School of Population Health

Utility and Validity of the Youth Level of Service/Case Management Inventory (YLS/CMI) for Young Offenders in Western Australia

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research 2007 (updated 2018). The proposed research study received human research ethics approval from the Curtin University Human Research Ethics Committee, Approval Number: HRE2020-0046.

Signature:

Date: 28 March 2022

Abstract

This thesis examines the validity and utility of the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2003) general risk assessment tool for youth offenders in Western Australia. Chapter one provides an overview of the thesis. The second chapter provides an overview of youth crime and considers current trends in youth offending within an Australian context with a particular focus on the overrepresentation of Indigenous[1] young people in the criminal justice system. Chapter three provides an overview of the relevant history of youth risk assessment, a summary of the two major approaches to standardised risk assessment (i.e., structured and unstructured clinical judgment), and implications for practice and future research.

Chapter four presents a meta-analysis of three standardised risk assessment tools to evaluate whether there is a superior tool for predicting general recidivism for youth offenders. Each of the three risk assessment tools (YLS/CMI; Youth Assessment and Screening Instrument [YASI]; Orbis Partners, 2000; and Youth Actuarial Risk Assessment Tool [Y-ARAT; van der Put, 2014]) were found to predict general recidivism with reasonable accuracy. However, there was significant variability amongst effect sizes when comparing different outcome measures (i.e., recidivism) and country of origin. Collectively, there is a need for further research into the general risk assessment tools, particularly the YASI and the Y-ARAT, to gain a better understanding of their psychometric properties and practical utility. This paper is currently under review with a journal.

Chapter five comprises an empirical research study which evaluates the validity and utility of the YLS/CMI in a sample of Western Australian youth offenders. The YLS/CMI

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[1] Throughout this thesis, the term 'Indigenous' is used to refer to Aboriginal and Torres Strait Islander peoples. The term is used as a collective name for the original people of Australia and their descendants and is not intended to detract from the unique identity and great diversity between Aboriginal and Torres Strait Islander peoples throughout Australia.

was found to be a valid and reliable predictor of general recidivism for West Australian youth offenders with moderate effect sizes for Indigenous (AUC = .65) and non-Indigenous youth (AUC = .66). Cross validation analyses revealed significant differences between groups on total YLS/CMI scores and risk domains. This paper has been accepted for publication in the International Journal of Offender Therapy and Comparative Criminology.

Chapter six includes additional empirical research that expands on the findings from the study included in chapter five, with a specific focus on the differences in criminogenic risk/needs between Indigenous and non-Indigenous youth. Additional analyses examined the predictive validity of a shortened version of the YLS/CMI and results showed that a specific combination of five items improved predictive validity of the tool for both Indigenous and non-Indigenous youth in the sample. This paper is in the final stages of review with the International Journal of Offender Therapy and Comparative Criminology.

Finally, chapter seven summarises the findings from the previous chapters, considering applied implications, strengths and limitations of the research, and future directions for research, the development of policy and practice, and reducing Indigenous overrepresentation in Western Australia.

knowledge and expertise with me – you continue to inspire me to pursue my dream of becoming a forensic psychologist and to never stop trying to make a difference.

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List of Publications Included as Part of the Thesis

Study one (chapter four) has been submitted for publication and is currently under review. Study two (chapter five) has been accepted for publication in the International Journal of Offender Therapy and Comparative Criminology, and study three (chapter six) has been submitted for publication and is in the final stages of review following minor amendments. I warrant that I have obtained, where necessary, permission from the copyright owners to use any of my own published work (e.g., journal articles) in which the copyright is held by another party (e.g., publisher, co-author). The following is a list of the publications included in this thesis:

Dellar, K., Roberts, L., Bullen, J., Downe, K., & Kane, R. (2022). *Meta-analysis of three general risk assessments for youth* [Manuscript submitted for publication]. School of Population Health, Curtin University.

Dellar, K., Roberts, L., Bullen, J., Downe, K., & Kane, R. (in press). Validation of the YLS/CMI as Risk/Needs Assessment Tool Amongst a Western Australian Juvenile Offender Population. *International Journal of Offender Therapy and Comparative Criminology.*

Dellar, K., Roberts, L., Bullen, J., Downe, K., & Kane, R. (2020). *Overrepresentation of Young Indigenous Offenders: Differences in Criminogenic Risk/Needs and Implications for Practice* [Manuscript submitted for publication]. School of Population Health, Curtin University.

