRS Total (Static + Dynamic) Score Percentiles (continued)

Score	Below	Same	Higher	Percentile	Score	Below	Same	Higher	Percentile
60.5	84.5	0.8	14.7	84.9	69.5	98.9	0.1	1.0	99.0
61	85.4	1.2	13.4	86.0	70	99.0	0.4	0.6	99.2
61.5	86.5	1.2	12.3	87.1	70.5	99.4	0.1	0.5	99.5
62	87.7	0.8	11.5	88.1	71	99.5	0.1	0.4	99.6
62.5	88.6	1.1	10.3	89.1	71.5	99.5	0.0	0.4	99.6
63	89.7	1.6	8.7	90.5	72	99.6	0.2	0.2	99.7
63.5	91.3	0.6	8.1	91.6	72.5	99.6	0.0	0.2	99.7
64	91.9	0.7	7.4	92.3	73	99.9	0.1	0.0	99.9
64.5	92.6	0.9	6.5	93.1	73.5	99.9	0.0	0.0	99.9
65	93.5	0.8	5.7	93.9	74	99.9	0.0	0.0	99.9
65.5	94.3	0.9	4.8	94.8	74.5	99.9	0.1	0.0	99.9
66	95.2	0.7	4.1	95.6	75	99.9	0.0	0.0	99.9
66.5	96.0	0.5	3.5	96.3	75.5	99.9	0.0	0.0	99.9
67	96.5	0.7	2.8	96.9	76	99.9	0.0	0.0	99.9
67.5	97.2	0.2	2.6	97.3	76.5	99.9	0.0	0.0	99.9
68	97.4	0.6	2.0	97.7	77	99.9	0.0	0.0	99.9
68.5	98.0	0.4	1.6	98.2	77.5	99.9	0.0	0.0	99.9
69	98.4	0.4	1.2	98.6	78	99.9	0.0	0.0	99.9
N = 1338, *M* = 42.8, *SD* = 16.0									

VRS Dynamic Total Score Percentiles

Score	Below	Same	Higher	Percentile	Score	Below	Same	Higher	Percentile
0-1	.0	0.1	99.9	.1	17.5	13.3	0.3	86.4	13.5
1.5	.0	0	99.9	.1	18	13.6	1.3	85.1	14.3
2	.1	0.1	99.8	.2	18.5	14.9	0.2	84.9	15.0
2.5	.1	0.2	99.7	.2	19	15.2	1.2	83.6	15.8
3	.4	0.4	99.2	.6	19.5	16.4	0.2	83.4	16.5
3.5	.4	0	99.2	.4	20	16.6	1.5	81.9	17.4
4	.7	0.3	99.0	.9	20.5	1.1	0.4	81.5	18.3
4.5	1.0	0.1	98.9	1.1	21	18.5	1.6	79.9	19.3
5	1.1	0.3	98.6	1.3	21.5	20.1	0.4	79.5	20.3
5.5	1.4	0.4	98.2	1.6	22	20.6	1.6	77.8	21.4
6	1.8	0.3	97.9	2.0	22.5	22.2	0.2	77.6	22.3
6.5	2.1	0.4	97.5	2.3	23	22.4	0.8	76.8	22.8
7	2.5	0.4	97.1	2.7	23.5	23.2	0.8	76.0	23.6
7.5	2.5	0.0	97.1	2.5	24	24.1	1.3	74.6	24.8
8	2.9	0.6	96.5	3.2	24.5	25.3	0.7	74.0	25.7
8.5	3.5	0.1	96.4	3.6	25	26.0	1.6	72.4	26.8
9	3.7	0.7	95.6	4.1	25.5	27.6	1.3	71.1	28.3
9.5	4.4	0.3	95.3	4.6	26	28.9	1.6	69.5	29.7
10	4.7	0.5	94.8	5.0	26.5	30.5	1.1	68.4	31.1
10.5	5.2	0.6	94.2	5.5	27	31.6	1.0	67.4	32.1
11	5.8	0.4	93.8	6.0	27.5	32.7	1.3	66.0	33.4
11.5	6.3	0.3	93.4	6.5	28	33.9	1.1	65.0	34.4
12	6.6	0.7	92.7	6.9	28.5	35.1	0.9	64.0	35.6
12.5	7.3	0.2	92.5	7.4	29	35.9	2.0	62.1	36.9
13	7.5	0.7	91.8	7.9	29.5	38.0	0.8	61.2	38.4
13.5	8.3	0.7	91.0	8.7	30	38.8	1.6	59.6	39.6
14	9.0	0.5	90.5	9.3	30.5	40.4	1.0	58.6	40.9
14.5	9.5	0.7	89.8	9.9	31	41.4	1.1	57.5	41.9
15	10.2	0.6	89.2	10.5	31.5	42.5	1.0	56.5	43.0
15.5	10.8	0.1	89.1	10.9	32	43.5	1.9	54.6	44.5
16	10.8	1.1	88.1	11.4	32.5	45.4	1.0	53.6	45.9
16.5	12.0	0.6	87.4	12.3	33	46.4	1.3	52.3	47.1
17	12.6	0.7	86.7	13.0	33.5	47.7	1.5	50.8	48.5

