Australian Government
Australian Institute of Criminology

AIC reports
Research Report 34

Validation of the Violence Risk Scale for Australian male prison populations

Emma Ziersch
Shawn Sowerbutts
Yilma Woldgabreal
Sophie Ransom

ISSN (Online) 2206-7280
ISBN 978 1 922877 93 2 (Online)
https://doi.org/10.52922/rr77932

Published by the Australian Institute of Criminology
GPO Box 1936 Canberra ACT 2601
Tel: (02) 6268 7166
Email: front.desk@aic.gov.au
Website: www.aic.gov.au

Please note: Minor revisions are occasionally made to publications after release. The online versions available on the AIC website will always include any revisions.

All publications in the Research Report series are subject to peer review–either through a double-blind peer review process, or through stakeholder peer review. This report was subject to double-blind peer review.

Disclaimer: This research report does not necessarily reflect the policy position of the Australian Government.

General editor: Dr Rick Brown, Deputy Director, Australian Institute of Criminology

Edited and typeset by the Australian Institute of Criminology

A full list of publications in the AIC Reports series can be found on the Australian Institute of Criminology website at **aic.gov.au**

Contents

Figures

Tables

Acknowledgement of Country

This document was developed on Kaurna land. The South Australian Department for Correctional Services (DCS) acknowledges the spiritual connection to country and recognises the Kaurna people as the custodians of the greater Adelaide region. DCS also acknowledges and pays respect to Traditional Owners across South Australia. We recognise the continuing importance of language, land, culture and spiritual beliefs to Aboriginal and Torres Strait Islander people from all regions of Australia, particularly those who will potentially be impacted by this research.

Other acknowledgements

We would like to thank all staff who played a role in the project, particularly the members of the VRS Steering Group and Working Group who made the project possible. Their assistance in garnering support for the project, facilitating approvals, and with data extraction and advice throughout the project has been invaluable. Our thanks are also extended to Steve Wong and his colleagues for generously sharing their expertise and to the Westerman Jilya Institute for Indigenous Mental Health for its important contribution to this project. We also recognise the contribution of Aboriginal staff from DCS who provided feedback and assistance throughout the project.

Content warning

This report contains literature, data and other information regarding the over-representation of Aboriginal and Torres Strait Islander people in the criminal justice system, which may be distressing. We also wish to advise Aboriginal and Torres Strait Islander readers that information in this report may have been provided by Aboriginal and Torres Strait Islander people who are now deceased.

Aboriginal and Torres Strait Islander peoples

When referring to the First Peoples of the lands and waters currently known as Australia, this Research Report uses the terms 'Aboriginal and Torres Strait Islander people/s' and 'Aboriginal people', depending on the specificity of the context to Australia. Where the report is describing data from the present study, the term Aboriginal is used as the sample is almost entirely based on this population. The use of the term Aboriginal in this context is intended to be inclusive of the very small number of Torres Strait Islander people in the sample. The term 'non-Indigenous people' is used for people who are not the First Peoples of the lands on which they reside. In Australia, this refers to people who are not Aboriginal, Torres Strait Islander, or Aboriginal and Torres Strait Islander.

Funding

This research was funded by the Australian Institute of Criminology under the Indigenous Justice Research Program. The Program was established to fund various types of policy-relevant research, including research that will identify and analyse policies, programs or other activities that will contribute to a reduction in the over-representation of Aboriginal and Torres Strait Islander people in the criminal justice and related systems. In-kind support was also provided by each participating correctional agency and the New South Wales Bureau of Crime Statistics and Research.

Acronyms and abbreviations

ABS	Australian Bureau of Statistics
ANZSOC	Australia and New Zealand Standard Offence Classification
BOCSAR	Bureau of Crime Statistics and Research
DCS	Department for Correctional Services
LSI-R	Level of Service Inventory—Revised
RNR	risk-need-responsivity
VRS	Violence Risk Scale
VRS-SV	Violence Risk Scale Screener Version

Abstract

The Violence Risk Scale (VRS) is a risk assessment tool designed to assess and predict risk of future offending, inform decisions around therapeutic intervention and measure changes in violence risk as a result of treatment. While the tool has been used extensively both internationally and in Australia, its applicability to our Australian population is unclear.

This study investigated the discriminative and predictive validity of the VRS for Australian Aboriginal and non-Indigenous males convicted of violent offending in multiple jurisdictions. The VRS total score had moderate discriminative accuracy for violent reoffending at five-year follow-up. However, Aboriginal males were significantly more likely to be categorised as high risk, and additional discrimination measures revealed variation in performance between Aboriginal and non-Indigenous males. Implications of the findings for correctional practice and recommendations to reduce bias in the assessment of Aboriginal offenders are discussed.

Executive summary

The over-representation of Aboriginal and Torres Strait Islander Australians in the criminal justice system as a result of colonisation remains a critical issue despite the introduction of various strategies to address the problem. Individuals who are sentenced to correctional supervision are subject to risk assessment tools that form the basis for decision-making around how they progress through the system. For those convicted of offences involving violence, most jurisdictions in Australia use the Violence Risk Scale (VRS; Wong & Gordon 2003). This tool is based on the risk-need-responsivity model and is designed to assess and predict risk of future offending, inform decisions around therapeutic intervention and measure changes in violence risk as a result of treatment (Wong & Gordon 2006).

Concerns have been raised about the applicability of the VRS to diverse populations who may experience unique, culturally specific risk factors, including Aboriginal and Torres Strait Islander Australians (Shepherd 2016). Critics argue that the assumption that actuarial instruments such as the VRS are generalisable to all is ethnocentric and contributes to the misclassification of minority groups, resulting in further disadvantage (Mals et al. 2000; Martel, Brassard & Jaccoud 2011; Woldgabreal, Day & Tamatea 2020; Westerman & Dear 2023). This is supported by evidence that shows that not only is the accuracy of risk instruments less for Indigenous populations than for white Anglo populations, but Indigenous individuals regularly receive higher scores on these instruments than non-Indigenous offenders. Given these tools are used to inform decisions around sentencing pathways in corrections, including decisions around suitability for community-based supervision, conditional release and prison security ratings, this can further disadvantage First Nations people.

Given the concerns raised as to the generalisability of the VRS to the Australian population, the aim of the current project was to assess its discriminative and predictive validity for Australian males, particularly Aboriginal and Torres Strait Islander individuals. A further focus was to examine the risk and need profile of the cohort according to the static and dynamic items measured by the tool. The study draws on a large sample of VRS assessments administered to males sentenced to a term of imprisonment for a violent offence.

Method

Correctional agencies in five jurisdictions, including New South Wales, Victoria, Western Australia, South Australia and Tasmania, contributed retrospective VRS item data. The dataset was comprised of 2,877 adult males (of which 28.4% were Aboriginal) who were administered a VRS assessment pre-treatment between 2010 and 2022. The sample predominantly comprised data from New South Wales (25.0%), Victoria (34.8%) and South Australia (34.4%). Participants were aged between 18 and 82 years at the time of assessment, with the average age similar across jurisdictions (*M*=33 years, *SD*=9.0). Post-treatment VRS ratings were also available for 941 individuals in the sample, including 289 Aboriginal males (30.7%).

Data on the reoffending outcomes of those assessed were supplied by correctional agencies and the New South Wales Bureau of Crime Statistics and Research. Recidivism was defined as any conviction for a new offence following the index release from prison that resulted in a sanction administered by correctional services. The type of any reoffending was coded as either violent or non-violent, with recidivism rates examined over equal follow-up periods of two and five years. Individuals with insufficient follow-up time were excluded from the recidivism analyses, leaving a total of 2,125 males in the two-year sample and 938 in the five-year sample.

Information on participation in a violence-specific rehabilitation program was used to evaluate changes in dynamic risk following treatment. Each dynamic item identified as a treatment target was rated pre- and post-treatment to assess the stage of change achieved (ie precontemplation, contemplation, preparation, action or maintenance) and produce a total dynamic change score. The treatment efficacy of the various treatment programs delivered in each jurisdiction was not explored as part of this study.

Results

Key finding 1: The VRS showed a moderate level of discriminative accuracy for future violent offending

One-quarter (25.0%) of the sample were convicted of a violent offence within a two-year follow-up period, with this figure rising to 42.0 percent over a five-year follow-up period. Aboriginal males recorded consistently higher rates of violent and non-violent recidivism in each follow-up period than their non-Indigenous counterparts.

Receiver operating characteristic analyses were used to generate the area under the curve (AUC) statistic. The AUC values for the dynamic, static and total VRS scores were in the low to moderate range for discriminative accuracy for future violent reoffending in the two-year and five-year follow-up periods (range of 0.59 to 0.70 across the subscales and VRS total score). Static scores showed the highest discrimination for violent reoffending for Aboriginal males, with an AUC of 0.66 (95% CI=[0.62, 0.71]) at the two-year mark and 0.70 (95% CI=[0.63, 0.76]) in the five-year follow-up period. This finding did not extend to non-Indigenous males, with similar AUCs in both follow-up periods (0.62 and 0.59 respectively).

Additional discrimination measures revealed variation in performance by Aboriginality. In relation to violent recidivism, when applying the threshold that meets the classification for high risk on the VRS, sensitivity (the proportion of recidivists who were at or above this threshold) was 79.8 percent for Aboriginal males and specificity (the proportion of non-recidivists who were below the cut-off) was 35.7 percent. For non-Indigenous males, sensitivity (55.1%) was lower than specificity (61.7%) for violent recidivism. For both cohorts, the VRS was less accurate in predicting the proportion of males in the high risk category who did record a violent reoffence (PPV=42.9% Aboriginal; 26.8% non-Indigenous) than the proportion of males below this threshold who did not (NPP=74.6% Aboriginal; 84.4% non-Indigenous). Among the entire sample, calibration (based on the expected/observed index) varied across risk level, with a tendency to underestimate violent recidivism rates in the lower risk levels compared with the VRS normative sample and to overestimate risk for those at the highest risk level.

Discrimination metrics also varied by jurisdiction, possibly due to differences in the criteria for a violence risk assessment and the characteristics of each sample. In New South Wales and South Australia, the total VRS scores were in the low range for discriminative accuracy for two-year violent reoffending (AUC range of 0.59 to 0.64) and specificity was particularly low for Aboriginal males (22.4% in New South Wales and 34.9% in South Australia). In Victoria, the total VRS score did not discriminate between Aboriginal violent recidivists and non-recidivists and had low discriminative accuracy for non-Indigenous males (AUC of 0.64).

Key finding 2: Aboriginal males recorded higher static, dynamic and total VRS scores than non-Indigenous males

Of the 2,689 males with a full VRS assessment, around half (52.5%) recorded a VRS pre-treatment score that fell into the high risk category (a score of greater than 50). A higher proportion of Aboriginal males were identified as high risk on the VRS (71.8%) compared with non-Indigenous males (44.7%). This difference was reflected in their higher average total VRS score of 55.7 (*SD*=9.4) compared with 48.6 (*SD*=10.7). The finding of elevated risk for Aboriginal males was generally consistent across jurisdictions; however, there was variation between the states in the proportion that fell into the high risk category, likely due to state differences in assessment pathways and eligibility criteria.

The higher VRS pre-treatment risk score among Aboriginal males was in part due to higher static scores (*M*=14.1, *SD*=3.0) compared with non-Indigenous males (*M*=11.7, *SD*=3.6). Most notably, Aboriginal males recorded a higher average risk score for the static item 'age at first conviction' (*M*=2.06), indicating that they were younger at the time of their first conviction than non-Indigenous males (*M*=1.54). A higher average score was also recorded in relation to 'number of youth convictions' (*M*=2.27) compared with non-Indigenous males (*M*=1.48). The higher VRS pre-treatment risk score was also due to Aboriginal males recording higher dynamic scores (*M*=41.2, *SD*=7.6) compared with their non-Indigenous counterparts (*M*=36.6, *SD*=8.5).

Key finding 3: Aboriginal males recorded a higher level of treatment need than non-Indigenous males

While the treatment need profile was quite similar overall, there were several areas in which Aboriginal males recorded significantly higher rates of treatment need on the VRS. These included:

- work ethic—a treatment need for two-thirds (65.6%) of Aboriginal males compared with half (48.9%) of non-Indigenous males;
- community support—a treatment need for 74.2 percent of Aboriginal males compared with 60.0 percent of non-Indigenous males;
- criminal peers—a treatment need for 83.2 percent of Aboriginal males compared with 69.4 percent of non-Indigenous males; and
- released to high risk situations—a treatment need for 80.5 percent of Aboriginal males compared with 66.8 percent of non-Indigenous males.

For non-Aboriginal males, the greatest area of treatment need related to 'emotional control' and 'substance abuse' (86.5% each).

Nearly two-thirds of Aboriginal men in the sample (63.2%) were identified on the VRS as having 15 or more treatment targets, with the proportion highest in South Australia (71.9%) and lowest in Victoria (41.2%). Among non-Indigenous males, less than half recorded 15 or more treatment targets (42.1%).

Key finding 4: The relationship of VRS static items with violent recidivism varied between Aboriginal and non-Indigenous males

Significant correlations were observed between three static items on the VRS and violent recidivism in the two-year follow-up for Aboriginal males. Current age and age at first conviction provided the highest coefficients with violent recidivism (r=0.22 and r=0.19 respectively; p<0.01) and strengthened at five-year follow-up (r=0.24 and r=0.30 respectively; p<0.01). Violence throughout lifespan showed a significant relationship with five-year violent recidivism for Aboriginal males (r=0.23, p<0.01) but was outside the threshold for significance at two-year follow-up.

Among non-Indigenous males, age at first conviction was also significantly correlated with two-year violent recidivism (r=0.14, p<0.01) but this did not extend to the five-year follow-up period. Prior release failures/escapes was found to be significantly related to two-year (r=0.11, p<0.01) and five-year violent recidivism (r=0.14, p<0.01).

Key finding 5: Treatment was associated with a reduction in VRS post-treatment scores but the dynamic change score had poor discriminative accuracy for future violent reoffending

In line with the expectation that treatment should reduce the risk of violence and therefore VRS risk levels, dynamic and total VRS scores were significantly lower than pre-treatment scores for both groups. Of the 941 males that received a VRS assessment post-treatment, the average change score following treatment was 4.5 (*SD*=3.0), with Aboriginal offenders recording a higher change score than non-Indigenous offenders (*M*=5.2 compared with *M*=4.2).

After controlling for baseline risk, a weak negative correlation emerged between the residual change score and two-year violent recidivism ($r = -0.09$, $p<0.05$). Moreover, when cultural group was considered, this relationship was only significant for Aboriginal males ($r = -0.17$, $p<0.05$). The AUC statistic revealed the residual change score to have poor discriminative accuracy for future violent reoffending in the overall sample and for non-Indigenous males. These findings may be impacted by the variation in the nature and intensity of the programs delivered in each jurisdiction and potential differences in their treatment efficacy.

Discussion

The results of this study found that the VRS was correlated with violent recidivism and had a moderate level of discriminative accuracy for Aboriginal and Torres Strait Islander men and their non-Indigenous counterparts. The findings were relatively similar to those reported in the international literature and studies of other risk assessment tools in Australia. Despite the tool having equivalent discriminative validity, Aboriginal and Torres Strait Islander men scored more highly on the VRS, with most of the sample being placed in the high risk band and having a greater volume of treatment need than non-Indigenous males. The tool also had low specificity for Aboriginal males, in that it was less accurate at identifying individuals who did not reoffend as being at lower risk than for non-Indigenous males. This limitation, along with the much greater volume of Aboriginal men recording very high risk scores, can result in detrimental correctional practices, including more stringent security placements, higher treatment intensity, lower likelihood of parole, and even consideration for further supervision orders.

In the interim, there is a need to develop culturally relevant semi-structured interview schedules to help practitioners mitigate the risk of differential scoring, along with training to build cultural competence and reduce bias in the assessment of Aboriginal and Torres Strait Islander offenders. Further research is also needed to establish the construct validity of the tool for these populations. The long-term research agenda, however, should be the co-design of a culturally validated risk assessment scale that can take into account structural inequalities and disadvantages facing Aboriginal and Torres Strait Islander prisoners. Ultimately, correctional agencies in Australia have an inherent responsibility to invest in these areas and to encourage ongoing research that will contribute to closing the gap and delivering better life outcomes for Aboriginal and Torres Strait Islander peoples.