Statement of Contribution of Others

See Appendix A for co-author attribution tables of the articles submitted for publication included as part of this thesis. As indicated in the appendices, Kristie Dellar was the lead author on all three of the submitted papers. Kristie Dellar, Lynne Roberts, Kristy Downe, and Robert Kane conceptualised the research design and methodology. Kristie Dellar analysed the dataset with input from Robert Kane and Lynne Roberts. Taylor Joachim, a Curtin University Psychology student, also assisted in the quality assessment of articles utilised in the included meta-analysis. Kristie Dellar drafted the manuscripts. All authors edited drafts of the manuscript and approved the final versions.

We acknowledge the participation and assistance of the Western Australian Department of Justice in the conduct of our research and in supplying the dataset that was used. The research reported cannot be considered as either endorsed by the Department of Justice or an expression of the policies or view of the Department. Any errors of omission or commission are the responsibility of the researchers.

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Chapter 1: Overview of Thesis

There is a wealth of research that shows juvenile justice systems that utilise structured and validated risk assessment tools, such as the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2003) are far more effective at reducing rates of recidivism (reoffending) than those who do not (see Bonta & Andrews, 2017; Hoge, 2016). In line with this research, the Department of Justice (DoJ) in Western Australia adopted the YLS/CMI in 2016 as the primary risk assessment tool for evaluating the criminogenic risk and needs of youth entering the justice system. While there is evidence supporting the utility of the YLS/CMI in predicting recidivism (see Olver et al., 2009; Pusch & Holtfreter, 2017), there is little research demonstrating its effectiveness in Australian juvenile populations and no such research in a West Australian population. There is also a lack of research on the utility of the tool with young Indigenous offenders, which is particularly concerning given the significant overrepresentation of Indigenous people in the Australian criminal justice system (Australian Institute of Health & Welfare [AIHW], 2021).

The studies included in this thesis address these gaps in the literature by evaluating the utility and validity of the YLS/CMI risk assessment tool for West Australian youth offenders. Despite its widespread use in Western Australia since 2016, there have been no validation studies of the YLS/CMI using a West Australian sample and limited studies with other Australian youth offender populations. The research element of this thesis therefore also contributes to building an empirical base for best practice in risk assessment and risk management with West Australian youth. The specific aims of this thesis are:

- To explore the effectiveness of general risk assessment measures for youth
- To evaluate the utility and validity of the YLS/CMI for West Australian youth
- To establish whether risk factors associated with recidivism differ between Indigenous and non-Indigenous youth in Western Australia

Data Collection and Analysis

The first aim was achieved through a meta-analysis of three standardised risk assessment tools for the prediction of general recidivism in youth: the YLS/CMI (Hoge & Andrews, 2003), the YASI (Orbis Partners, 2000), and the Y-ARAT (van der Put, 2014). The systematic search process yielded 59 studies suitable for inclusion in the meta-analysis, with each of the studies being subjected to a quality assessment.

The dataset utilised to address the second and third aims was provided by the Western Australian Department of Justice (DoJ) and included all YLS/CMI assessments completed with young offenders from 2016-2020 ($N = 4653$). Official recidivism data were available for 921 young offenders with a minimum follow-up period of two years. Adolescent and adult offending records were used to determine recidivism. Recidivism was defined as any re-arrest during the follow-up period and the types of offences were also recorded: violent, sexual, substance related, property (stealing included), and all other offence types fell under the category 'other'. Recidivism data were used to conduct predictive validity analyses.

To address the second aim, the analyses were completed in three separate stages. Stage one included descriptive statistics for YLS/CMI total scores and subcomponent scores separated by gender, offender type (i.e., custodial or community offender), and ethnicity (i.e., Indigenous or non-Indigenous). Stage two encompassed reliability analysis to determine the internal consistency of the tool. The final stage included validity analyses. This analysis included a 2 (sample) x 2 (ethnicity) analysis of covariance (ANCOVA) with age as the sole covariate. Males and females were examined separately to assess potential moderators and any subgroup differences in criminogenic factors. Indigenous and non-Indigenous offenders were also examined separately. For the subcomponents, a corresponding 2 x 2 multivariate analysis of covariance (MANCOVA) was conducted. Predictive validity was assessed by examining YLS/CMI total scores as a predictor of recidivism using Receiver Operating

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Characteristic (ROC) analysis and reported using the area under the curve (AUC) values. Sensitivity (i.e., the proportion of recidivists who were rated as high risk) and specificity (i.e., the proportion of non-recidivists rated low risk) was also calculated using YLS/CMI total scores. Survival analysis was used to examine length of time to reoffending within the two-year follow-up period. Cox regression analysis with any recidivism (yes/no) as the outcome variable was also conducted to determine if gender or Indigenous status independently predicted recidivism after accounting for total YLS/CMI scores.