VRS Dynamic Total Score Percentiles (Continued)

Score	Below	Same	Higher	Percentile	Score	Below	Same	Higher	Percentile
34	49.2	1.0	49.8	49.7	47.5	87.7	1.6	10.7	88.5
34.5	50.2	1.3	48.5	50.9	48	89.2	1.1	9.7	89.8
35	51.6	1.7	46.7	52.5	48.5	90.4	1.0	8.6	90.9
35.5	53.3	0.7	46.0	53.7	49	91.3	1.4	7.3	92.0
36	54.0	1.9	44.1	55.0	49.5	92.8	1.0	6.2	93.3
36.5	55.9	1.0	43.1	56.4	50	93.7	1.2	5.1	94.3
37	57.0	1.5	41.5	57.8	50.5	94.9	1.0	4.1	95.4
37.5	58.4	1.0	40.6	58.9	51	95.9	1.3	2.8	96.6
38	59.4	1.7	38.9	60.3	51.5	97.2	0.4	2.4	97.4
38.5	61.1	1.0	37.9	61.6	52	97.6	0.7	1.7	97.9
39	62.2	1.6	36.2	63.0	52.5	98.3	0.4	1.3	98.5
39.5	63.8	0.7	35.5	64.1	53	98.7	0.5	0.8	99.0
40	64.4	1.3	34.3	65.1	53.5	99.2	0.1	0.7	99.3
40.5	65.7	0.8	33.5	66.1	54	99.3	0.4	0.3	99.5
41	66.5	1.9	31.6	67.5	54.5	99.7	0.1	0.2	99.8
41.5	68.5	1.3	30.2	69.2	55	99.9	0.1	0.0	99.9
42	69.7	2.9	27.4	71.2	55.5	99.9	0.0	0.0	99.9
42.5	72.6	1.1	26.3	73.1	56	99.9	0.0	0.0	99.9
43	73.8	1.3	24.9	74.5	56.5	99.9	0.0	0.0	99.9
43.5	75.0	1.5	23.5	75.8	57	99.9	0.1	0.0	99.9
44	76.5	2.5	21.0	77.8	57.5	99.9	0.0	0.0	99.9
44.5	79.0	1.9	19.1	80.0	58	99.9	0.0	0.0	99.9
45	80.9	2.0	17.1	81.9	58.5	99.9	0.0	0.0	99.9
45.5	82.9	1.3	15.8	83.6	59	99.9	0.0	0.0	99.9
46	84.2	1.5	14.3	85.0	59.5	99.9	0.0	0.0	99.9
46.5	85.7	1.1	13.2	86.3	60	99.9	0.0	0.0	99.9
47	86.8	0.9	12.3	87.3					
N = 1338, *M* = 32.8, *SD* = 12.4									