Introduction

Aboriginal and Torres Strait Islander people continue to experience significant marginalisation because of the ongoing colonisation of Australia, and disproportionately negative life outcomes relative to other groups of Australians in areas such as education, health, justice and employment. For example, recent data from the Productivity Commission (2022) on the progress of Target 10 under the National Agreement on Closing the Gap revealed that from 2019 to 2021 the over-representation of Indigenous adults in the criminal justice system worsened. Figures from the Australian Bureau of Statistics (ABS) showed that First Nations people represented 3.8 percent of the overall Australian population yet comprised 31.8 percent of adults in custody (ABS 2022, 2021). Moreover, 77.7 percent of Indigenous people in custody had experienced prior adult imprisonment.

One of the key findings of the Royal Commission into Aboriginal Deaths in Custody was that:

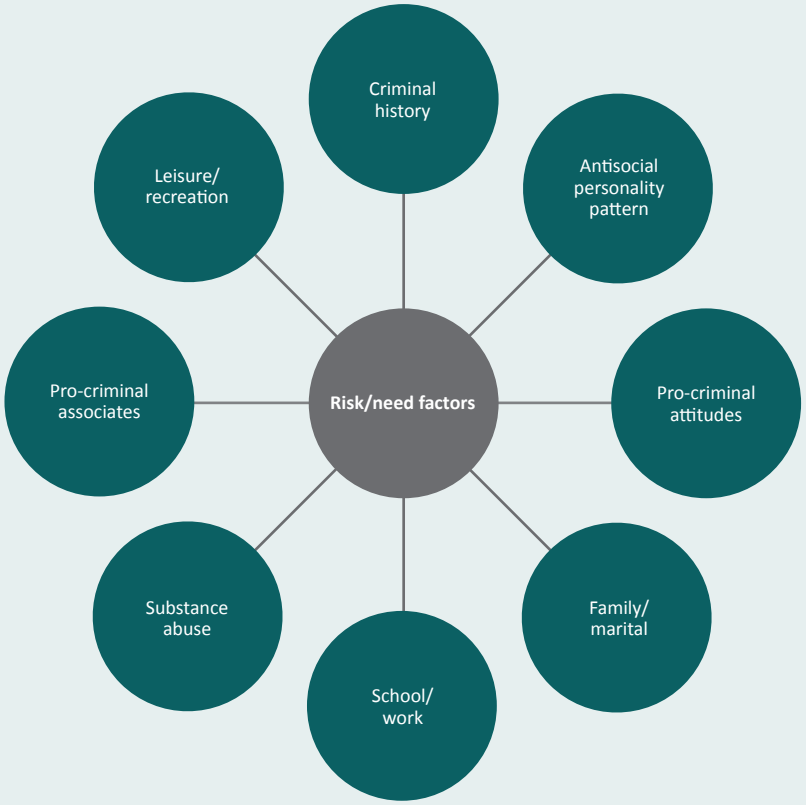
> The more fundamental causes of over-representation of Aboriginal people in custody are not to be found in the criminal justice system but those factors which bring Aboriginal people into conflict with the criminal justice system in the first place … [and] the most significant contributing factor is the disadvantaged and unequal position in which Aboriginal people find themselves in society—socially, economically and culturally. (Johnston 1991a: 1.7.1)

This disadvantage is further exacerbated during interactions with the criminal justice system, which is underpinned by institutionalised and systemic racism (Johnston 1991b). One area in which bias can manifest is in the application of risk assessment theories and models to Aboriginal people. One of the most widely accepted frameworks for the assessment and treatment of individuals sentenced to correctional supervision is the risk-need-responsivity (RNR) model. First disseminated in the 1990s by Andrews, Bonta and Hoge (1990), it proposes three general principles for effective offender rehabilitation:

- the risk principle—match level of program intensity to offender risk level;
- the need principle—target needs that are functionally related to criminal behaviour; and
- the responsivity principle—create an environment in which change is promoted.

Addressing factors that have been demonstrated to be associated with offending behaviour is the primary goal of RNR-based management and treatments. These criminogenic factors have been subsumed under major categories of predictors of offending. Referred to as the 'central eight' risk factors (see Figure 1), these predictors underlie the items used in instruments for measuring static and dynamic risk of recidivism (Bonta & Andrews 2010). Static factors are those that do not generally change over time. They provide a baseline risk estimate. Dynamic risk factors are those that do change with time. They are used to identify treatment targets.

Figure 1: Central eight risk factors of the risk-need-responsivity model



Designed to support the ability of treatment providers to place individuals in treatment of the correct intensity and to offer treatment that addresses relevant criminogenic needs, risk assessment tools form the cornerstone of decision-making in contemporary correctional practice. For individuals convicted of offences involving violence, most jurisdictions in Australia use the Violence Risk Scale (VRS; Wong & Gordon 2003). This tool is based on the RNR model and is designed to assess and predict risk of future offending, inform decisions around therapeutic intervention and measure changes in violence risk as a result of treatment (Wong & Gordon 2006).

However, as most instruments for estimating risk of reoffending are based on RNR principles and have been derived from samples largely comprising Caucasian participants, their use with diverse populations who may experience unique, culturally specific risk factors raises concern (Shepherd et al. 2014). Critics argue that the assumption that actuarial instruments are generalisable to all is ethnocentric and contributes to the misclassification of minority groups, resulting in further disadvantage (Mals et al. 2000; Martel, Brassard & Jaccoud 2011; Schmidt, Heffernan & Ward 2019; Westerman & Dear 2023; Woldgabreal, Day & Tamatea 2020). Indeed, some researchers contend that many of the central eight risk markers in the RNR model fail to consider the significant impact of colonisation and intergenerational trauma that influences Indigenous offending trajectories (Allan & Dawson 2004; Jones et al. 2002; Shepherd & Lewis-Fernandez 2016).

These concerns were recently highlighted when the Federal Court in Canada held that the Correctional Service of Canada (CSC) breached its statutory duty to Jeffrey Ewert, a prisoner of Métis heritage, in assessing his risk of recidivism using actuarial risk assessment tools that had not been proven to be accurate when applied to Indigenous offenders (*Ewert v Canada* 2018). While this decision was later overturned on appeal, the Supreme Court wrote:

> “Thus, the clear danger posed by the CSC’s continued use of assessment tools that may overestimate the risk posed by Indigenous inmates is that it could unjustifiably contribute to disparities in correctional outcomes in areas in which Indigenous offenders are already disadvantaged. (*Ewert v Canada* 2018 SCC 30 [2018] 2 SCR 198 [65])

Given that the samples with which risk instruments have been constructed have typically consisted of predominantly white Anglo individuals, the content of the instruments is largely based on the norms, characteristics and behavioural expectations of Western culture (Shepherd 2018; Shepherd & Lewis-Fernandez 2016). Where instruments require a degree of subjectivity by the assessors (albeit guided)—as happens to a varying degree in assessments of dynamic risk—there is room for unintentional biases in interpretations, which could further undermine the accuracy of the instrument. Because risk assessment has implications for an individual’s liberty and for community safety, it is important that clinicians are aware of the limitations of assessment.

Woldgabreal, Day and Tamatea (2020), in their paper on the role of risk assessment in the enduring 'color line', argued that the theoretical underpinnings of contemporary risk assessments have an individualistic lens and largely ignore the broader historical and structural drivers of crime. They asserted that this further exacerbates the over-representation of people of colour in the criminal justice system given these tools are based on criminological theories that emphasise personal responsibility and fail to consider any inherent cultural bias. These tools are used to inform decisions around sentencing pathways in corrections (eg decisions around suitability for community-based supervision, prison security ratings, and suitability for conditional release), which can further disadvantage First Nations people (Woldgabreal, Day & Tamatea 2020). Areas of concern they identified included misclassification, over-assessment, placement in the wrong rehabilitation pathways, and longer than necessary imprisonment and/or supervision.

Related to this is the dilemma that in applying a uniform, objective risk instrument to all offending populations (under the assumption that risk markers do not vary as a function of ethnicity), the inherent biases within the tools may serve to inflate an Indigenous person's risk status (Martel, Brassard & Jaccoud 2011). That is, in the process of applying a neutral risk assessment to Aboriginal and Torres Strait Islander offenders, under contemporary risk assessment theories' assertions that risk markers are the same across populations, these tools can result in the classification of Aboriginal and Torres Strait Islander people in the high risk, high need category more often than non-Indigenous populations (Martel, Brassard & Jaccoud 2011). Evidence shows that not only is the accuracy of risk instruments lower for Indigenous populations than for white Anglo populations, but that Indigenous individuals regularly receive higher scores on these instruments than non-Indigenous offenders (Shepherd 2018).

For example, in relation to presence of a criminal history (a common item in risk assessment tools), statistics show that Aboriginal and Torres Strait Islander juveniles and young adults have much higher rates of contact with police in comparison with their non-Indigenous counterparts. In 2014–15, over 40 percent of all Indigenous men in Australia reported having been formally charged with an offence by police before the age of 25 (ABS 2016). This results in Aboriginal and Torres Strait Islander people being more likely to receive a higher score on that item.

Cultural disparities are also evident in relation to education levels, with Indigenous young people recording nearly half the rate of post-school participation in education and training compared with non-Indigenous young people (35.9% compared with 68.5%; Steering Committee for the Review of Government Service Provision 2020). Research has also found that failure to complete Year 12 was significantly related to increased contact with police and imprisonment for Indigenous people (Weatherburn, Snowball & Hunter 2006). Poorer educational outcomes are, in turn, likely to hamper the ability to achieve and maintain meaningful employment. This is demonstrated by the lower employment rate of Aboriginal and Torres Strait Islander people compared with non-Indigenous people (Steering Committee for the Review of Government Service Provision 2020). These inequities impact both education and employment risk markers.

There is some support for the argument of inflated risk, with a review of the Australian literature on risk assessments revealing the presence of higher baseline scores for Indigenous participants compared with non-Indigenous participants on tools such as the Level of Service Inventory-Revised (LSI-R; Shepherd et al. 2014). For example, Aboriginal offenders in New South Wales scored consistently higher on every subscale of the LSI-R than non-Indigenous offenders and recorded significantly greater criminogenic needs related to education and employment, family discord, constructive leisure time and antisocial peers (Hsu, Caputi & Byrne 2010). A later study on the same population found similar results, with Aboriginal offenders recording higher scores on all subscales of the LSI-R excluding the emotional/personal scale (Watkins 2011). Despite these differences, the tool was found to have similar predictive abilities for both groups.

In relation to violence risk assessment more specifically, a recent study using South Australian correctional data from 366 VRS assessments showed Aboriginal males scored significantly higher than non-Indigenous males at pre-treatment and post-treatment (Woldgabreal et al. 2022). In addition, the study noted a significantly elevated score for incarcerated Aboriginal men on most of the VRS risk domains. This was consistent with the findings from a prison sample in Western Australia involving LSI-R and VRS Screener Version (VRS-SV) assessments (Gower, Morgan & Saunders 2022). Aboriginal offenders (male and female) who committed violent offences were predominantly identified as high risk on the VRS-SV and, on average, scored higher than their counterparts on all components of the screening tool. The authors highlighted parallels with other Australian research (Shepherd et al. 2014) in relation to Aboriginal offenders having significantly higher scores in the areas of substance abuse and education and employment—factors that have been identified as symptoms of colonisation and intergenerational trauma.

These Australian studies are generally consistent with the international literature (Olver et al. 2024) in pointing to cultural disparities in overall risk levels and markers of treatment need. What is not yet clear from current research is whether, and to what extent, these differences impact the ability of the VRS to predict future violence among Australia's First Nations peoples. As pointed out by Shepherd et al. (2014), given the history of colonisation, genocide, dispossession and racism, and the over-representation of Aboriginal people in Australia's criminal justice system for violence-related offences, it is important that such instruments are validated as culturally appropriate for use with Aboriginal individuals who have committed violent offences. A failure to do so perpetuates inequity.

Overview of current project

Given that questions remain as to the generalisability of the VRS to the Australian population, with its unique, culturally specific risk factors, the aim of the current project was to assess the predictive validity of the VRS for Australian violent males, and in particular Aboriginal individuals.

The project aimed to answer the following key questions:

- Do VRS scores differ between Aboriginal and non-Indigenous males?
- What proportion of individuals have an identified treatment target on each dynamic item and are there differences in identified treatment needs between Aboriginal and non-Indigenous males?
- How well does the VRS predict recidivism in an Australian cohort and does the tool have the same discriminative performance for Aboriginal and non-Indigenous males?
- What is the relationship between static items and recidivism for Aboriginal and non-Indigenous males?
- Are there differences in treatment change scores on the VRS for Aboriginal and non-Indigenous males who have engaged in a violence-specific rehabilitation program, and what are the rates of reoffending for this sub-cohort?

Method

Sampling and data collection

Correctional agencies in five jurisdictions—New South Wales, Victoria, Western Australia, South Australia and Tasmania—contributed retrospective VRS item data, including a small number of VRS-SV assessments (*n*=188, 6.5% of the sample). All VRS assessments were rated by tertiary-qualified staff from the respective correctional agencies based on an interview and review of institutional records. The dataset comprised males imprisoned for a violent offence who were assessed for violence risk using the VRS tool.

The ability of each state to provide unit record data varied. Most jurisdictions only had VRS-SVs or a VRS-SV total score (or risk band) available in their administrative databases. In addition, there were differences in the time period in which states commenced using the VRS and the criteria for administration of the tool (see Table A1 in the *Appendix* for further detail). Full item-level data collection required manual data coding of paper-based files. For this reason, priority was given to providing complete data for a stratified sample of violent male prisoners. South Australia collected all available assessments administered to June 2020; Victoria selected a random sample of 1,000 records from a list of sentenced male prisoners with a full VRS who had been released from custody by December 2019; and New South Wales supplied all available records of male prisoners administered the VRS to October 2020.

Ethics

The study was approved by the Western Australian Aboriginal Health Ethics Committee and the Victorian Department of Justice and Community Safety Human Research Ethics Committee. Approval was also received from the relevant research/ethics committees in each participating correctional agency.

Description of the VRS

The VRS consists of six static and 20 dynamic predictors. The static variables are current age, age of first violent conviction, number of juvenile convictions, violence throughout lifespan, prior release failures/escapes, and stability of family upbringing. These should predict reoffending but are largely historical and cannot be influenced by interventions. The dynamic variables include violent lifestyle, criminal personality, criminal attitude, work ethic, criminal peers, interpersonal aggression, emotional regulation/control, violence during institutionalization, weapon use, insight into violence, mental illness, substance abuse, stability of relationships, community support, released to high risk situations, violence cycle, impulsivity, cognitive distortion, compliance with supervision and security level of release institution. These dynamic variables are considered changeable as a result of factors such as treatment intervention, and any shifts in these domains are linked to changes in violence risk.

All 26 variables are rated on a four-point scale (from 0 to 3) based on case file review and a semi-structured interview, with higher scores on each variable indicating greater links to violence in everyday functioning. The total VRS score provides an assessment of the level of violence risk, with higher scores indicating greater risk and greater priority for intervention. The VRS is also used to inform decision-makers and service providers regarding the offender's treatment targets (dynamic risk items rated 2 or 3) and motivation to change, and to assess changes in risk following treatment.

Key definitions

Aboriginal persons

In Western Australia, South Australia and Tasmania, Aboriginal and Torres Strait Islander identity is determined based on an individual's self-report to corrections at admission to prison; in some cases, it may also be determined based on information reported previously in official documentation (eg court documents). In New South Wales, the information is gathered through documentation completed as part of the court process and entered into the NSW Offender Integrated Management System by sentence administration staff. The NSW Bureau of Crime Statistics and Research (BOCSAR) also supplied data on Aboriginal and Torres Strait Islander persons as recorded by the NSW Police Force for any contact ('Aboriginality ever recorded'). In the present study, where Aboriginality was unknown in the NSW Corrections dataset, this information was populated based on information in the BOCSAR dataset (one remaining case with an unknown Aboriginal and/or Torres Strait Islander status was recoded as non-Indigenous).

In Victoria, identification of Aboriginal and Torres Strait Islander persons is part of a prisoner's 'Physical description' dataset, which is shared between Corrections Victoria and Victoria Police. When a person enters custody, the physical description will entirely reflect Victoria Police data, but prison staff can update the information based on self-report if required. Only one individual in the Victorian sample had an unknown Aboriginal and Torres Strait Islander status and was recoded as non-Indigenous.

Recidivism

Recidivism was defined as any conviction for a new offence following the index release from prison that resulted in a sanction administered by correctional services (eg sentenced imprisonment, supervised probation). It therefore excluded any convictions that did not result in contact with corrections, such as a fine, loss of licence, or unsupervised bond. Pseudo-convictions (ie convictions relating to historical behaviour which pre-dated the index imprisonment) were excluded, and any instances of re-contact with correctional services solely due to a breach or cancellation of parole were not coded as recidivism.