To address the third aim, the odds ratio (OR) was used as a measure of association between risk factor and recidivism to identify the most predictive risk factors for Indigenous and non-Indigenous youth. Risk factors with an OR greater than 3.00 were included in a backward binomial logistic regression model that was tested for recidivism versus non-recidivism over a two-year follow-up period. Predictive validity estimates were examined and reported using AUC values determine the most predictive combination of risk factors for both Indigenous and non-Indigenous youth.

Structure of Thesis

Chapter two includes a general overview of youth crime and considers current trends of youth offending within an Australian context. Chapter two also reviews theories of youth offending to explore the contributing factors to antisocial and offending behaviour. Finally, chapter two includes a review of empirically supported risk and protective factors identified for youth offenders and summarises the most empirically researched and validated model of offender assessment and management: The Risk-Need-Responsivity (RNR; Bonta & Andrews, 2017) model. The RNR model is the primary theoretical and empirical basis underpinning the empirical studies included in this thesis.

Chapter three includes an overview of the relevant history of youth risk assessment, a summary and review of the two major approaches to standardised risk assessment (i.e.,

structured and unstructured clinical judgment), and implications for practice and future research. This chapter provides an overview of current best practice approaches to risk assessment with young offenders, including the selection of appropriate risk assessment tools.

Study one is presented in chapter four. This study was a random-effects meta-analysis of three standardised risk assessment tools for predicting general recidivism in youth: the YLS/CMI (Hoge & Andrews, 2003), the Youth Assessment and Screening Inventory (YASI; Orbis Partners, 2000) and the Youth Actuarial Risk Assessment Tool (Y-ARAT; van der Put, 2014). While there is an emerging body of evidence supporting the utility of risk assessment tools, it has not been established whether there is a superior risk assessment tool for predicting general recidivism in youth. This meta-analysis provides an update to previous research on the three standardised risk assessment tools used to assess general reoffending risk in youth. Overall, the three risk assessment tools performed similarly in terms of predictive validity, with no superior risk assessment tool identified. The implication for clinical practice is that the use of these tools may be appropriate for youth offenders when predicting general risk but should be interpreted and applied with caution.

Study two is presented in chapter five and examines the reliability and validity of the YLS/CMI with a large sample of young offenders in Western Australia ($N = 4653$). This study presents the results of two analyses. The first examines the properties of the YLS/CMI, including factor structure, internal consistency, and differences between male and female youth, and between Indigenous and non-Indigenous youth. The findings contribute insight into the importance of specific risk and need factors for minority groups in the sample, including Indigenous and female youth. The second analysis examines the predictive validity of the YLS/CMI in a subsample of 921 youth with a minimum follow-up period of two years. The findings provide empirical support for the use of the YLS/CMI as a reliable method for conducting general risk assessments with young West Australian offenders.

Study three is presented in chapter six and expands on the findings from study two, utilising the same dataset. This study aimed to provide insight into the specific presentation of factors associated with recidivism risk in the West Australian juvenile offender population and to explore the differences between Indigenous and non-Indigenous youth in terms of criminogenic risk and need profiles. Another aim was to explore and test the most predictive combinations of the YLS/CMI risk factors to determine if a shortened version of the tool could be utilised to improve its predictive utility for both Indigenous and non-Indigenous juvenile offenders. Results highlight the significance of specific risk factors for Indigenous and non-Indigenous youth offenders and confirm that a shorter version of the tool can be used to improve the predictive validity for both groups.

Finally, chapter seven provides a general discussion which includes a summary of key findings from each of the included studies. General strengths and limitations of the research are discussed, followed by recommendations and implications for future research.