VRS Static Score Percentiles

Score	Below	Same	Higher	Percentile
0	0.0	1.2	98.8	.6
1	1.2	1.4	97.4	1.9
2	2.6	3.1	94.3	4.2
3	5.8	2.7	91.5	7.2
4	8.5	5.3	86.2	11.2
5	13.8	5.8	80.4	16.7
6	19.6	5.0	75.4	22.1
7	24.6	5.7	69.7	27.5
8	30.4	5.7	63.9	33.3
9	36.1	6.1	57.8	39.2
10	42.2	6.3	51.5	45.4
11	48.6	7.2	44.2	52.2
12	55.8	7.9	36.3	59.8
13	63.7	6.5	29.8	67.0
14	70.3	7.4	22.3	74.0
15	77.7	6.5	15.8	81.0
16	84.2	8.1	7.7	88.3
17	92.4	5.8	1.8	95.3
18	98.2	1.8	0.0	99.1
N = 1335, M = 10.2, SD = 4.6				

VRS Dynamic Total Change Score Percentiles

Score	Below	Same	Higher	Percentile
0.0	4.7	8.4	86.9	8.9
0.5	13.1	1.8	85.1	14.0
1.0	15.0	4.6	80.4	17.3
1.5	19.6	4.2	76.2	21.7
2.0	23.8	4.1	72.1	25.9
2.5	27.9	5.3	66.8	30.5
3.0	33.1	3.9	63.0	35.1
3.5	37.1	4.9	58.0	39.6
4.0	41.9	5.1	53.0	44.4
4.5	47.0	5.9	47.1	50.0
5.0	53.0	4.3	42.7	55.2
5.5	57.3	4.2	38.5	59.4
6.0	61.5	6.3	32.2	64.7
6.5	67.8	4.5	27.7	70.1
7.0	72.3	5.4	22.3	75.0
7.5	77.7	3.7	18.6	79.6
8.0	81.3	2.5	16.2	82.6
8.5	83.8	2.8	13.4	85.2
9.0	86.6	2.1	11.3	87.6
9.5	88.7	2.0	9.3	89.7
10.0	90.7	1.7	8.8	91.6
10.5	92.4	0.9	6.7	92.9
11.0	93.3	0.7	6.0	93.6
11.5	94.0	1.2	4.8	94.6
12.0	95.1	1.1	3.8	95.6
12.5	96.2	0.5	3.3	96.5
13.0	96.7	0.8	2.5	97.1
13.5	97.5	0.7	1.8	97.9
14.0	98.2	0.1	1.7	98.3
14.5	98.3	0.9	0.8	98.8
15.0	99.2	0.8	0.0	99.6
N = 761, *M* = 4.6, *SD* = 4.0				

Appendix B

Sample 1: Aggressive Behavior Control (ABC) Program, Regional Psychiatric Centre (RPC), Correctional Service Canada (CSC) (Lewis et al., 2013): A correctional sample of 198 men (*n* = 152 with any outcome, *n* = 82 with 5-year outcome) attending a high intensity violence reduction program (Aggressive Behaviour Control or ABC; Wong, Gordon & Gu, 2007; Wong & Gordon, 2013) for high risk, high need violent men. The mean length of program stay was 6.0 months (*SD* = 1.9). The VRS was rated pre and posttreatment from detailed institutional files, which included treatment progress (or lack thereof) information, along with single timepoint ratings of the Hare Psychopathy Checklist-Revised (PCL-R; Hare, 2003). Men with 5-year outcomes were followed up an average 7.0 years (SD = 1.2) post release. Recidivism was operationalized as any new criminal conviction incurred post release of a violent or general (i.e., violent or nonviolent) nature.

Sample 2: ABC Program, RPC, CSC (Coupland & Olver, 2020a, 2020b): A correctional sample of 178 men (*n* = 155 with all outcome, *n* = 145 with 5-year outcome) attending the same ABC high intensity violence reduction program for high risk, high need violent offenders, noted above. The mean length of program stay was 6.4 months (*SD* = 2.7). The VRS was rated pre- and posttreatment from detailed institutional files, along with the HCR-20 V2 and Structured Assessment of Protective Factors (SAPROF; deVogel et al., 2009); dimensional PCL-R scores as available were also extracted from assessment reports. Individuals with 5-year outcome were followed up an average 10.2 years (SD = 1.8) post release. Recidivism was defined as any new conviction incurred post release of a violent or general (i.e., violent or nonviolent) nature.