Due to jurisdictional differences in legislation, data collection systems, counting rules and definitions of violence, offences were categorised based on the ABS (2011) national offence classification system (Australia and New Zealand Standard Offence Classification (ANZSOC)). The type of any reoffending was coded as either violent or non-violent (general) offending. The criteria for a violent offence included convictions such as homicide, assault, sexual assault, dangerous or negligent acts endangering persons, other acts intended to cause injury (eg threats to endanger life, stalking), robbery and affray (see Table A2 in the *Appendix* for detail). The National Offence Index (ABS 2018) was used to provide a ranking of the seriousness of the offence categories in the ANZSOC to determine a principal (most serious) offence.

Recidivism rates were examined over follow-up periods of two and five years. The follow-up period for each individual was calculated based on 'free time' in the community (ie not incarcerated due to reoffending and therefore available to offend). Any reoffending that occurred after the respective cut-off period was excluded to allow an equal follow-up time for each person. Individuals with only VRS-SV data were excluded from the recidivism analyses (n=188) and reoffence data was not available for Tasmania (n=74). A further 242 cases (8.4%) were excluded from the recidivism analyses due to having no time available to reoffend (ie incarcerated for the entire follow-up period), being deported or transferred interstate on index release, or death. An additional 248 cases were excluded due to their free time in the community not reaching the minimum two-year threshold (8.6%). This left a total of 2,125 males in the two-year recidivism sample and 938 in the five-year recidivism sample.

Therapeutic change

The VRS was designed to evaluate changes in dynamic risk as a result of treatment. Each dynamic item identified as a treatment target (ie with a rating of 2 or 3 at baseline) was rated pre- and post-treatment to assess the stage of change achieved (ie precontemplation, contemplation, preparation, action or maintenance). Movement from one stage to the next will result in the post-treatment score increasing or decreasing by 0.5, depending on the direction of the change. For example, an individual with a pre-treatment rating of 3 on an item that progressed through two stages will have a 1-point reduction, resulting in a post-treatment rating of 2 for that item. The total change score is the sum of the change scores for all relevant dynamic items.

Data analyses

SPSS version 28.0 was used to undertake all analyses. Measures of skewness and kurtosis for subscale and total VRS scores across time points and cohorts were within −1 and +1, indicating the data were normally distributed. The study's research questions and how the data analyses addressed these are set out below.

Research Question 1: Do VRS scores differ between Aboriginal and non-Indigenous males?

Descriptive statistics were used to highlight the risk level of the sample based on their total VRS scores along with scores on the static and dynamic subscales of the tool. These were then compared for both groups and by jurisdiction to see whether there were any differences in the risk profiles based on the composition of Aboriginal males in each state. A chi-square test was carried out to identify significant differences in risk level by group and independent samples *t*-tests were used to determine whether there were differences in subscale scores between Aboriginal and non-Indigenous males.

Research Question 2: What proportion of individuals have an identified treatment target and are there differences in need between Aboriginal and non-Indigenous males?

Descriptive statistics were calculated for those in the sample with a score of 2 or 3 on a dynamic item (the threshold for a treatment target). These analyses were broken down by group and jurisdiction and a chi-square test was performed to identify significant differences in level of treatment need between Aboriginal and non-Indigenous males.

Research Question 3: How well does the VRS predict recidivism in an Australian cohort?

Discrimination (relative predictive accuracy) and calibration (absolute predictive accuracy) statistics were used to address this research question. To assess discrimination, receiver operating characteristic (ROC) analyses were used to generate the area under the curve (AUC), with a value ranging from 0 to 1 representing the probability that a randomly selected recidivist will have a higher score than a randomly selected non-recidivist. A score of 0.5 is chance level and would indicate the test does not discriminate between recidivists and non-recidivists. As a general rule, AUC values of 0.56 to less than 0.64 are interpreted as low, 0.64 to less than 0.71 as medium, and 0.71 or greater as high (Rice & Harris 2005). Cohen's *d* was computed to provide a further estimate of the effect size difference between recidivists and non-recidivists on their VRS score. Cohen's *d* is a common way to measure an effect size and is used to indicate the standardised difference between two means. The analysis followed Cohen's (1988) guideline, in which a *d* value of 0.20 was considered small, 0.50 was considered medium and 0.80 was large. Cohen's *d* was also computed for recidivists and non-recidivists by Aboriginality.

Additional measures of discrimination accuracy were examined, comparing the ability of the high versus low-moderate risk dichotomy to discriminate between recidivists and non-recidivists (for more information on predictive validity performance indicators, see Singh 2013). Although risk is best understood on a continuum, in reality individuals in Australian jurisdictions in the high risk group receive the most resources (longer, high-intensity programs), more stringent management, and greater scrutiny in relation to considerations for parole or further supervision orders. For this analysis, a comparison of recidivism rates for the sub-cohort classified as high risk and those not classified as high risk was made. Individuals classified as high risk who reoffended with a violent offence were considered 'true positives', while the proportion not classified as high risk (ie low or moderate risk) who did not reoffend with a violent offence were considered 'true negatives'. This type of analysis is based on the (false) assumption that all 'high risk' individuals will reoffend while none of the 'lower risk' individuals will; it is therefore not expected that 100 percent classification accuracy will be achieved. However, the statistics present a useful way to compare the discriminative accuracy of the VRS 'high risk' band for different cohorts and reoffending types.

The measures (see Table 1) included:

- classification accuracy—the total proportion of 'correct' risk ratings;
- sensitivity—the proportion of violent recidivists identified as high risk;
- specificity—the proportion of non-recidivists identified as low or moderate risk;
- positive predictive value (PPV)—the proportion of those classified as high risk who did record a violent offence; and
- negative predictive value (NPV)—the proportion of those classified as lower risk who did not reoffend.

There are no agreed standards on what constitutes acceptable levels of these metrics in forensic settings, and they often involve a trade-off between false negatives and false positives (Douglas et al. 2017). A measure with a low rate of false negatives (due to high sensitivity) will be most effective in identifying recidivists (ie knowing who to treat or detain). A measure with a low rate of false positives (due to high specificity) will be most effective in identifying individuals who do not reoffend (ie knowing who to screen out).

Table 1: Measures of predictive validity

		Repeat violent offence?		
		Yes	No	
Classified as high risk?	Yes	True positive (tp)	False positive (fp)	Positive predictive value tp/(tp+fp)
	No	False negative (fn)	True negative (tn)	Negative predictive value tn/(fn+tn)
		Sensitivity tp/(tp+fn)	Specificity tn/(fp+tn)	Classification accuracy (tp+tn)/n

To assess calibration, the expected/observed (E/O) index was calculated (Gail & Pfeiffer 2005). This index represents the ratio of the expected number of violent recidivists (based on official recidivism estimates of the VRS) divided by the observed number of violent recidivists in the present study. An E/O index of 1 would indicate that the scale has perfect calibration (ie the total number of recidivists matches the number of expected recidivists); a ratio below 1 would indicate that the number of expected recidivists was less than the number observed; and a ratio above 1 would indicate that the number of expected recidivists exceeded the number observed.

Research Question 4: What is the relationship between static items and recidivism?

Correlations were used to examine violent and non-violent reoffending rates on each static item. Analyses were broken down by group to identify any differences between Aboriginal and non-Indigenous males.

Research Question 5: Are there differences in treatment change scores for people who have engaged in treatment, and what are the rates of reoffending for this sub-cohort?

Descriptive statistics were used to examine residual treatment change scores (ie change scores after baseline risk is controlled for using linear regression) among individuals who engaged in a violence treatment program. Independent samples *t*-tests were also used to determine whether there were significant reductions in post-treatment dynamic and total VRS scores, with analyses broken down by Aboriginality.

For the reoffending component, chi-square analyses were used to identify significant differences in the rate of general and violent reoffending for Aboriginal and non-Indigenous males. Point biserial correlations were also calculated to examine the relationship between residual treatment change scores and recidivism. Analyses were broken down by Aboriginality to examine whether there were differences in the strength of the relationship between treatment change scores and recidivism. The AUC statistic was also generated to examine the discriminative accuracy of the change score.

Sample

The combined sample consisted of 2,877 adult males incarcerated for a violent offence who were administered a VRS assessment pre-treatment between 2010 and 2022. A total of 26 individuals (0.9% of the sample) had been released to community supervision at the time of their VRS assessment. Table 2 shows that the sample predominantly comprised data from New South Wales (25.0%), Victoria (34.8%) and South Australia (34.4%). Participants were aged between 18 and 82 years at the time of assessment, with the average age similar across jurisdictions (*M*=33 years, *SD*=9.0). On average, participants in the Tasmanian sample were slightly older (*M*=35 years, *SD*=10.4) and those in Western Australia were younger (*M*=31 years, *SD*=8.0).

There was considerable variation in the proportion of Aboriginal males in the data from each jurisdiction, with the highest proportion observed in New South Wales (48.0% of the sample) and the lowest in Victoria (13.1%). This may be related to differences in the size of the Aboriginal population in each state and also jurisdictional differences in assessment pathways and eligibility criteria for a violence risk assessment. For example, the Victorian sample was almost entirely based on eligibility criteria that existed up to July 2019, which included individuals with violent offences who had a sentence length of more than three months. In contrast, in South Australia and New South Wales there tended to be a bias towards administering the VRS to individuals convicted of a violent offence who were viewed as more serious offenders, based on legislation, sentence length, and consideration for extended supervision or continuing detention orders (where Aboriginal males are disproportionately represented). Due to Aboriginal males also scoring higher on general risk assessments or screening tools than non-Aboriginal males, they are more likely to be triaged for further assessment and treatment.

Fifteen individuals in the overall sample (0.5%) identified as Torres Strait Islander or both Aboriginal and Torres Strait Islander. The combined VRS sample consisted of 817 Aboriginal and Torres Strait Islander males (28.4%), which was representative of the general prison population in Australia (30.3% Aboriginal; ABS 2021). There was minimal difference in the average age of Aboriginal and non-Indigenous participants (32 years and 33 years respectively).

Excluding those with an unknown country of birth (9.3%), most individuals in the sample were born in Australia (87.7%), 2.9 percent were born in New Zealand and 2.0 percent were of European or African descent respectively. Three jurisdictions also provided data on the postcode or region resided in prior to the index imprisonment. For New South Wales, BOCSAR supplied a remoteness code for each proven court appearance prior to the index imprisonment event. Where individuals had multiple prior proven court appearances, the most remote area was selected. Region data were mapped to the ABS Remoteness Areas (ABS 2023). Remoteness Areas divide Australia into five classes of remoteness which are characterised by a measure of relative geographic access to services.

Among Aboriginal Australians with location data available (95% of cases), 59.7 percent were classified as residing in a major city prior to imprisonment, 19.4 percent were classified as inner regional and 11.3 percent as outer regional (6.7% were classified as regional 'not further defined'). Only 2.8 percent of Aboriginal men in the sample were classified as residing in a remote or very remote location prior to entry to custody.

Table 2: Characteristics of individuals administered a VRS				
	Total		Aboriginal	
	Number	Percent	Number	Percent
Jurisdiction of VRS administration				
New South Wales	719	25.0	345	48.0
Victoria	1,000	34.8	131	13.1
Western Australia	93	3.2	48	51.6
South Australia	991	34.4	278	28.1
Tasmania	74	2.6	15	20.3
Age at VRS administration				
18–24	535	18.6	187	35.0
25–34	1,208	42.0	343	28.4
35–44	802	27.9	199	24.8
45+	332	11.5	88	26.5
Australian citizen[a]	2,288	87.7	817	100.0
Residence prior to index custody[a]				
Major city	–	–	427	59.7
Regional	–	–	268	37.5
Remote	–	–	20	2.8

a: Figures exclude unknowns

Post-treatment VRS ratings were available for 941 individuals in the sample, including 289 Aboriginal males (30.7%). Table 3 shows that most individuals engaged in a treatment program to address prior violent behaviours (93%), with 79 percent of participants recorded as having completed the full treatment dosage (see Table A3 in the *Appendix* for violence treatment program information). Program hours for violence treatment programs ranged from 40 to 316 hours (average=223 hours). For a small proportion of the sample (3.7%), the most intensive program undertaken during the index episode was a family violence program (average of 87 treatment hours).

Table 3: Treatment program information for individuals with a post-treatment VRS (*n*=941)		
Program type	**Number**	**Percent**
Violence	878	93.3
Sexual	5	0.5
Family violence	35	3.7
General offender/drug and alcohol	16	1.7

Limitations

The dataset was limited to males who had served a period of imprisonment for a violent offence and had a minimum sentence length (and seriousness of offence) to meet the criteria for a full VRS assessment. This is likely to have contributed to skewing the dataset towards those in the higher risk brackets, as longer sentences can be indicative of more serious offences. However, this is not always the case, as an individual may receive a lengthy sentence of imprisonment for a homicide offence or a first time 'commit theft using force' offence, and often these higher-gravity, single offences can produce a low risk score on the VRS. Moreover, around one-third of the data came from Victoria at a time when its criteria for a VRS assessment only required a minimum sentence of more than three months (along with other criteria). The use of a custodial sample also meant that it was not possible to make comparisons with a community sample, which may have increased the range in the risk scores.

The sample was generated in a field setting, which can make it susceptible to errors. It was not possible to establish the inter-rater reliability of the sample, as data were collected from individual states under different conditions and criteria for administration, and for different purposes (eg assessment for treatment, further supervision orders). These are limitations; however, they also reflect the real-world application of the tool. Relatedly, there may also be errors in data input, storage and handling, along with issues related to the extraction of VRS, offence and treatment information from multiple states. While efforts were made to minimise inaccuracies through the development of a data collection protocol and agreed definitions of terms, the use of data from different agencies may have resulted in some inconsistencies.

A further limitation of the study was the exclusion of female violent offenders due to not all states administering the VRS to this cohort. It was therefore not possible to identify and compare the criminogenic risk profile and treatment needs of female Aboriginal and non-Indigenous offenders. The predictive validity of the tool and the central risk factors that contribute to recidivism for this cohort remain underexplored.

Lastly, the definition of recidivism used in the study is likely to have underestimated the prevalence of further violent and non-violent behaviour, as it was restricted to convictions that resulted in subsequent contact with corrective services. Therefore, any charges that were dismissed or did not result in a conviction were excluded, along with convictions that did not result in some form of correctional supervision. The use of de-identified data also meant that it was not possible to identify convictions that occurred in a different jurisdiction to the one an individual was initially released from.

Results

Violence Risk Scale score profile of Australian males

During the study period in which the VRS assessments were conducted, full VRS scores were assigned to one of three risk bands: low, moderate or high. Table 4 shows that of the 2,689 males with a full VRS assessment, around half (52.5%) recorded a VRS pre-treatment score that fell into the high risk category (a score of greater than 50). The average total VRS score was 50.6 (*SD*=10.8) with a median of 52.0. A chi-square test of independence was performed to examine the relationship between Aboriginal identity and VRS risk band. The relationship was significant, with a higher proportion of Aboriginal males identified as high risk on the VRS (71.8%) compared with non-Indigenous males (44.7%, $\chi^2(1, n=2,689)=173.9$, $p<0.01$). This difference was reflected in their higher average total VRS score of 55.7 (*SD*=9.4) compared with 48.6 (*SD*=10.7).

Table 4: Distribution of sample by VRS risk category and Aboriginality

	Aboriginal		Non-Indigenous		Total	
Risk band	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Low	20	2.6	221	11.5	241	9.0
Moderate	198	25.6	838	43.8	1,036	38.5
High**	556	71.8	856	44.7	1,412	52.5
Total	**774**	**100.0**	**1,915**	**100.0**	**2,689**	**100.0**

**statistically significant at $p<0.01$

Table 5 presents the proportion of individuals placed in the high risk category by state. It shows that the finding of elevated risk for Aboriginal males was generally consistent across jurisdictions. However, there was variation in the proportion that fell into the high risk category: 77.4 percent for South Australia and 79.7 percent for New South Wales, compared with 45.0 percent for Victoria. This is likely a result of jurisdictional differences in assessment pathways and eligibility criteria for a violence risk assessment.

Table 5: Proportion of sample in the VRS high risk band by jurisdiction and Aboriginality						
	Aboriginal		Non-Indigenous		Total	
	Number	Percent	Number	Percent	Number	Percent
New South Wales	275	79.7	210	56.1	485	67.5
Victoria	59	45.0	276	31.8	335	33.5
South Australia	182	77.4	310	54.6	492	61.3
Total—5 states**	**556**	**71.8**	**856**	**44.7**	**1,412**	**52.5**

**statistically significant at $p<0.01$

A recent change to the VRS (Olver et al. 2022) has increased the number of risk categories from three to five, along with a move away from the use of stigmatising language such as 'high risk' to describe these risk bands. Table 6 shows the distribution of the sample by Aboriginality based on the revised five-level risk scheme. As shown, non-Indigenous males most frequently fell into risk level III (41.5%) followed by level IV (32.5%), while Aboriginal males most commonly fell into risk level IV (37.9%) and level V (37.1%).