Chapter 2: Introduction

This chapter provides an overview of youth crime and considers current trends in youth offending within an Australian context with a particular focus on the overrepresentation of Indigenous young people in the criminal justice system. This chapter also reviews theories of juvenile offending, differentiating between micro (individual) and macro (environmental) level theories to explore the contributing factors to antisocial and offending behaviour in youth. Finally, I review the empirically supported risk and protective factors for youth offenders and conclude with a summary of the most empirically researched and validated model of offender assessment and management: The Risk-Need-Responsivity (RNR) model. The RNR model is the primary theoretical and empirical basis underpinning the studies included in this thesis, including the Youth Level of Service/Case Management Inventory (YLS/CMI) risk assessment tool that is the focus of evaluation in this research.

Overview of Youth Crime

According to the age-crime curve, adolescents and young adults are more likely to engage in offending and delinquent behaviour than any other age group (Farrington, Loeber, & Jolliffe, 2008; Viljoen, Gray, & Barone, 2016). It has been well established that the age-crime curve peaks during adolescence (Barbot & Hunter, 2012; Landsheer & van Dijkum, 2005) and that the severity and rate of offences during adolescence are strong predictors of continued offending (Barbot & Hunter, 2012; Overbeek et al., 2001). In Australia, the rate of juvenile offending has consistently been higher than that of adult offending, with young people between 15-19 years of age continuing to commit the highest rates of crime compared to any other age group (Australian Bureau of Statistics [ABS], 2021). Despite being the highest risk age group for offending, over the past decade rates of youth crime have decreased across most Australian jurisdictions, with the rate of police proceedings against young people declining 36% (Clancey, Wang, & Lin, 2020).

The majority of all juvenile crime is committed by young males. This pattern is a universal observation in criminology and has remained for decades (Barber & Hunter, 2012; Kempf-Leonard, 2012; Kennedy et al., 2020; Tracy et al., 2009). Over the past few decades, arrest rates have declined for both male and female youth, although the female arrest rate declined less than that for males and has been relatively stable in recent years in comparison (Kempf-Leonard, 2012; Tracy et al., 2009). This is consistent with trends in Australia that have shown that the rates of detention and community-based supervision of young male offenders have decreased in recent years, whereas the rates for young female offenders have fluctuated and remained relatively stable (Australian Institute of Health and Welfare [AIHW], 2021).

Although youth crime rates have declined over the past decade, it is not feasible to simply wait until young people mature out of their offending behaviour, given the enormous economic and victim-related costs associated with youth crime (Viljoen et al., 2016). Preventing a single young person from engaging in a life of crime can save society, on average, $2.6 to $5 million which includes operational costs, such as running youth detention facilities, and victim-related costs, such as the provision of medical and mental health care (Cohen & Piquero, 2009; Viljoen et al., 2016).

Theories of Youth Offending

There are various theories that have attempted to explain the causes and correlates of youth offending. Theories on the development, trajectory, and desistence of youth crime can be separated into two broad categories, micro-level and macro-level theories. Micro-level theories focus on psychological and individual-based characteristics (e.g., developmental, personality, cognitive functioning, and mental health), that exist within individuals and interact with the external environment (Kennedy et al., 2020). Macro-level theories are more sociologically based and include reference to the influence of extrinsic factors such as social

learning, community-based, control, and deterrence (Kennedy et al., 2020). Irrespective of different aetiological explanations, one point that most researchers agree on, is the relationship between crime and age – that is, as age increases, crime rates decrease (Mazerolle & McGee, 2017). There are, however, points of disagreement amongst scholars in the explanation of this phenomenon.

Micro-level Theories of Youth Offending: Developmental Perspectives

One of the most prevalent theories of criminal development is the dichotomy described by Moffitt (1993) differentiating between *adolescent-onset* and *life-course persistent* offenders. In this model, *adolescent-onset* or *adolescent-limited* offenders describe young people who begin engaging in antisocial and offending behaviour during early adolescence. These young people rarely engage in severe offending or violence and typically cease their antisocial and offending behaviour by late adolescence or early adulthood (Moffitt, 1993). In contrast, *life-course persistent* offenders typically begin their offending behaviour earlier in childhood, commit a higher number and severity of offences, and persist in this behaviour throughout their lives (Moffitt, 1993). For young people in this category, antisocial and offending behaviour is not considered to reflect 'normal' progression through adolescence but rather, represents a lifestyle. Individuals in this category are more frequently diagnosed with conduct disorder in childhood and antisocial personality disorder in adulthood (Miller, 2014; Moffitt, 1993). Thus, Moffit (1993) posits that *adolescent-limited* offending is representative of a stage of normative adolescent rule-breaking whereas *life-course persistent* offending represents more of a pathological disorder associated with chronic long-term offending.