Sample 3: Violence Prevention Program, CSC (Higgs et al., 2020): A correctional sample of 139 men (all with outcome data, *n* = 133 with pre-post and outcome, *n* = 119 with 5-year outcome) attending a high intensity prison-based violence reduction program (Violence Prevention Program, or VPP) for high risk, high need violent offenders. The mean length of program stay was 5.0 months (*SD* = 2.1). The VRS was rated in real time pre and posttreatment from interview and file information by treatment staff and the men were followed up prospectively an average of 7.0 years (SD = 2.2) post release. Recidivism was defined as any new conviction incurred post release of a violent or general (i.e., violent or nonviolent) nature.

Sample 4: Alberta Hospital Edmonton (Hogan & Olver, 2019): A forensic mental health sample of 78 (71 men, 7 women) inpatients found not criminally responsible on account of mental disorder (NCR) or admitted under other psycho-legal circumstances (any outcome: total *n* = 66, male *n* = 61, female *n* = 5; 5-year outcome: total *n* = 44, male *n* = 41, female *n* = 3) attending violence reduction and mental health services. The mean length of hospitalization between VRS pre and post ratings was 22.5 months (*SD* = 26.9). The VRS was rated pre and posttreatment from detailed institutional files along with the HCR-20 V3 and single timepoint ratings of the PCL-R were completed. Individuals with 5-year outcome were followed up an average 9.2 years (*SD* = 1.7) post release. Recidivism was defined as any new conviction incurred post release of a violent or general (i.e., violent or nonviolent) nature.

Sample 5: Colorado Mental Health Institute at Pueblo, Colorado (Eggert et al., 2020): A forensic mental health sample of 290 inpatients (251 men, 38 women, 1 non-binary) found not guilty by reason of insanity (NGRI) (all outcome: total *n* = 133, male *n* = 115, female *n* = 17, non-binary *n* = 1; 5-year outcome: total *n* = 82, male *n* = 72, female *n* = 9, non-binary, *n* = 1) attending violence reduction and mental health services. The mean length of hospitalization between VRS pre and post ratings was 54.3 months (*SD* = 35.8). The VRS was rated in real time pre and posttreatment from interview and file information by treatment staff and individuals with 5-year outcome were followed up prospectively an average of 11.0 years (SD = 3.3) post

release. Recidivism was defined as any new arrest incurred post release of a violent or general (i.e., violent or nonviolent) nature.[3]

Sample 6: Violent Offender Survey (VOS; Wong & Gordon, 2006): The Violent Offender Survey (VOS) was a study commissioned in 2000 by CSC to examine the risk profiles and release outcomes of a stratified sample of 766 men convicted for violent offenses incarcerated within institutions throughout CSC Prairie Region. Single timepoint ratings were completed for the VRS (*n* = 455, Wong & Gordon, 2006) and PCL-R (*n* = 451 with outcome, see Olver, Neumann et al., 2013, 2018) from detailed institutional files; Statistical Information on Recidivism scores were extracted on individual cases from file as available (*n* = 425). The sample was followed up an average 28 months post release. Recidivism was defined as any new conviction incurred post released that was violent or general (i.e., violent or nonviolent) in nature.

[3] Although CMHIP used arrest (as opposed to conviction) to operationalize recidivism, the substantive prediction analyses had initially been conducted prior to the inclusion of these data and the results were not meaningfully different. These analyses minus CMHIP are reported in a supplemental VRS output file (i.e., logistic and Cox regression survival analyses, pp. 77-90).