Table 6: Distribution of sample by five-level risk scheme and Aboriginality						
	Aboriginal		Non-Indigenous		Total	
Risk level	Number	Percent	Number	Percent	Number	Percent
Level I (0–19.9)	0	0.0	10	0.5	10	0.4
Level II (20–34.9)	16	2.1	183	9.6	199	7.4
Level III (35–49.9)	178	23.0	794	41.5	972	36.1
Level IV (50–59.9)	293	37.9	623	32.5	916	34.1
Level V (60–78)	287	37.1	305	15.9	592	22.0
Total	**774**	**100.0**	**1,915**	**100.0**	**2,689**	**100.0**

Subscale and total VRS scores

Table 7 presents the scores on the static and dynamic subscales along with the full VRS score pre-treatment. An independent samples *t*-test was conducted to examine whether there were differences in the static and dynamic subscale scores by Aboriginality. The results indicated that Aboriginal males (M=14.1, SD=3.0) recorded significantly higher static scores than non-Indigenous males (M=11.7, SD=3.6, $t(2,875)$=18.2, $p<0.01$). This represented a medium effect size, as measured by Cohen's d (d=0.69, 95% CI=[0.61, 0.78]). Aboriginal males also recorded significantly higher dynamic scores (M=41.2, SD=7.6) compared with non-Indigenous males (M=36.6, SD=8.5, $t(2,687)$=13.6, $p<0.01$), with a medium effect size (d=0.55, 95% CI=[0.47, 0.64]).

Table 7: Subscale and total VRS scores by Aboriginality								
	Aboriginal (*n*=726)			Non-Indigenous (*n*=1,870)				
	Mean	*SD*	Median	Mean	*SD*	Median	*d*	95% CI
Static score**	14.1	3.0	15.0	11.6	3.6	12.0	0.69	0.61, 0.78
Dynamic score**	41.2	7.6	42.0	36.6	8.4	37.0	0.55	0.47, 0.64
Total VRS**	**55.7**	**9.4**	**57.0**	**48.6**	**10.7**	**49.0**	**0.69**	**0.61, 0.78**

**statistically significant at $p<0.01$

Within the static items, significant differences were noted across all items by group, excluding current age (at VRS assessment), with Aboriginal males recording consistently higher scores (see Table 8). Most notably, Aboriginal males recorded a higher average risk score for age at first conviction ($M=2.06$), indicating that they were younger at the time of their first conviction than non-Indigenous males ($M=1.54$). An independent samples t-test revealed a t-statistic of 16.3 ($df=1,666$, $p<0.01$), with a medium effect size ($d=0.64$, 95% CI=[0.56, 0.72]). Aboriginal males also recorded a significantly higher average score for number of youth convictions ($M=2.27$) compared with non-Indigenous males ($M=1.48$, $t(1,746)=15.0$, $p<0.01$). This also represented a medium effect size ($d=0.58$, 95% CI=[0.50, 0.66]).

Table 8: VRS static item scores by Aboriginality								
	Aboriginal (*n*=817)			Non-Indigenous (*n*=2,060)				
	Mean	*SD*	Median	Mean	*SD*	Median	*d*	95% CI
Current age	2.11	0.96	2.0	2.04	1.00	2.0	–	
Age at first conviction**	2.06	0.74	2.0	1.54	0.83	2.0	0.64	0.56, 0.72
No. of youth convictions**	2.27	1.20	3.0	1.48	1.42	1.0	0.58	0.50, 0.66
Violence throughout lifespan**	2.66	0.55	3.0	2.36	0.70	2.0	0.46	0.38, 0.54
Prior release failures or escapes **	2.59	0.88	3.0	2.38	1.02	3.0	0.21	0.13, 0.29
Stability of family upbringing**	2.43	0.85	3.0	1.90	1.10	2.0	0.51	0.43, 0.59

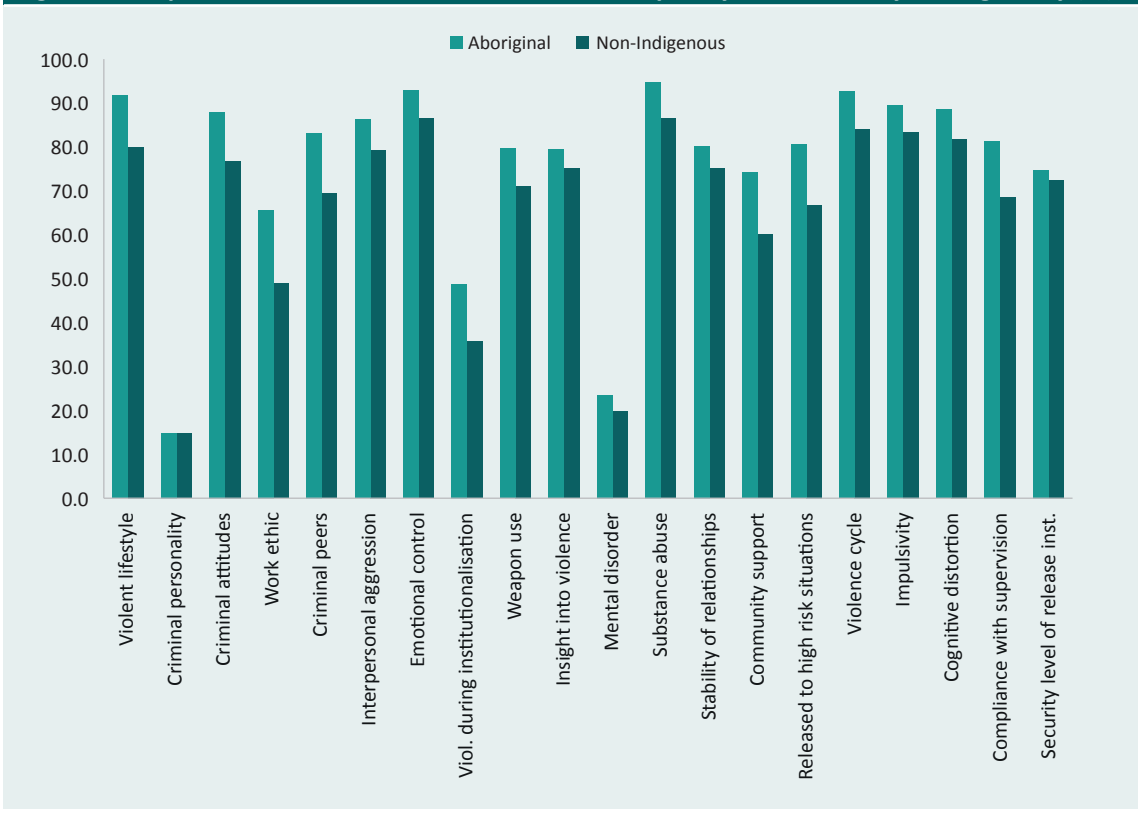
**statistically significant at $p<0.01$

Profile of dynamic treatment needs

Treatment needs for each dynamic item on the VRS were identified for the majority of the sample except for the items criminal personality, mental disorder and violence during institutionalization. Emotional control and substance use were identified as needs for most of the sample (88.9% and 88.3% respectively).

Figure 2 presents the proportion of the total sample with a treatment need on each dynamic item for Aboriginal and non-Indigenous males. While the treatment need profile was quite similar overall, there were several areas in which Aboriginal males recorded significantly higher rates of need. This included work ethic, with two-thirds (65.6%) recording this item as a treatment target compared with half (48.9%) of non-Indigenous males ($\chi^2(1, n=2{,}686)=61.8$, $p<0.01$). Community support was also a significantly higher treatment need for Aboriginal males (74.2%) compared with non-Indigenous males (60.0%, $\chi^2(1, n=2{,}685)=53.2$, $p<0.01$) along with criminal peers, which was a treatment need for 83.2 percent of Aboriginal males compared with 69.4 percent of non-Indigenous males ($\chi^2(1, n=2{,}680)=47.8$, $p<0.01$). In addition, four-fifths (80.5%) of Aboriginal males recorded a treatment target in relation to release to high risk situations compared with 66.8 percent of non-Indigenous males ($\chi^2(1, n=2{,}517)=47.3$, $p<0.01$).

Figure 2: Proportion of males with a treatment need per dynamic item by Aboriginality (%)



Note: Dynamic items with missing values were excluded from the percentage calculations

Treatment need by jurisdiction

State differences in the criteria for VRS assessment over the study period resulted in variation in their respective treatment target profiles. Among the three jurisdictions with a larger sample size, New South Wales and South Australia recorded very similar profiles, with Victoria recording a minimum 15 percentage points lower than the two other states in the following treatment areas:

- weapon use—identified as a treatment need for 61.2 percent of the Victorian sample compared with 82.9 percent for New South Wales and 80.9 percent for South Australia;
- community support—52.3 percent for Victoria compared with 74.4 percent for New South Wales and 67.3 percent for South Australia; and
- released to high risk situations—60.8 percent for Victoria compared with 79.2 percent for New South Wales and 75.7 percent for South Australia.

Other disparities in the target profiles of jurisdictions were noted for criminal attitudes, with 89.0 percent of the New South Wales sample recording a treatment target for this item compared with 78.2 percent in South Australia and 74.8 percent in Victoria. Nearly two-thirds of the New South Wales sample recorded a treatment target for work ethic compared with around half the sample for the other two states (51.7% for South Australia and 48.4% for Victoria). An even greater disparity was noted in relation to violence during institutionalization, with this item identified as a treatment target for 59.1 percent of the New South Wales sample compared with 35.7 percent in South Australia and only 28.7 percent in Victoria.

Level of treatment need for Aboriginal and non-Indigenous males

Table 9 shows the proportion of the sample with an identified treatment target across 15 or more dynamic items for Aboriginal and non-Indigenous males. A chi-square test of independence was performed to examine the relationship between Aboriginality and level of treatment need. The relationship was significant ($\chi^2(1, n=2{,}689)=97.7$, $p<0.01$). Nearly two-thirds of Aboriginal men in the sample (63.2%) recorded 15 or more treatment targets on the VRS, with the proportion highest in South Australia (71.9%) and lowest in Victoria (41.2%). In contrast, less than half of non-Indigenous males recorded 15 or more treatment targets (42.1%).

Table 9: Proportion with 15 or more treatment targets by jurisdiction and Aboriginality

	Aboriginal		Non-Indigenous	
	Number	Percent	Number	Percent
New South Wales	154	65.5	280	49.3
Victoria	54	41.2	292	33.6
South Australia	248	71.9	191	51.1
Total—5 states**	**489**	**63.2**	**807**	**42.1**

**statistically significant at $p<0.01$

Predictive validity of the Violence Risk Scale

Recidivism rates for Aboriginal and non-Indigenous males

Table 10 presents the proportion of the sample that reoffended over the two fixed follow-up periods. As shown, one-quarter (25.0%) had been convicted of a violent offence at the two-year mark and 38.6 percent had been convicted of a non-violent offence. For the five-year period, the proportion with a violent reoffence rose to 42.0 percent, and 55.8 percent recorded a non-violent offence. Aboriginal males recorded consistently higher rates of violent and non-violent recidivism in each follow-up period than their non-Indigenous counterparts.

Table 10: Recidivism rates at two-year (*n*=2,125) and five-year (*n*=938) follow-up by Aboriginality

	Aboriginal		Non-Indigenous		Total	
	Number	Percent	Number	Percent	Number	Percent
Two-year: violent reoffence	218	37.7	314	20.3	532	25.0
Two-year: non-violent reoffence	280	48.4	540	34.9	820	38.6
Five-year: violent reoffence	146	53.9	248	37.2	394	42.0
Five-year: non-violent reoffence	168	62.0	355	53.2	523	55.8

Table 11 displays the proportion of Aboriginal and non-Indigenous males that fell into each VRS risk band and the corresponding rate of two-year violent and non-violent recidivism for each risk category. As expected, those in the low risk band recorded the lowest rate of violent recidivism (15.0% of Aboriginal males and 8.0% of non-Indigenous males), with reoffending rates increasing with risk level (42.9% of Aboriginal males and 26.8% of non-Indigenous males in the high risk band recorded a violent reoffence). A similar trend was noted for non-violent recidivism, although the rates were higher than for violent recidivism across each risk band (51.7% of Aboriginal males and 38.1% of non-Indigenous males in the high risk band recorded a non-violent reoffence).

Table 11: Recidivism rates by VRS risk band and Aboriginality at two-year follow-up (%)

	Aboriginal			Non-Indigenous		
VRS risk band	% in risk band	% violent reoffence	% non-violent reoffence	% in risk band	% violent reoffence	% non-violent reoffence
Low	3.5	15.0	30.0	11.3	8.0	17.7
Moderate	26.4	26.8	41.8	47.0	17.5	36.2
High	70.1	42.9	51.7	41.7	26.8	38.1
Total	**100.0**	**37.7**	**48.4**	**100.0**	**20.3**	**34.9**

Table 12 displays the five-year rates of violent and non-violent recidivism for each risk category by group. Over the longer time period, there is less disparity between Aboriginal and non-Indigenous males in relation to non-violent recidivism for those in the moderate risk (53.4% compared with 54.2%) and high risk band (66.0% compared with 57.5%). In relation to five-year violent recidivism, rates were also comparable for both cohorts in the moderate risk group (37.0% and 32.5% respectively). For those in the high risk band there was a similar percentage point difference in the rate of violent recidivism between groups to that observed for the two-year period (61.7% for Aboriginal males and 45.5% for non-Indigenous males).

Table 12: Recidivism rates by VRS risk band and Aboriginality at five-year follow-up (%)

	Aboriginal			Non-Indigenous		
VRS risk band	% in risk band	% violent reoffence	% non-violent reoffence	% in risk band	% violent reoffence	% non-violent reoffence
Low	3.7	30.0	50.0	10.3	26.1	31.9
Moderate	26.9	37.0	53.4	48.4	32.5	54.2
High	69.4	61.7	66.0	41.2	45.5	57.5
Total	**100.0**	**53.9**	**62.0**	**100.0**	**37.2**	**53.2**

Tables 13 and 14 present two-year and five-year violent recidivism rates by group based on the five-level risk scheme. Consistent with the three risk categories, there was a corresponding increase in the rate of violent recidivism with each risk level. This incremental growth was more pronounced among Aboriginal males in both follow-up periods, whereas non-Indigenous males placed in risk levels IV and V showed similar rates of two-year violent recidivism (25.0% and 29.2%) and the same rate at five-year follow-up (45.0%).

Table 13: Violent recidivism rates by five-level risk scheme and Aboriginality at two-year follow-up (%)

	Aboriginal		Non-Indigenous	
VRS risk level	% in risk band	% violent reoffence	% in risk band	% violent reoffence
Level I	0.0	–	0.5	0.0
Level II	2.8	6.3	9.3	6.9
Level III	23.7	25.5	44.4	17.2
Level IV	39.6	37.1	31.6	25.0
Level V	34.0	49.2	14.2	29.2
Total	**100.0**	**37.7**	**100.0**	**20.3**

Table 14 shows that in comparison with the new VRS risk categories and recidivism estimates developed by Olver et al. (2022), the overall distribution of the present sample remained skewed towards the higher levels, particularly among Aboriginal males. For the entire sample, the rate of five-year violent recidivism was at the upper range or higher than the estimates for most risk levels. This was most notable for those in the level II category, with a violent recidivism rate of 25.8 percent, well above the recommended range of 5 percent to 13.9 percent based on VRS calculator-generated recidivism estimates (Mundt 2020). Aboriginal males in risk levels II, III and IV recorded five-year violent recidivism rates higher than the recommended ranges presented by Olver et al. (2022).

Table 14: Violent recidivism rates by five-level risk scheme and Aboriginality at five-year follow-up (%)

	Aboriginal		Non-Indigenous		Total		VRS recommended criterion cut-offs	
VRS risk level	% in risk band	% violent reoffence	% in risk band	% violent reoffence	% in risk band	% violent reoffence	% in risk band	Rec. range
Level I	0.0	–	0.4	0.0	0.3	0.0	10.2	0–4.9
Level II	3.0	25.0	8.1	25.9	6.6	25.8	20.9	5–13.9
Level III	24.0	35.4	46.2	31.8	39.8	32.4	29.9	14–31.9
Level IV	38.4	56.7	33.3	45.0	34.8	48.8	22.9	32–49.9
Level V	34.7	66.0	12.0	45.0	18.6	56.3	16.1	50+
Total	**100.0**	**53.9**	**100.0**	**37.2**	**100.0**	**42.0**	**100.0**	

Predictive validity of VRS scores for violent recidivism

Relative predictive accuracy of the VRS in discriminating violent recidivists from non-recidivists was assessed using the AUC from ROC analyses. The standardised difference in risk scores between recidivists and non-recidivists was also examined using Cohen's *d*.