Appendix C

Violence Risk Scale (VRS) Sample Characteristics and Recidivism Information

					VRS Score *(M, SD)*						
		Follow up	Recidivism *n (%)*			Dynamic		Total			
Sample	*N*	*(M SD)*	Violent	General	Static	pre	post	pre	post	Change	Risk classification
VRS CL Risk Category Sample Characteristics (Overall follow-up, N = 1,100)											
Lewis et al. (2013)	152	4.9 (2.6)	73 (48.0)	95 (62.5)	13.9 (3.1)	46.5 (7.2)	42.1 (7.2)	61.5 (8.5)	56.7 (9.1)	4.7 (3.0)	High
Coupland & Olver (2018)	155	9.7 (2.6)	94 (60.6)	122 (78.7)	13.1 (3.1)	45.4 (6.9)	40.8 (7.0)	58.4 (9.8)	53.5 (10.3)	4.6 (3.0)	High
Hogan & Olver (2019)	66	7.7 (3.0)	8 (12.1)	15 (22.7)	7.0 (4.3)	30.0 (10.9)	28.9 (11.1)	36.8 (14.1)	35.5 (14.2)	1.0 (1.2)	Moderate to low
Higgs et al. (2020)	139	7.2 (1.9)	56 (40.3)	95 (68.3)	13.1 (2.9)	44.3 (7.9)	36.7 (7.2)	57.5 (9.0)	49.9 (8.2)	7.6 (4.1)	High to moderate
Eggert et al. (2020)	133	7.7 (5.0)	10 (7.5)	22 (16.5)	7.6 (4.0)	31.1 (8.6)	27.0 (8.5)	38.9 (11.2)	34.8 (11.0)	4.2 (4.8)	Moderate to low
Wong & Gordon (2006)	455	2.2 (1.4)	39 (8.6)	102 (22.4)	9.6 (4.4)	24.8 (12.0)	-	33.4 (15.0)	-	-	Moderate to low
Overall	1,100	5.2 (3.9)	280 (25.5)	451 (41.0)	10.7 (4.6)	32.9 (12.8)		43.3 (16.5)		4.8 (4.0)	Moderate
VRS Calculator Sample Characteristics (Fixed 5-year follow-up, N = 472)											
Lewis et el. (2013)	82	7.0 (1.2)	45 (54.9)	66 (80.5)	14.1 (3.0)	46.7 (7.1)	42.3 (7.0)	62.0 (7.4)	57.1 (8.6)	4.9 (3.1)	High
Coupland & Olver (2018)	145	10.2 (1.8)	75 (51.7)	107 (73.8)	13.0 (3.9)	45.3 (6.8)	40.8 (7.0)	58.3 (9.8)	53.4 (10.2)	4.5 (3.0)	High
Hogan & Olver (2019)	44	9.2 (1.7)	6 (13.6)	12 (27.3)	6.3 (4.1)	28.4 (10.4)	27.6 (10.6)	34.2 (13.6)	33.3 (13.6)	0.9 (0.9)	Moderate to low
Higgs et al. (2020)	119	7.6 (1.3)	43 (36.1)	79 (66.4)	12.9 (2.9)	44.6 (7.9)	36.7 (7.0)	57.6 (9.0)	49.7 (8.1)	7.9 (4.2)	High to moderate
Eggert et al. (2020)	82	11.0 (3.3)	7 (8.5)	15 (18.3)	8.2 (3.8)	30.9 (9.0)	27.4 (9.2)	39.3 (11.3)	35.9 (11.6)	3.5 (5.3)	Moderate to low
Overall	472	9.1 (2.5)	176 (37.3)	279 (59.1)	11.7 (4.4)	41.3 (10.4)	36.5 (9.7)	53.2 (13.8)	48.2 (13.1)	4.9 (4.2)	High to moderate

Note: Overall aggregate VRS sample *N* = 1,338; VRS aggregate sample with any outcome *N* = 1,100; Sample with VRS pre-post and outcome *N* = 635; Sample with VRS pre-post and 5-year outcome *N* = 472.