The AUCs for the dynamic, static and total VRS score for violent reoffending at the two-year and five-year follow-up are shown in Table 15 (see Table A4 in the *Appendix* for three-year violent and non-violent recidivism analyses). All AUC values were in the low to moderate range in their ability to discriminate those who recorded a violent reoffence and those who did not (range of 0.58 to 0.70 across the subscales and VRS total score), and were statistically significant ($p<0.01$ for all AUCs except dynamic total for Aboriginal males at five-year follow-up at $p<0.05$). None of the lower parameters of the 95% confidence intervals were at or below 0.50, indicating that the probability that a randomly selected violent recidivist would have received a higher score on the VRS than a randomly selected non-recidivist for both follow-up periods was consistently above chance level.

Of note, static scores had the highest discriminatory effect in correctly classifying Aboriginal violent recidivists and non-recidivists, with an AUC of 0.66 (95% CI=[0.62, 0.71]) at the two-year mark and 0.70 (95% CI=[0.63, 0.76]) for the five-year follow-up period. This finding did not extend to non-Indigenous males, with similar AUCs for both follow-up periods (0.62 and 0.59 respectively). An independent samples *t*-test revealed a significant difference in static scores between Aboriginal violent recidivists (*M*=15.05, *SD*=2.7) and non-recidivists (*M*=13.5, *SD*=3.1) at two-year follow-up (*t*(500)=6.323, *p*<0.01) and at five years (*M*=14.97, *SD*=2.7 compared with *M*=13.13, *SD*=3.0, *t*(269)=5.341, *p*<0.01). This represented a medium effect size, with a Cohen's *d* of 0.53 at two years and 0.65 at five years.

Table 15: Predictive accuracy of the VRS for violent recidivism by Aboriginality

	Aboriginal				Non-Indigenous			
	Two-year		Five-year		Two-year		Five-year	
	d	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]
Static total	0.53	0.66** [0.62, 0.71]	0.65	0.70** [0.63, 0.76]	0.42	0.62** [0.58, 0.65]	0.34	0.59** [0.55, 0.64]
Dynamic total	0.35	0.60** [0.56, 0.65]	0.28	0.59* [0.52, 0.65]	0.35	0.60** [0.56, 0.63]	0.29	0.58** [0.54, 0.62]
Total VRS score	0.46	0.63** [0.59, 0.68]	0.43	0.63** [0.56, 0.69]	0.42	0.62** [0.58, 0.65]	0.35	0.60** [0.55, 0.64]

**statistically significant at *p*<0.01, *statistically significant at *p*<0.05
Note: CI=confidence interval

Logistic regression models were used to assess the relationship between total VRS scores and the likelihood of violent recidivism for Aboriginal and non-Indigenous males. The Hosmer–Lemeshow test was used to assess model goodness-of-fit and was non-significant for all six regressions shown in Table 16, indicating that the rates of violent recidivism associated with VRS scores fit a logistic distribution. The analysis yielded an odds ratio of 1.053 for the total sample at two-year follow-up (CI=[1.04, 1.06]). This indicates that a 1-point increase in VRS pre-treatment score was associated with a 5 percent increase in the odds of future violence, and this finding remained relatively stable at five-year follow-up (OR=1.045, 95% CI=[1.03, 1.06]). This compares to a slightly higher and increasing odds ratio observed over time by Olver et al. (2022; two-year OR=1.070, 95% CI=[1.042, 1.098]; five-year OR=1.081, 95% CI=[1.060, 1.103]).

Among Aboriginal males, the odds ratio was equivalent to the full sample (OR=1.053, 95% CI=[1.03, 1.07]) and, similarly, the strength of the association did not increase with a longer follow-up period (OR=1.047, 95% CI=[1.02, 1.08]).

Table 16: Logistic regression models predicting violent recidivism at two-year and five-year follow-up

Regression model	*B*	*SE*	Wald	*p*	OR [95% CI]
Two-year violent recidivism					
Total VRS score—Aboriginal	0.052	0.010	26.075	<0.001	1.053 [1.032, 1.074]
Total VRS score—non-Indigenous	0.042	0.006	41.269	<0.001	1.042 [1.029, 1.056]
Total VRS score—all	0.052	0.005	98.597	<0.001	1.053 [1.043, 1.064]
Five-year violent recidivism					
Total VRS score—Aboriginal	0.046	0.014	11.618	<0.001	1.047 [1.020, 1.075]
Total VRS score—non-Indigenous	0.035	0.008	18.008	<0.001	1.036 [1.019, 1.053]
Total VRS score—all	0.044	0.007	41.652	<0.001	1.045 [1.031, 1.059]

Note: OR=odds ratio; CI=confidence interval

Model statistics at two-year follow-up: Aboriginal—model χ^2(*df*, *n*)=28.50 (1, 579), *p*<0.001, Nagelkerke R^2=0.07; Non-Aboriginal—model χ^2(*df*, *n*)=43.64 (1, 1546), *p*<0.001, Nagelkerke R^2=0.04; Total sample—model χ^2(*df*, *n*)=108.22 (1, 2125), *p*<0.001, Nagelkerke R^2=0.07

Model statistics at five-year follow-up: Aboriginal—model χ^2(*df*, *n*)=12.34 (1, 271), *p*<0.001, Nagelkerke R^2=0.06; Non-Aboriginal—model χ^2(*df*, *n*)=18.81 (1, 667), *p*<0.001, Nagelkerke R^2=0.04; Total sample—model χ^2(*df*, *n*)=44.55 (1, 938), *p*<0.001, Nagelkerke R^2=0.06

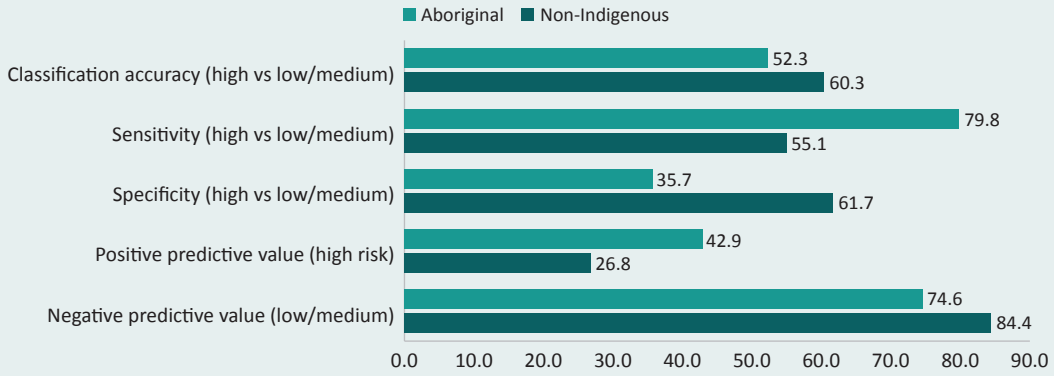
Additional discrimination metrics for violent recidivism

Figure 3 presents additional discrimination metrics based on the threshold that meets the classification for high risk on the VRS (a score of >50).

Classification accuracy, or the total proportion 'correctly' classified in the high risk group and low/moderate risk groups, was slightly higher for non-Indigenous males (60.3%) than for Aboriginal males (52.3%). In relation to sensitivity, the VRS high risk threshold accurately identified 79.8 percent of Aboriginal males with a violent reoffence. However, high sensitivity came at the expense of specificity, with only 35.7 percent of Aboriginal non-recidivists accurately identified below this threshold. In other words, the VRS had a high rate of 'false positives', or incorrect classification of Aboriginal males as high risk.

Non-Indigenous males showed the opposite trend. The sensitivity statistic was lower, with 55.1 percent of non-Indigenous violent recidivists correctly classified as recidivists, while specificity was higher, with 61.7 percent of non-recidivists correctly classified below this threshold.

Figure 3: Additional discrimination metrics of the VRS high risk threshold for two-year violent recidivism by Aboriginality (%)



Calibration was assessed using the E/O index. As noted earlier, this index represents the ratio of the expected number of violent recidivists based on a normative sample to the observed number of violent recidivists in the current study (Hanson 2017). Table 17 presents the E/O index and 95% confidence intervals for the five risk levels using expected numbers supplied by Olver et al. (2022) and based on the VRS calculator algorithm (see Table A5 in the *Appendix* for three-year E/O index analyses).

Table 17 shows that calibration between expected recidivism rates from the normative sample and those observed in the current sample was most disparate for males in risk level II, in which there were 16 violent recidivists and the scale predicted 6.2. The E/O index was 0.39, indicating that 39 percent of recidivists were predicted in this category (95% CI=[0.24, 0.63]). The tool also underestimated violent recidivism for risk level III, with 83 percent of recidivists predicted, although the upper confidence interval was very close to 1 (E/O index=0.83, 95% CI=[0.69, 0.99]). In risk level IV the E/O index was 1.01, indicating perfect calibration, and in risk level V the VRS predicted 12 percent more violent recidivists than was actually observed, although this difference was not statistically significant (95% CI=[0.92, 1.36]).

Overall, these findings indicate that calibration varied across risk levels, with a tendency to underestimate violent recidivism rates in the lower risk categories and slightly overestimate risk in the highest level.

Table 17: E/O index and 95% confidence intervals for violent recidivism by five-level risk scheme at five-year follow-up

		Observed Australian sample		Expected VRS norm			
VRS risk level	Number in risk category	% violent recidivists	Number violent recidivists	% violent recidivists	Number violent recidivists	E/O index	95% CI
Level I	3	0.0	0	3.5	0.1	–	–
Level II	62	25.8	16	10.0	6.2	0.39	[0.24, 0.63]
Level III	373	32.4	121	26.9	100.3	0.83	[0.69, 0.99]
Level IV	326	48.8	159	49.2	160.4	1.01	[0.86, 1.18]
Level V	174	56.3	98	63.0	109.6	1.12	[0.92, 1.36]

Note: Values in the Expected VRS norm columns were supplied by Olver et al. (2022) using the VRS calculator algorithm to generate recidivism estimates for the VRS scores in their sample, which were then averaged by risk level. To compute the E/O index, the expected number of violent recidivists was adjusted by applying the expected recidivism rate to the number in each risk category in the current sample

Predictive validity of VRS scores for non-violent recidivism

The above analyses were repeated to determine the predictive accuracy of the VRS for non-violent recidivism. As shown in Table 18, the AUC statistics for the static and total VRS scores were in the low range for relative predictive accuracy for two-year non-violent recidivism (range of 0.56 to 0.61) and were statistically significant ($p<0.01$). The effect size difference in static scores between Aboriginal non-violent recidivists and non-recidivists was small to moderate ($d=0.41$), reaching a medium effect size at five-year follow-up ($d=0.55$).

Similar results were observed in relation to non-violent recidivism at the five-year follow-up. The AUC statistics for the static and total VRS scores were in the low to moderate range for relative predictive accuracy for five-year non-violent recidivism (range of 0.56 to 0.65) and were statistically significant ($p<0.05$). The most notable difference between scores for non-violent recidivists and non-recidivists at five-year follow-up was in the static scores for Aboriginal males, with a medium effect size of $d=0.55$.

Table 18: Predictive accuracy of the VRS for non-violent recidivism by Aboriginality

	Aboriginal				Non-Indigenous			
	Two-year		Five-year		Two-year		Five-year	
	d	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]
Static total	0.41	0.61** [0.56, 0.66]	0.55	0.65** [0.58, 0.72]	0.31	0.58** [0.55, 0.61]	0.25	0.56** [0.52, 0.61]
Dynamic total	0.15	0.54 [0.49, 0.59]	0.16	0.55 [0.47, 0.62]	0.21	0.56** [0.53, 0.59]	0.30	0.58** [0.53, 0.62]
Total VRS score	0.24	0.56** [0.52, 0.61]	0.29	0.58* [0.51, 0.65]	0.27	0.57** [0.54, 0.60]	0.32	0.59** [0.54, 0.63]

**statistically significant at $p<0.01$, *statistically significant at $p<0.05$

Note: CI=confidence interval

The same set of logistic regression models was repeated to assess the impact of total VRS scores on the likelihood of non-violent recidivism (see Table 19). In contrast to the above findings for violent recidivism, the Hosmer–Lemeshow test was significant for two-year non-violent recidivism (χ^2(8, *n*=2,125)=19.165, *p*=0.014), suggesting that the model is not a good fit for the data. This was also the case in relation to two-year (χ^2(8, *n*=1,546)=32.005, *p*<0.001) and five-year (χ^2(8, *n*=667)=16.423, *p*<0.05) non-violent recidivism for non-Indigenous males.

Analysis of five-year non-violent recidivism yielded an odds ratio of 1.045 for the total sample, (95% CI=[1.03, 1.06]). This indicates that a 1-point increase in VRS pre-treatment score was associated with a 5 percent increase in the odds of future non-violent recidivism. This compares to a slightly higher odds ratio observed by Olver et al (2022; five-year OR=1.095, 95% CI=[1.074, 1.117]).

Among Aboriginal males, the odds ratio for five-year non-violent recidivism was equivalent to the full sample (OR=1.047, 95% CI=[1.02, 1.08]).

Table 19: Logistic regression models predicting non-violent recidivism at two-year and five-year follow-up

Regression model	*B*	*SE*	Wald	*p*	OR [95% CI]
Two-year non-violent recidivism					
Total VRS score—Aboriginal	0.052	0.010	26.075	<0.001	1.053 [1.032, 1.074]
Total VRS score—non-Indigenous	0.042	0.006	41.269	<0.001	1.042 [1.029, 1.056]
Total VRS score—All	0.052	0.005	98.597	<0.001	1.053 [1.043, 1.064]
Five-year non-violent recidivism					
Total VRS score—Aboriginal	0.046	0.014	11.618	<0.001	1.047 [1.020, 1.075]
Total VRS score—non-Indigenous	0.035	0.008	18.008	<0.001	1.036 [1.019, 1.053]
Total VRS score—All	0.044	0.007	41.652	<0.001	1.045 [1.031, 1.059]

Note: OR=odds ratio. CI=confidence interval

Model statistics at two-year follow-up: Aboriginal—model χ^2(*df*, *n*)=8.22 (1, 579), *p*<0.05, Nagelkerke R^2=0.02; Non-Aboriginal—model χ^2(*df*, *n*)=25.73 (1, 1546), *p*<0.001, Nagelkerke R^2=0.02; Total sample—model χ^2(*df*, *n*)=51.87 (1, 2125), *p*<0.001, Nagelkerke R^2=0.03

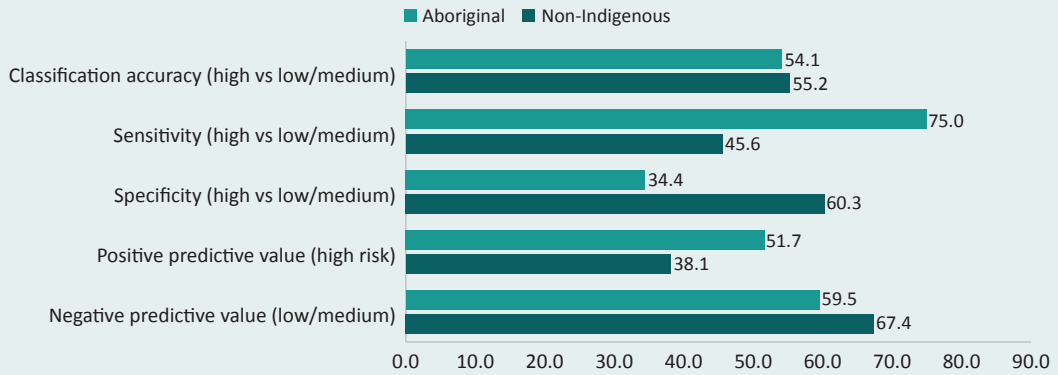
Model statistics at five-year follow-up: Aboriginal—model χ^2(*df*, *n*)=5.35 (1, 271), *p*<0.001, Nagelkerke R^2=0.03; Non-Aboriginal—model χ^2(*df*, *n*)=17.07 (1, 667), *p*<0.001, Nagelkerke R^2=0.03; Total sample—model χ^2(*df*, *n*)=27.57 (1, 938), *p*<0.001, Nagelkerke R^2=0.04

Additional discrimination metrics for non-violent recidivism

Figure 4 presents the additional discrimination metrics for two-year non-violent recidivism based on the threshold that meets the classification for high risk on the VRS (a score of >50). Note that the limitations of this analysis outlined above in relation to violent reoffending also apply here. Classification accuracy, or the total proportion of 'correctly' classified risk ratings, was equivalent for non-Indigenous (55.2%) and Aboriginal males (54.1%). Once again, the VRS threshold had high sensitivity in correctly classifying Aboriginal non-violent recidivists (75.0%) but low specificity, with 34.4 percent of non-recidivists correctly classified below this threshold.