Appendix D

Predictive Validity of VRS Risk and Change Scores for Violent and General Recidivism at 2, 3, and 5 Years Fixed Follow-up (N = 472)

VRS measure	Violent recidivism *AUC [95%CI]*			General recidivism *AUC [95%CI]*		
	2-year	3-year	5-year	2-year	3-year	5-year
Static	.69 [.63, .74]	.72 [.67, .76]	.70 [.65, .75]	.68 [.64, .73]	.72 [.68, .77]	.76 [.72, .81]
Dynamic pre	.64 [.58, .70]	.65 [.60, .70]	.68 [.63, .73]	.64 [.59, .69]	.67 [.62, .72]	.72 [.67, .77]
Dynamic post	.67 [.62, .73]	.69 [.64, .74]	.71 [.67, .76]	.66 [.63, .73]	.70 [.66, .75]	.75 [.71, .80]
Total pre	.66 [.58, .70]	.68 [.63, .73]	.70 [.65, .74]	.64 [.59, .69]	.70 [.65, .75]	.75 [.71, .80]
Total post	.68 [.62, .74]	.71 [.66, .76]	.72 [.68, .77]	.68 [.63, .73]	.73 [.68, .77]	.77 [.73, .82]
Change†	.57 [.50, .64]	.59 [.53, .65]	.57 [.52, .62]	.57 [.52, .62]	.58 [.53, .64]	.59 [.53, .64]

Note: all $p < .001$ except † in which all $p < .05$.
Change measure represents the VRS dynamic residualized change score, controlling for pretreatment score with AUC reversed for consistency in direction effects.

Appendix E

Logistic Regression Models for VRS Calculator in the Generation of Recidivism Estimates Over Defined Follow-ups

Regression	Violent recidivism					General recidivism				
model	B	SE	Wald	p	e^B [95% CI]	B	SE	Wald	p	e^B [95% CI]
2-year										
VRS Pre	.067	.013	26.12	<	1.070 [1.042,	.057	.009	38.63	<	1.059 [1.040,
VRS Change	-.080	.031	6.55	.010	0.923 [0.868,	-.066	.025	6.94	.008	0.936 [0.891,
Constant	-4.993	.770				-3.359	.502			
3-year										
VRS Pre	.078	.012	40.80	<	1.081 [1.056,	.074	.009	62.51	<	1.077 [1.057,
VRS Change	-.100	.029	11.91	.001	0.905 [0.856,	-.100	.026	15.10	<	0.905 [0.860,
Constant	-5.093	.706				-3.682	.497			
5-year										
VRS Pre	.078	.010	58.12	<	1.081 [1.060,	.091	.010	85.43	<	1.095 [1.074,
VRS Change	-.082	.026	10.02	.002	0.922 [0.876,	-.113	.028	16.51	<	0.893 [0.846,
Constant	-4.423	.569				-3.866	.491			

Appendix F

Cox Regression Survival Analysis for VRS Scores in the Prediction of Violent and General Recidivism

Regression model (1-4) by outcome		B	SE	Wald	p	e^B [95%CI]
				Risk and change score (N = 635)		
	Violent recidivism					
1.	VRS Pretreatment Total	.065	.007	99.54	< .001	1.068 [1.054, 1.081]
	VRS Change	-.057	.016	12.86	< .001	0.944 [0.915, 0.974]
	General recidivism					
2.	VRS Pretreatment Total	.063	.005	140.63	< .001	1.065 [1.054, 1.076]
	VRS Change	-.045	.012	12.71	< .001	0.956 [0.933, 0.980]
				All assessments (N = 1,100)		
	Violent recidivism					
3.	VRS Total	.061	.005	130.54	< .001	1.063 [1.052, 1.074]
	General recidivism					
4.	VRS Total	.051	.004	180.68	< .001	1.052 [1.044, 1.060]

Appendix G

References

Note: Only a few key references are provided below, a more extensive reference list is available on our website.

Gordon, A. & Wong, S.C.P. (2010). Offense Analogue Behaviours as indicator of criminogenic need and treatment progress in custodial settings. In Daffern, M., Jones, L. & Shine, J. (Ed.). *Offence Paralleling Behaviour: An Individualized Approach to Offender Assessment and Treatment*. Wiley.

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