The finding in relation to non-violent recidivism for non-Indigenous males was consistent with that observed for violent recidivism. The sensitivity statistic was relatively low, with 45.6 percent of non-Indigenous general recidivists correctly classified as recidivists at this threshold, but there was greater specificity (60.3% of non-recidivists were correctly classified as non-recidivists below this threshold).

Figure 4: Additional discrimination metrics of the VRS high risk threshold for two-year non-violent recidivism by Aboriginality (%)



Jurisdictional differences in predictive validity of VRS scores

Further predictive validity analyses were undertaken on data from New South Wales, Victoria and South Australia to examine whether the overall findings were replicated in each state (see Appendix Table A6 for additional predictive validity measures for the tables below). Analyses were limited to a two-year follow-up period to maximise the sample size. Jurisdictional differences were noted in the relative predictive validity of the VRS for violent and non-violent recidivism. These differences may in part be related to differences in the base rates of violent and non-violent recidivism in each state (see Table 20). They may also reflect a lack of consistency or inter-rater reliability between the states in how clinicians have interpreted and scored the items in the tool.

Table 20: Recidivism rates at two-year follow-up by Aboriginality for New South Wales, Victoria and South Australia

	Aboriginal		Non-Indigenous		Total	
	Number	Percent	Number	Percent	Number	Percent
Two-year: violent reoffence						
New South Wales	106	44.2	48	20.3	154	32.4
Victoria	34	26.8	166	20.3	200	21.2
South Australia	57	34.3	86	19.0	143	23.1
Two-year: non-violent reoffence						
New South Wales	124	51.7	73	30.9	197	41.4
Victoria	58	45.7	321	39.3	379	40.2
South Australia	74	44.6	126	27.9	200	32.4

In New South Wales, Table 21 shows that static scores had the highest relative predictive accuracy for violent reoffending for Aboriginal (AUC=0.68, 95% CI=[0.61, 0.75]) and non-Indigenous males (AUC=0.66, 95% CI=[0.62, 0.71]) and the largest effect sizes (*d*=0.56 and 0.58 respectively). The sensitivity of the threshold for high risk on the VRS was high for both Aboriginal and non-Aboriginal males (84.0% and 75.0% respectively), with the high risk threshold correctly classifying most violent recidivists as such. However, specificity for Aboriginal males was around half that of non-Indigenous males, with only 22.4 percent of Aboriginal non-recidivists correctly classified as low risk compared with 45.7 percent of non-Indigenous males.

In relation to non-violent reoffending in New South Wales, the AUC statistics were in the low range in terms of accuracy in discriminating between non-violent Aboriginal recidivists and non-recidivists (range of 0.55 to 0.60 across the subscales and VRS total score) and the lower parameters of the 95% confidence intervals were below 0.50 for the dynamic and total VRS scores, indicating that discriminatory power was not above chance level. Among non-Indigenous males, AUCs were very similar across subscales and the total VRS score (range of 0.64 to 0.65) and the lower parameters of the 95% confidence intervals were all above 0.50, indicating that classifications between non-violent recidivists and non-recidivists were consistently above chance level.

Table 21: New South Wales—Predictive accuracy of the VRS for two-year recidivism by Aboriginality

	Aboriginal (*n*=240)				Non-Indigenous (*n*=236)			
	Violent recidivism		Non-violent recidivism		Violent recidivism		Non-violent recidivism	
	d	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]
Static total	0.56	0.68** [0.61, 0.75]	0.38	0.60** [0.53, 0.67]	0.58	0.66** [0.58, 0.74]	0.49	0.64** [0.56, 0.71]
Dynamic total	0.26	0.57 [0.49, 0.64]	0.23	0.55 [0.48, 0.62]	0.38	0.61** [0.53, 0.69]	0.53	0.64** [0.57, 0.71]
Total VRS score	0.42	0.61** [0.54, 0.69]	0.30	0.56 [0.49, 0.64]	0.48	0.63** [0.55, 0.71]	0.56	0.65** [0.58, 0.72]

**statistically significant at $p<0.01$, *statistically significant at $p<0.05$
Note: CI=confidence interval

Table 22 presents the findings for Victoria. The AUC statistics ranged from 0.58 to 0.61 for two-year violent recidivism; however, the lower parameters of the 95% confidence intervals were at or below 0.50 for the static, dynamic and total VRS scores. This may be related to the small number of Aboriginal males in Victoria who recorded a violent offence in the two-year period (*n*=34), and the findings should be interpreted with this in mind. Among non-Indigenous males, the AUC statistics were in the low range for discriminative accuracy for two-year violent recidivism (range of 0.62 to 0.64) and non-violent recidivism (range of 0.55 to 0.62).

Mixed findings were noted in relation to other discrimination measures. The VRS threshold for high risk against the lower risk bands showed low sensitivity for both groups (55.9% for Aboriginal and 45.2% for non-Indigenous) but higher specificity than observed for the entire sample, particularly for non-Indigenous males (72.9%; 58.1% for Aboriginal males). In other words, the tool was better at accurately classifying violent recidivists as high risk than correctly classifying non-recidivists as lower risk. The greater spread of risk scores and high proportion of non-Indigenous males in the Victorian sample may partly explain these differences.

Table 22: Victoria—Predictive accuracy of the VRS for two-year recidivism by Aboriginality

	Aboriginal (*n*=127)				Non-Indigenous (*n*=816)			
	Violent recidivism		Non-violent recidivism		Violent recidivism		Non-violent recidivism	
	d	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]
Static total	0.38	0.61* [0.50, 0.72]	0.05	0.50 [0.40, 0.60]	0.47	0.63** [0.58, 0.68]	0.44	0.62** [0.58, 0.66]
Dynamic total	0.24	0.58 [0.46, 0.69]	0.23	0.44 [0.34, 0.54]	0.41	0.62** [0.57, 0.66]	0.19	0.55** [0.51, 0.59]
Total VRS score	0.31	0.60 [0.48, 0.71]	0.19	0.44 [0.34, 0.55]	0.50	0.64** [0.59, 0.68]	0.30	0.59** [0.55, 0.62]

**statistically significant at $p<0.01$, *statistically significant at $p<0.05$
Note: CI=confidence interval

In South Australia, the strength of the AUC scores for the static subscale were in the moderate range for violent (AUC=0.70) and non-violent recidivism (AUC=0.69), as shown in Table 23. The AUC value for the total VRS score was slightly lower (AUC=0.64 for violent recidivism and 0.62 for non-violent recidivism).

In relation to non-Indigenous males, the static, dynamic and total VRS scores had low discriminatory accuracy for both violent and non-violent recidivism (highest AUC was 0.59).

The sensitivity of high risk ratings against lower risk ratings was very precise for Aboriginal males in South Australia (87.7%) but less so for non-Indigenous males (60.5%). Specificity was lower for both groups but more pronounced for Aboriginal males (34.9% and 51.9% for non-Indigenous males).

Table 23: South Australia—Predictive accuracy of the VRS for two-year recidivism by Aboriginality

	Aboriginal (*n*=166) AUC [95% CI]		Non-Indigenous (*n*=452) AUC [95% CI]	
	Violent recidivism	Non-violent recidivism	Violent recidivism	Non-violent recidivism
Static total	0.70** [0.61, 0.78]	0.69** [0.61, 0.77]	0.58* [0.51, 0.65]	0.52 [0.46, 0.58]
Dynamic total	0.61* [0.52, 0.70]	0.58 [0.50, 0.67]	0.58* [0.51, 0.64]	0.58** [0.52, 0.63]
Total VRS score	0.64** [0.55, 0.72]	0.62** [0.54, 0.71]	0.59** [0.52, 0.65]	0.57* [0.52, 0.63]

**statistically significant at $p<0.01$, *statistically significant at $p<0.05$
Note: CI=confidence interval

Correlation of VRS static scores with recidivism

Bivariate correlations were used to examine the relationships between static VRS items and recidivism. To account for the increased risk of Type I errors (false positives) due to multiple comparisons, a Bonferroni adjustment was used to reduce the likelihood of such errors. The initial significance threshold of 0.05 was adjusted to 0.002 (0.05/24 tests), with only tests below this *p*-value considered statistically significant. Of interest was whether the association of risk items with recidivism differed for Aboriginal and non-Indigenous males. It is acknowledged that individual VRS items are not, and should not, be used to inform decision-making and that a single VRS item is not sufficient to assess the underlying constructs that make up the tool.

As shown in Table 24, significant correlations were noted between a number of static items and violent recidivism in the two-year follow-up for both cohorts. Current age and age at first conviction provided the highest coefficients with violent recidivism for Aboriginal offenders (r=0.22 and r=0.19 respectively; p<0.002). Age at first conviction also had the strongest correlation with violent recidivism for non-Indigenous offenders (r=0.14, p<0.002), while prior release failures/escapes had the strongest relationship to non-violent recidivism for both groups (Aboriginal males r=0.15, p<0.002; non-Indigenous males r=0.16, p<0.002).

Violence throughout lifespan and stability of family upbringing were not related to non-violent offending at the two-year mark for either group.

Table 24: Correlation between two-year recidivism and static items by Aboriginality

	Two-year: violent reoffence		Two-year: non-violent reoffence	
Static item	Aboriginal	Non-Indigenous	Aboriginal	Non-Indigenous
Current age	0.22**	0.07	0.10	0.07
Age at first conviction	0.19**	0.14**	0.13**	0.10**
No. of youth convictions	0.14**	0.11**	0.12	0.11**
Violence throughout lifespan	0.11	0.10**	0.09	0.02
Prior release failures or escapes	0.08	0.11**	0.15**	0.16**
Stability of family upbringing	0.10	0.06	0.09	0.04

**statistically significant at Bonferroni-adjusted level of p<0.002

Similar findings were observed at the five-year recidivism mark, with even higher coefficients noted across most static items for Aboriginal offenders (see Table 25). In particular, a stronger relationship between violent recidivism and age at first conviction (r=0.30) and violence throughout lifespan (r=0.23) was observed for Aboriginal offenders. Age at first conviction and prior release failures/escapes were also the static items most strongly correlated with non-violent recidivism in the five-year follow-up for Aboriginal offenders.

The relationship between static items and violent recidivism rates weakened for non-Indigenous offenders at five-year follow-up, with the main exception being prior release failures/escapes (r=0.14, p<0.002). However, this item was not related to five-year non-violent recidivism for non-Indigenous males. Among Aboriginal males, Age at first conviction and prior release failures/escapes were significantly correlated with five-year non-violent recidivism (r=0.19, p<0.002 for both items).

Table 25: Correlation between five-year recidivism and static items by Aboriginality

	Five-year: violent reoffence		Five-year: non-violent reoffence	
Static item	Aboriginal	Non-Indigenous	Aboriginal	Non-Indigenous
Current age	0.24**	0.11	0.11	0.07
Age at first conviction	0.30**	0.11	0.19**	0.04
No. of youth convictions	0.17	0.08	0.15	0.08
Violence throughout lifespan	0.23**	0.07	0.11	0.03
Prior release failures or escapes	0.06	0.14**	0.19**	0.12
Stability of family upbringing	0.10	0.06	0.14	0.06

**statistically significant at Bonferroni-adjusted level of p<0.002

Changes in VRS scores post-treatment

Table 26 presents the dynamic and total VRS scores post-treatment for Aboriginal and non-Indigenous males. In line with the expectation that treatment should reduce the risk of violence and therefore VRS risk levels, dynamic and total VRS scores post-treatment were significantly lower than pre-treatment scores (t(940)=36.8, p<0.01, d=1.2 and t(940)=35.5, p<0.01, d=1.2 respectively). Reductions in post-treatment dynamic and total VRS scores were also significant for both Aboriginal offenders (t(288)=25.4, p<0.01, d=1.5 and t(288)=24.8, p<0.01, d=1.5) and non-Indigenous offenders (t(651)=27.9, p<0.01, d=1.1 and t(651)=26.8, p<0.01, d=1.1).

Treatment change was examined for 941 males who received a VRS assessment post-treatment. VRS change scores were computed using the rationale described in the *Method* section. The average change score following treatment was 4.5 (SD=3.0), with Aboriginal offenders recording a significantly higher change score (M=5.2, SD=3.0) than non-Indigenous offenders (M=4.2, SD=2.9, t(939)=4.58, p<0.01). This was a small effect size (d=0.32, 95% CI=[0.18, 0.46]).

Table 26: Post-treatment scores and treatment change by Aboriginality

	Aboriginal (n=289)		Non-Indigenous (n=652)		Total (n=941)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Dynamic pre score	42.8	6.7	38.0	7.5	39.5	7.6
Dynamic post score	37.8	6.7	34.1	7.4	35.3	7.4
Total VRS pre score	57.4	8.3	50.3	9.3	52.5	9.6
Total VRS post score	52.4	8.1	46.4	9.1	48.2	9.2
Treatment change score	5.2	3.0	4.2	3.0	4.5	3.0

The relationship of risk change to violent recidivism

This section examines the relationship of dynamic risk change to violent recidivism among males who engaged in a violence rehabilitation program. The analyses were based on individuals who had participated in a violence treatment program, were administered a VRS assessment post-treatment, and had a minimum two-year follow-up period (n=700). After conducting a regression to control for baseline risk using the VRS pre-treatment score, we examined whether residual change scores were predictive of violent recidivism. A small negative correlation was found between the change score and two-year violent recidivism (r= −0.09, p<0.05); however, when broken down by group, the relationship was only statistically significant for Aboriginal males (r= −0.17, p<0.05). The AUC statistic revealed the change score to have poor discriminative accuracy for future violent reoffending in the overall sample (AUC=0.43, p=0.01, d= −0.23, p=0.013) and for non-Indigenous males (AUC=0.43, p=0.054, d= −0.19, p=0.122). Aboriginal males recorded a similar AUC statistic to their non-Indigenous counterparts (AUC=0.40, p=0.024), although the effect size difference in the residual change score was significant (d= −0.35, p=0.02).

When the analysis was repeated in relation to non-violent offending, the same finding emerged. A weak, negative correlation was observed between residual change score and two-year non-violent recidivism (r= −0.11, p<0.01), with the change score showing poor discriminative accuracy (AUC=0.42). It should be noted that there was variation in the nature and length of the violence prevention programs delivered in each jurisdiction and limited information as to their treatment efficacy. These factors may have impacted the findings.

Engagement in a violence treatment program

While we found no association between treatment change scores and violent recidivism, participation in a violence prevention program was associated with a significantly lower rate of violent recidivism at the two-year mark (21.0% compared with 27.4%; $\chi^2(1, n=2{,}075)=10.1$, p<0.01). However, when broken down by Aboriginality, while both groups performed better as a result of treatment, the difference was only significant for non-Indigenous offenders ($\chi^2(1, n=1{,}503)=14.4$, p<0.01).

Table 27 shows that at five-year follow-up violent reoffending rates were slightly higher among Aboriginal males who engaged in treatment compared with Aboriginal males who did not (57.3% compared with 51.7%), although this may in part be related to a smaller sample size at this time point (n=269).

Table 27: Violent recidivism rates by engagement in violence treatment program and Aboriginality

	Aboriginal		Non-Indigenous		Total	
	Number	Percent	Number	Percent	Number	Percent
Two-year: violent reoffence						
Violence treatment program (Total *n*=700)	71	37.0	76	15.0	147	21.0
No treatment program (Total *n*=1,375)	145	38.3	232	23.3	377	27.4
Five-year: violent reoffence						
Violence treatment program (Total *n*=299)	55	57.3	64	31.5	119	39.8
No treatment program (Total *n*=626)	89	51.7	180	39.7	269	43.0

Discussion

This study examined the psychometric properties of the VRS in an Australian sample of men convicted of violent offences. The sample included a large number of men of Aboriginal and Torres Strait Islander background, which allowed VRS profile, discriminative and predictive validity, and changes associated with treatment for this group to be compared with those for non-Indigenous men with violent offences.

Aboriginal men scored higher on the VRS at pre-treatment than their non-Indigenous counterparts, a difference that resulted in more Aboriginal men being placed in the high risk band. Although this finding of elevated risk was generally consistent across jurisdictions, there was variation in the proportion of Aboriginal males that fell into the high risk category. The percentage in Victoria (45%) was substantially lower than in South Australia (77%) or New South Wales (80%). From August 2019, Victoria's eligibility criteria were limited to those with a total sentence length of 18 months or more, so it is expected that this change will more closely align the profile of their violent offender population with that of the other states. However, it is not yet known whether this change has increased the number of Aboriginal males subject to a VRS assessment and, if so, to what extent. While South Australia and New South Wales recorded similar risk and need profiles, the proportion of Aboriginal males in the New South Wales sample (48%) was substantially higher than the proportion of Aboriginal men in the overall prison population (27%; ABS 2021). In comparison, South Australia recorded a difference of only four percentage points between the proportion of Aboriginal men in the sample (28% Aboriginal) and their representation in the overall prison population (24%; ABS 2021).

The distribution of risk level in the Australian sample was quite different from the new VRS risk categories and recidivism estimates developed by Olver et al. (2022), with the North American sample showing a more even distribution across the five risk levels and lower violent recidivism rates across most levels except for level V. In comparison, the present sample remained skewed towards the higher levels, and the rate of five-year violent recidivism was at or above the upper range across most risk levels. This is also likely due to the different conditions under which the samples were collected and highlights the limitations in their generalisability to other populations. When these new risk levels and recidivism estimates are compared with just the Aboriginal cohort in the present study, these differences become even more pronounced.

Along with higher overall VRS scores, Aboriginal males recorded significantly higher static scores than non-Indigenous males. The largest effect sizes were for age at first conviction (*d*=0.64), number of youth convictions (*d*=0.58) and stability of family upbringing (*d*=0.51). Age at first conviction and number of youth convictions may reflect systemic bias in policing practices, such as racial profiling (Mears, Cochran & Lindsey 2016), higher rates of arrest (O'Brien 2021) and lower rates of diversion (Cunneen 2005; Wundersitz & Hunter 2005) but could also be associated with economic disadvantage. In addition, age at first conviction and number of youth convictions may be associated with instability of family upbringing, as a result of the historic and ongoing impacts of colonisation. Notwithstanding the underlying factors that may have contributed to Aboriginal males recording higher scores on these items, age at first conviction had one of the strongest associations with risk of future violence at both time points.

Aboriginal males also recorded significantly higher dynamic scores than their non-Indigenous counterparts. In relation to treatment needs, association with criminal peers was significantly more common for Aboriginal males. This may well be linked to the communal living styles of Aboriginal people and the challenges that incarcerated Aboriginal people face when they are released into the community. Work ethic also emerged as a significant need for two-thirds of Aboriginal males. A possible explanation for this may be linked to a range of geographical and/or structural barriers in finding employment. This may well reflect the ongoing impacts of colonisation on Aboriginal communities, which have continued to lead to limited employment opportunities.

Aboriginal males had a greater prevalence of treatment need related to inadequate community support and being released into high risk situations than their non-Indigenous counterparts. Both factors may be related to a lack of suitable accommodation or a desire to return to their communities, which may involve environments associated with their past use of violence and increased likelihood of contact with criminal peers, as noted earlier. There may also be differences in how clinicians assess and interpret community support for Aboriginal offenders. This also reflects the argument that dynamic risk factors are, by definition, only so in relation to illegal behaviour, and that any legal system is highly culture-dependent (Schmidt, Heffernan & Ward 2019). Therefore, it is almost certain that some of the commonly identified risk factors will mean different things in different cultures (Sowerbutts et al. 2021) and be interpreted in ways that perpetuate racial bias. It is also possible that there are other factors that mediate the relationship between these criminogenic needs and risk of future violence. Therefore, it is possible that community support, as assessed (which might be distorted by biases), may not be valid or relevant for Aboriginal people.

Along with higher scores across dynamic items, the study found a greater volume of treatment need among Aboriginal males, with nearly two-thirds (63%) having 15 or more identified treatment targets (a score of 2 or 3) on the VRS. This compares with 42 percent of non-Indigenous males. The most recorded treatment targets for Aboriginal men in the study sample (accounting for over 90%) were violence cycle, emotional control and substance abuse. It could be argued that all three of these items reflect maladaptive ways of coping with ongoing trauma resulting from invasion, colonisation and ongoing racism. The latter two items were also treatment needs for over 85 percent of non-Aboriginal males in the sample, indicating some commonalities for intervention.

In relation to the predictive and discriminative validity of the tool, the VRS score and subscales were found to have a low to moderate level of discriminative efficacy for both groups (combined AUC of 0.65). The magnitudes of the AUCs were relatively similar to those reported in the international literature (AUC of 0.65 in Yang, Wong & Coid 2010), including a recent systematic review of risk assessment tools comparing Indigenous and non-Indigenous groups (Olver et al. 2024). The findings were also comparable with a NSW correctional sample (AUC of 0.66 for Aboriginal males on the LSI-R; Watkins 2011) and broadly consistent with a validation study of the VRS with a sample of high risk offenders, including a significant number of Canadian First Nations people (Lewis, Olver & Wong 2012). However, in contrast to the findings of the present study, VRS pre-treatment scores and violent recidivism rates for Aboriginal offenders in the Canadian sample were not significantly higher than for non-Indigenous offenders. This is possibly due to their sample having a very high risk profile overall (mean VRS score of 61.6) and a more restricted range.

While the findings of the current study indicate the tool has acceptable discriminative utility with Australian Aboriginal offenders, its relatively modest accuracy is a clear limitation. Analysis of sensitivity and specificity statistics for the VRS high risk threshold revealed that the threshold had high sensitivity for Aboriginal males convicted of further violent offending, indicating the vast majority of violent recidivists were high risk on the VRS. However, the tool had low specificity, indicating it had less accuracy in correctly classifying Aboriginal non-recidivists below this threshold. Given that most (72%) of the Aboriginal men in the sample were categorised in the high risk band, compared with less than half (45%) of non-Indigenous men, this has resulted in a disproportionate number of Aboriginal men receiving a 'false positive' rating. In other words, the VRS was more likely to classify Aboriginal men who did not go on to reoffend as being high risk than it was for non-Indigenous men. This is consistent with the findings of a recent Victorian study of the LSI-R (Ashford et al. 2022), which found the scale more likely to classify an Aboriginal non-recidivist as someone who would reoffend than a non-Indigenous person, despite both groups having similar predictive accuracy scores (AUC of 0.60 and 0.63 respectively). Relatedly, calibration metrics for the current study showed that the tool overestimated risk among individuals in the level V risk category.

Disproportionately higher risk scores for Aboriginal people have very tangible implications for correctional practice, including decisions around security placements, treatment intensity, parole, and even consideration for further supervision orders. Thus, this finding is consistent with the literature that highlights the role that standardised and 'one-size-fits all' types of risk assessments play in contributing to the over-representation of Aboriginal people in the criminal justice system. The recent change from a three-level to five-level risk rating on the VRS, along with the introduction of less stigmatising language to describe risk (Olver et al. 2022), may help reduce the disproportionate number of Aboriginal men falling into the upper risk levels, although this was not found to be the case in the current sample.

Implications and future directions

As noted by Allan and Dawson (2004), even if risk assessment tools are highly accurate in assessing the risk of recidivism, they may still exclude important predictors of unique relevance to Aboriginal people, a criticism that extends to most psychometric assessment tools (Westerman & Dear 2023). Consequently, their use inhibits our ability to better understand the dynamics of violent offending for this cohort and therefore to develop strategies to reduce future harmful behaviour. Relatedly, part of the criticism of risk assessments that rely on the RNR model is that these assessments fail to capture the culturally specific needs that do not neatly fall within the criminogenic/non-criminogenic groupings. Jones et al. (2002) described these as needs that are likely to reflect relationships between factors that operate on multiple levels (eg individual and community, past and present). This multidimensionality is therefore unlikely to be represented through individual correlations with reoffending, as is the case with identification of criminogenic needs in the RNR model.

This is supported by theories such as the Tjallara-Hovane family violence theory (Hovane 2015), which identified factors such as colonisation and the imposition of Anglo-patriarchal values, norms, beliefs and practices as important contributors to Aboriginal violence. These theories highlight the possibility that social, contextual or cultural variables and circumstances, not currently captured in risk measures such as the VRS, may contribute to recidivism in Aboriginal men who have committed violent offences. Conversely, the VRS also excludes protective factors such as cultural engagement, measured in the form of connection to culture and Country and participation in cultural events, which have been associated with lower rates of psychological distress and violent recidivism for Aboriginal offenders (Shepherd et al. 2018).

Given the criticism that neutral risk assessment tools ignore cultural inequities that differentially inflate the risk status of Aboriginal people (Martel, Brassard & Jaccoud 2011; Shepherd & Lewis-Fernandez 2016) and fail to capture culturally relevant predictors for this cohort, what is the alternative? In the absence of a validated Aboriginal violence risk assessment tool, how do we appropriately manage risk and at the same time mitigate the potential disadvantage that the VRS has on Aboriginal people convicted of violence? A different conceptual framework for understanding the dynamic risk factors measured by the VRS may be a starting point.

For example, recent research on the factor structure of the VRS with a South Australian prison sample found that VRS dynamic items could be meaningfully structured under four independent conceptual domains: cognition-related risk, self-regulation risk, lifestyles risk and compliance-related risk (Woldgabreal et al. 2022). The study found support for the premise that there are different needs among Aboriginal populations and that treatment should be tailored according to the scores in these domains. The authors contend that while current rehabilitation programs tend to focus on the cognitive and self-regulation domains, there is a need for more emphasis on providing treatment to address lifestyle and compliance-related risk factors to improve rehabilitation outcomes. A further advantage of the grouping of these dynamic factors into more relevant domains is that it can better inform correctional practices around case formulation, treatment planning and post-treatment reporting (Woldgabreal et al. 2022).

Training to build cultural competence is another key component for reducing bias in the assessment of Aboriginal offenders. Given the argument that standardised tools such as the VRS have historically been influenced by values, worldviews, beliefs and perceptions of the dominant culture in Western societies, recommendations have been made to integrate standardised tools that rely on nomothetic information with idiographic data that can take into account cultural contexts (Day, Woldgabreal & Butcher 2022; Woldgabreal et al. 2022). This involves the need to adequately consider a person's background and circumstances when considering risk, and sensitively build trust to limit practices that contribute to maintaining structural disadvantage (Allan et al. 2021). Collaboration with cultural consultants to foster relationships and better understand the Aboriginal populations being assessed, along with the development of cultural guidelines or culturally relevant definitions of risk items, also offer meaningful ways to integrate these learnings into the risk assessment process (Allan et al. 2021; Shepherd & Anthony 2018; Shepherd & Lewis-Fernandez 2016).

Overall, this study has made a valuable contribution to our understanding of the risk profile of Aboriginal males across multiple correctional settings in Australia. While the findings in relation to the VRS's predictive validity across cultural groups are consistent with the literature, predictive and discriminative accuracy was relatively modest and specificity metrics were lower for Aboriginal males, to their detriment. In the absence of existing culturally appropriate risk assessment tools, or agreement on which cultural factors are relevant for Aboriginal people, there is a need for meaningful action to ensure that risk assessment processes are not imposing further disadvantage and harm on First Nations Australians.

As Skeem and Monahan (2011) noted over a decade ago, the violence risk assessment field may well be reaching a point of diminishing returns in instrument development, as these tools account for very little of the variance in predictive accuracy. Given that an overwhelming need remains to reduce the over-representation of Aboriginal people in our justice system, it is essential to develop a better understanding of the correctional interventions that are most effective for Aboriginal people and the factors that support their desistance pathways. As such, in the short term, further research is needed to develop culturally relevant semi-structured interview schedules to help practitioners mitigate the risk of differential scoring. The long-term research agenda, however, should be the co-design of a culturally validated risk assessment scale that can take into account the structural inequalities and disadvantages that Aboriginal prisoners face. Ultimately, correctional agencies in Australia have an inherent responsibility to invest in these areas and encourage ongoing research that will contribute to closing the gap and delivering better life outcomes for Aboriginal and Torres Strait Islander peoples.

References

ABS—see Australian Bureau of Statistics

Allan A & Dawson D 2004. Assessment of the risk of re-offending by Indigenous male violent and sexual offenders. *Trends & issues in crime and criminal justice* no. 280. Canberra: Australian Institute of Criminology. https://www.aic.gov.au/publications/tandi/tandi280

Allan A, Parry CL, Tubex H, Spiranovic C & Morgan F 2021. Forensic experts' perspectives on Australian Indigenous sexual offenders and factors important in evaluating the risk of recidivism. *International Journal of Offender Therapy and Comparative Criminology* 65(15): 1653–1675. https://doi.org/10.1177/0306624X20967941

Andrews DA, Bonta J & Hoge RD 1990. Classification for effective rehabilitation: Rediscovering psychology. *Criminal Justice and Behavior* 17: 19–52. https://doi.org/10.1177/0093854890017001004

Ashford L, Spivak B, Ogloff J & Shepherd S 2022. The cross-cultural fairness of the LS/ RNR: An Australian analysis. *Law and Human Behavior* 46(3): 214–226. https://doi.org/10.1037/lhb0000486

Australian Bureau of Statistics 2023. *Remoteness areas*. Canberra: ABS. https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/remoteness-structure/remoteness-areas

Australian Bureau of Statistics 2022. *Prisoners in Australia*. Canberra: ABS. https://www.abs.gov.au/statistics/people/crime-and-justice/prisoners-australia/2022

Australian Bureau of Statistics 2021. *Estimates of Aboriginal and Torres Strait Islander Australians*. Canberra: ABS. https://www.abs.gov.au/statistics/people/aboriginal-and-torres-strait-islander-peoples/estimates-aboriginal-and-torres-strait-islander-australians/jun-2021

Australian Bureau of Statistics 2018. *National offence index.* Canberra: ABS. https://www.abs.gov.au/statistics/classifications/national-offence-index/latest-release

Australian Bureau of Statistics 2016. *National Aboriginal and Torres Strait Islander social survey, 2014–15*. Canberra: ABS. https://www.abs.gov.au/ausstats/abs@.nsf/mf/4714.0

Australian Bureau of Statistics 2011. *Australian and New Zealand standard offence classification (ANZSOC)*. Canberra: ABS. https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-offence-classification-anzsoc/2011

Bonta J & Andrews D 2010. *The psychology of criminal conduct*, 5th ed. New York: Routledge

Cohen J 1988. *Statistical power analysis for the behavioral sciences*, 2nd ed. Hillsdale, NJ: Lawrence Erlbaum

Cunneen C 2005. Racism, discrimination and the over-representation of indigenous people in the criminal justice system: Some conceptual and explanatory issues. *Current Issues in Criminal Justice* 17: 329–46. https://doi.org/10.1080/10345329.2006.12036363

Day A, Woldgabreal Y & Butcher L 2022. Cultural bias in forensic assessment: Considerations and suggestions. In G Liell, L Jones & M Fisher (eds), *Challenging bias in forensic psychological assessment and testing.* London: Routledge, Taylor & Francis Group: 245-258. https://doi.org/10.4324/9781003230977

Douglas T, Pugh J, Singh I, Savulescu J & Fazel S 2017. Risk assessment tools in criminal justice and forensic psychiatry: The need for better data. *European Psychiatry* 42: 134–137. https://doi.org/10.1016/j.eurpsy.2016.12.009

Gail M & Pfeiffer R 2005. On criteria for evaluating models of absolute risk. *Biostatistics* 6(2): 227–239. https://doi.org/10.1093/biostatistics/kxi005

Gower M, Morgan F & Saunders J 2022. Aboriginality and violence: Gender and cultural differences on the Level of Service/Risk, Need, Responsivity (LS/RNR) and Violence Risk Scale (VRS). *Psychiatry, Psychology and Law* 30(3): 249–270. https://doi.org/10.1080/13218719.2021.2006098

Hanson RK 2017. Assessing the calibration of actuarial risk scales: A primer on the E/O index. *Criminal Justice and Behavior* 44(1): 26–39. https://doi.org/10.1177/0093854816683956

Hovane V 2015. Improving outcomes through a shared understanding of family violence in Aboriginal communities: Towards an Aboriginal theory of family violence. *InPsych: The Bulletin of the Australian Psychological Society Ltd* 37(5). https://psychology.org.au/inpsych/2015/october/hovane

Hsu C, Caputi P & Byrne M 2010. The Level of Service Inventory-Revised (LSI-R): Assessing the risk and need characteristics of Australian Indigenous offenders. *Psychiatry, Psychology and Law* 17: 355–367. https://doi.org/10.1080/13218710903089261

Johnston E 1991a. *Royal Commission into Aboriginal Deaths in Custody. National report volume 1*. Canberra: Australian Government Publishing Service. https://www.austlii.edu.au/au/other/IndigLRes/rciadic/national/vol1/

Johnston E 1991b. *Royal Commission into Aboriginal Deaths in Custody. National Report volume 4*. Canberra: Australian Government Publishing Service. https://www.austlii.edu.au/au/other/IndigLRes/rciadic/national/vol4/

Jones R, Masters M, Griffiths A & Moulday N 2002. Culturally relevant assessment of Indigenous offenders: A literature review. *Australian Psychologist* 37: 187–197. https://doi.org/10.1080/00050060210001706866

Lewis K, Olver ME & Wong SC 2012. The Violence Risk Scale: Predictive validity and linking changes in risk with violent recidivism in a sample of high-risk offenders with psychopathic traits. *Assessment* 20(2): 150–164. https://doi.org/10.1177/1073191112441242

Mals P, Howells K, Day A & Hall G 2000. Adapting violence rehabilitation programs for the Australian Aboriginal offender. *Journal of Offender Rehabilitation* 30(1–2): 121–135. https://doi.org/10.1300/J076v30n01_08

Martel J, Brassard R & Jaccoud M 2011. When two worlds collide: Aboriginal risk management in Canadian Corrections. *British Journal of Criminology* 51: 235–255. https://doi.org/10.1093/bjc/azr003

Mears D, Cochran J & Lindsey A 2016. Offending and racial and ethnic disparities in criminal justice: A conceptual framework for guiding theory and research and informing policy. *Journal of Contemporary Criminal Justice* 32(1): 78–103. https://doi.org/10.1177/1043986215607252

Mercer G, Ziersch E, Sowerbutts S, Day A & Pharo H 2022. The Violence Prevention Program in South Australia: A recidivism and cost–benefit analysis pilot study. *Criminal Justice and Behavior* 49(1): 20–36. https://doi.org/10.1177/00938548211038333

Mundt JC 2020. VRS calculator. https://psynergy.ca/vrs

O'Brien G 2021. Racial profiling, surveillance and over-policing: The over-incarceration of young First Nations males in Australia. *Social Sciences* 10(2): 68. https://doi.org/10.3390/socsci10020068

Olver M et al. 2024. Too risky to use, or too risky not to? Lessons learned from over 30 years of research on forensic risk assessment with Indigenous persons. *Psychological Bulletin* 150(5): 487–553. https://doi.org/10.1037/bul0000414

Olver M et al. 2022. Assessing dynamic violence risk: Common language risk levels and recidivism rates for the Violence Risk Scale. *Psychological Assessment* 34(6): 528–545. https://doi.org/10.1037/pas0001116

Productivity Commission 2022. *Closing the Gap annual data compilation report*. Canberra: Productivity Commission. https://www.pc.gov.au/closing-the-gap-data/annual-data-report/2022

Rice ME & Harris GT 2005. Comparing effect sizes in follow-up studies: ROC Area, Cohen's *d*, and *r*. *Law and Human Behavior* 29: 615–620. https://doi.org/10.1007/s10979-005-6832-7

Schmidt S, Heffernan R & Ward T 2019. Why we cannot explain cross-cultural differences in risk assessment. *Aggression and Violent Behavior* 50. Article 101346. https://doi.org/10.1016/j.avb.2019.101346

Shepherd S 2018. Violence risk assessment and Indigenous Australians: A primer. *Alternative Law Journal* 43(1): 45–47. https://doi.org/10.1177/1037969x17748210

Shepherd S 2016. Violence risk instruments may be culturally unsafe for use with Indigenous patients. *Australasian Psychiatry* 24: 565–567. https://doi.org/10.1177/1039856216665287

Shepherd S, Adams Y, McEntyre E & Walker R 2014. Violence risk assessment in Australian Aboriginal offender populations: A review of the literature. *Psychology, Public Policy, and Law* 20(3): 281–293. https://doi.org/10.1037/law0000017

Shepherd S & Anthony T 2018. Popping the cultural bubble of violence risk assessment tools. *Journal of Forensic Psychiatry & Psychology* 29(2): 211–220. https://doi.org/10.1080/14789949.2017.1354055

Shepherd S, Delgado R, Sherwood J & Paradies Y 2018. The impact of Indigenous cultural identity and cultural engagement on violent offending. *BMC Public Health* 18: 1–7. https://doi.org/10.1186/s12889-017-4603-2

Shepherd S & Lewis-Fernandez R 2016. Forensic risk assessment and cultural diversity: Contemporary challenges and future directions. *Psychology, Public Policy, and Law* 22(4): 427–438. https://doi.org/10.1037/law0000102

Singh JP 2013. Predictive validity performance indicators in violence risk assessment: A methodological primer. *Behavioral Sciences & the Law* 31(1): 8–22. https://doi.org/10.1002/bsl.2052

Skeem JL & Monahan J 2011. Current directions in violence risk assessment. *Current Directions in Psychological Science* 20(1): 38–42. https://doi.org/10.1177/0963721410397271

Sowerbutts S, Mercer G, Pharo H, Dodd V & Leonello J 2021. The collaborative design and development of a violence prevention program for Aboriginal and Torres Strait Islander men: What we learned to guide corrections to 2030. *Advancing Corrections Journal* 11: 65–78

Steering Committee for the Review of Government Service Provision (SCRGSP) 2020. *Overcoming Indigenous disadvantage: Key indicators 2020*. Canberra: Productivity Commission. https://www.pc.gov.au/ongoing/overcoming-indigenous-disadvantage/2020

Watkins I 2011. The utility of Level of Service Inventory-Revised (LSI-R) assessments within NSW correctional environments. Corrective Services NSW Research Bulletin 29. https://correctiveservices.dcj.nsw.gov.au/resources/research-and-reports/corrections-research-evaluation-and-statistics/research-and-statistical-publications-by-year-of-release.html

Weatherburn D, Snowball L & Hunter B 2006. *The economic and social factors underpinning Indigenous contact with the justice system: Results from the 2002 NATSISS survey*. Crime and Justice Bulletin no. 104. Sydney: NSW Bureau of Crime and Statistics Research. https://bocsar.nsw.gov.au/research-evaluations/2006/cjb104-the-economic-and-social-factors-underpinning-indigenous-contact-with-the-justice-system-results-from-the-2002-natsis.html

Westerman TG & Dear GE 2023. The need for culturally valid psychological assessment tools in Indigenous mental health. *Clinical Psychologist* 27(3): 284–289. https://doi.org/10.1080/13284207.2023.2247532

Woldgabreal Y, Day A, Daffern M, Lloyd C & Graffam J 2022. An empirical test of the factor structure of the Violence Risk Scale and its measurement invariance across time and cultural groups. *Criminal Justice & Behavior* 49(9): 1255–1275. https://doi.org/10.1177/00938548221084984

Woldgabreal Y, Day A & Tamatea A 2020. Do risk assessments play a role in the enduring 'color line'? *Advancing Corrections Journal* 10: 18–28

Wong S & Gordon AE 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 & Gordon AE 2003. Violence Risk Scale. https://psynergy.ca/vrs

Wundersitz J & Hunter N 2005. *Juvenile justice in Australia: Where are we now?* Office of Crime Statistics and Research Information Bulletin 40

Yang M, Wong SC & Coid J 2010. The efficacy of violence prediction: A meta-analytic comparison of nine risk assessment tools. *Psychological Bulletin* 136(5): 740–767. https://doi.org/10.1037/a0020473

Appendix

Table A1: VRS assessment—Date implemented and criteria for administration by state

State	Date implemented	Criteria for administration
NSW	2012	Those administered a VRS typically fall into the following categories: • Pre- and post-treatment for custody-based intensive therapeutic programs (eg Violent Offender Treatment Program) • Serious offenders assessed for whole-of-sentence case planning and identification of program pathway • Offenders being considered for parole and release to community • Offenders assessed under the *Crimes (High Risk Offender) Act 2006* for Extended Supervision or Continuing Detention Orders • Offenders in the community to help inform case management/risk management
Vic	2006	Prior to August 2019, male prisoners were eligible to receive a VRS-SV if they met the following criteria: • subject to a term of imprisonment that includes a period of eligibility for parole; and • a current conviction for a serious violent offence (pursuant to section 3 of the *Corrections Act 1986*); and • a sentence length of more than three months. From 1 August 2019, male prisoners are eligible to receive a VRS-SV if they meet the following criteria: • subject to a term of imprisonment with a current conviction for a serious violent offence (pursuant to section 3 of the *Corrections Act 1986*) (regardless of parole eligibility); and • a total sentence length of 18 months or more, with at least three months' time remaining on sentence as at the date of referral to Forensic Intervention Services (may be followed by a community-based disposition, with a combined sentence and order length of 18 months or more). Under both sets of eligibility criteria, service users screened as having moderate or high violence risk progress to receive a full VRS assessment. Those screened as low violence risk are not eligible for further violence offence-specific services.

Table A1: VRS assessment—Date implemented and criteria for administration by state (cont.)

State	Date implemented	Criteria for administration
WA	2014	The VRS is administered to offenders serving a sentence of more than six months who have a current violent offence. A screening tool (the Risk of Reoffending Prison Version; RoR-PV), developed by Queensland Corrections in collaboration with Griffith University, was implemented in Western Australia in late 2018. The RoR-PV is a four-item general risk instrument designed to predict recidivism for the purpose of screening which individuals should be subjected to more comprehensive risk/needs assessments. It is not a violence-specific screening tool. Each item on the RoR-PV is weighted according to the person's status on each risk factor, with scores ranging from 1 to 20 (with 20 being the highest risk of recidivism). The items are: Convicted of a Breach of Justice Order (Y/N)? Convicted of an assault or related offences (Y/N)? Number of convictions in the past 10 years (0, 1–2, 3+), and Age at admission (17–21, 22–26, 27–34, 35+). This screening tool rules out those assessed as low risk from further assessment. The VRS is also administered to individuals serving a life or indeterminate sentence and to High-Risk Serious Offenders by the Forensic Assessment Team on a periodic basis (RoR-PV is not used). VRS assessments are also completed by external contracted psychologists for any violent offenders (RoR-PV is not used).
SA	2006	A VRS Screener Version (VRS-SV) is administered to males convicted of a violent offence and sentenced to a term of imprisonment of more than 12 months. Those with a VRS-SV score that places them in the risk category of medium or above are then administered a full VRS to further determine their suitability and level of treatment need.
Tas	2018	The VRS assessments are typically administered to prisoners with a sufficient sentence length to determine suitability for an intervention program. Generally this involves a sentence of 12 or more months but consideration may be given to those on a shorter sentence on a case-by-case basis. Individuals do not have to have a current conviction for a violent offence—historical convictions for violence can be considered.

Table A2: Definitions of violent offences based on ANZSOC categories	
ANZSOC DIVISION 1—HOMICIDE AND RELATED OFFENCES	
011	Murder
012	Attempted murder
013	Manslaughter and driving causing death
ANZSOC DIVISION 2—ACTS INTENDED TO CAUSE INJURY	
021	Assault
029	Other acts intended to cause injury
ANZSOC DIVISION 3—SEXUAL ASSAULT AND RELATED OFFENCES	
031	Sexual assault
032	Non-assaultive sexual offences
ANZSOC DIVISION 4—DANGEROUS OR NEGLIGENT ACTS ENDANGERING PERSONS	
041	Dangerous or negligent operation of a vehicle
049	Other dangerous or negligent acts endangering persons
ANZSOC DIVISION 5—DANGEROUS OR NEGLIGENT ACTS ENDANGERING PERSONS	
051	Abduction and kidnapping
052	Deprivation of liberty/false imprisonment
053	Harassment and threatening behaviour
ANZSOC DIVISION 6—ROBBERY, EXTORTION AND RELATED OFFENCES	
061	Robbery
062	Blackmail and extortion
ANZSOC DIVISION 13—PUBLIC ORDER OFFENCES	
1313	Riot and affray

Table A3: Violence treatment programs in which VRS participants engaged by state

State	Program name	Program length (hours)
NSW	EQUIPS Aggression	40
	Violent Offender Treatment Program—High Intensity	300
	Violent Offender Treatment Program—Self-regulation Program	300
Vic	High Intensity Violence Intervention Program	165
	Moderate Intensity Violence Intervention Program (M-VIP)	83.5
	See Change for Men	55
	Individual—Counselling	Varied
WA	Violent Offending—Intensive Program	316
SA	Living Without Violence	145
	Violence Prevention Program (VPP)[a]	260
	VPP-Aboriginal Men	260
	VPP-me (cognitively impaired)	260
Tas	Violence Prevention Program (VPP)	250

a: Program has been subject to formal evaluation. See Mercer et al. (2022)

Table A4: Predictive accuracy of the VRS for three-year recidivism by Aboriginality

	Aboriginal (*n*=519)				Non-Indigenous (*n*=1,448)			
	Violent recidivism		Non-violent recidivism		Violent recidivism		Non-violent recidivism	
	d	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]	*d*	AUC [95% CI]
Static total	0.38	0.68** [0.63, 0.72]	0.05	0.62** [0.57, 0.67]	0.47	0.61** [0.58, 0.65]	0.44	0.59** [0.56, 0.62]
Dynamic total	0.24	0.59** [0.54, 0.64]	0.23	0.54 [0.49, 0.59]	0.41	0.60** [0.57, 0.64]	0.19	0.58** [0.55, 0.61]
Total VRS score	0.31	0.62** [0.58, 0.67]	0.19	0.56* [0.51, 0.61]	0.50	0.62** [0.59, 0.65]	0.30	0.59** [0.56, 0.62]

**statistically significant at $p<0.01$, *statistically significant at $p<0.05$
Note: CI=confidence interval

Table A5: E/O index and 95% confidence intervals for violent recidivism by five-level risk scheme at three-year follow-up

		Observed Australian sample		Expected VRS norm			
VRS risk level	Number in risk category	% violent recidivists	Number violent recidivists	% violent recidivists	Number violent recidivists	E/O index	95% CI
Level I	8	0.0	0	1.7	0.1	–	–
Level II	150	12.0	18	5.2	7.8	0.43	[0.27, 0.69]
Level III	790	23.4	185	15.5	122.5	0.66	[0.57, 0.76]
Level IV	660	37.4	247	32.4	213.8	0.87	[0.76, 0.98]
Level V	359	46.8	168	45.7	164.1	0.98	[0.84, 1.14]

Note: Values in the Expected VRS norm columns were supplied by Olver et al. (2022) using the VRS calculator algorithm to generate recidivism estimates for the VRS scores in their sample, which were then averaged by risk level. To compute the E/O index, the expected number of violent recidivists was adjusted by applying the expected recidivism rate to the number in each risk category in the current sample

Table A6: Predictive validity metrics of the VRS high risk threshold for two-year violent recidivism by Aboriginality for New South Wales, Victoria and South Australia (%)

New South Wales	Aboriginal (*n*=240)	Non-Indigenous (*n*=236)
Classification accuracy (high vs low/medium)	49.6	51.7
Sensitivity (high vs low/medium)	84.0	75.0
Specificity (high vs low/medium)	22.4	45.7
Positive predictive value (high risk)	46.1	26.1
Negative predictive value (low/medium)	63.8	87.8
Victoria	**Aboriginal (*n*=127)**	**Non-Indigenous (*n*=816)**
Classification accuracy (high vs low/medium)	57.5	67.3
Sensitivity (high vs low/medium)	55.9	45.2
Specificity (high vs low/medium)	58.1	72.9
Positive predictive value (high risk)	32.8	29.9
Negative predictive value (low/medium)	78.3	83.9
South Australia	**Aboriginal (*n*=166)**	**Non-Indigenous (*n*=452)**
Classification accuracy (high vs low/medium)	53.0	53.5
Sensitivity (high vs low/medium)	87.7	60.5
Specificity (high vs low/medium)	34.9	51.9
Positive predictive value (high risk)	41.3	22.8
Negative predictive value (low/medium)	84.4	84.8

AIC reports
Research Report

Emma Ziersch is a Senior Programs Evaluation Officer at the Department for Correctional Services, South Australia.

Shawn Sowerbutts is a Senior Programs Officer at the Department for Correctional Services, South Australia.

Yilma Woldgabreal is a Senior Rehabilitation Psychologist at the Department for Correctional Services, South Australia.

Sophie Ransom is a Senior Programs Evaluation Officer at the Department for Correctional Services, South Australia.

Australia's national research and
knowledge centre on crime and justice

www.aic.gov.au