Subsequent research has largely endorsed and attempted to expand on Moffit's (1993) developmental trajectory model. For example, Dilalla and Gottesman (1989) suggested three pathways to offending, the first two, *transitory antisocial* and *continuous antisocial*, are

largely commensurate with Moffit's (1993) *adolescent-limited* and *life-course persistent*

subtypes. However, Dilalla and Gottesman (1989) identified an additional category, *late*

bloomers, which refers to a subgroup of individuals who have relatively unremarkable

childhood and early teen years before developing offending behaviour in late adolescence or

early adulthood that continues throughout their life. Subsequent research provided some

support for this third category of offenders and identified that females tend to make up most

of the *late bloomers* (see Lyons et al., 1995; Marmorstein & Iacono, 2005). It has been

postulated that females may take longer to develop antisocial attitudes and behaviours and

may not become aggressive in their offending until later in life (Miller, 2014).

A consistent finding from the developmental trajectory perspectives described above

is that a small group of persistent, chronic, lifelong offenders begin their antisocial and

offending behaviour early in childhood/adolescence and commit a larger number and greater

severity of offences (Miller, 2014; Russell & Odgers, 2016). Research shows that *life-course*

persistent offenders have a higher number of family members with criminal histories,

domestic violence, and child abuse compared to *adolescent-limited* offenders (see Russell &

Odgers, 2016). There is some support for a stronger neurogenetic basis for the *life-course*

persistent offenders as they tend to have higher rates of neurodevelopmental and

psychosocial risk factors such as substance abuse, impulsivity, hyperactivity, low verbal IQ,

neuropsychological impairments, and poor academic achievement (Kerridge et al., 2020;

Miller, 2014; Russell & Odgers, 2016).

Young people on the *life-course persistent* trajectory of offending behaviour tend to

experience a range of negative outcomes in adolescence and adulthood. Longitudinal and

population-based studies have shown that young people on this trajectory are more likely to

engage in violence and crime in adulthood, have increased risk for developing mental and

physical health problems, and tend to experience greater financial hardship by age 32 (see

Odgers et al., 2008; Russell & Odgers, 2016). In addition, studies have shown that these youth are more likely to be diagnosed with antisocial personality disorder, have higher levels of substance use, and tend to engage in higher levels of violent behaviour (Harachi et al., 2006; Russell & Odgers, 2016).

Fortunately, population-based studies have shown that *life-course persistent* offenders are relatively rare, corresponding to a rate of 5-6% of all offenders, although this group are responsible for committing 50-60% of all recorded crime across populations (Bassarath, 2001; Blazei et al., 2006; Farrington, 1995; Jacobson et al., 2002; Jaffee et al., 2002; Lahey & Waldman, 2003; Moffitt, 1993; Moffitt & Caspi, 2001; Russell & Odgers, 2016; Taylor et al., 2000; Tremblay, 2001). Consistent with criminal behaviour generally, it is the minority of offenders who commit the most and the worst offending and this extends to youth offenders (Miller, 2014).

Although most of the work on developmental offending trajectories has occurred outside of Australia, the available research suggests that these patterns also extend to Australian offending cohorts (Broidy et al., 2015; Ferrante, 2013b; Livingston et al., 2008). Specifically, studies have shown that males and Indigenous offenders exhibit more serious and chronic patterns of offending in comparison to their female and non-Indigenous counterparts (Broidy et a., 2015; Ferrante, 2013b; Fitzgerald et al., 2012). Collectively, the research suggests that minority populations, including Indigenous Australian offenders, populate *life-course persistent* trajectories at higher rates than non-Indigenous offenders (Broidy et al., 2015). Similar to minority populations that are overrepresented in the American criminal justice system, it has been argued that the higher proportion of *life-course persistent* Indigenous offenders is a reflection of the disadvantages that accrue to minority populations, along with structural and systemic biases (Broidy et al., 2015).

Macro-Level Theories of Youth Offending: Sociological Perspectives

Generally speaking, sociological theories of youth offending argue that societal factors and social processes create opportunities for young people to develop criminal behaviour. Bandura's (1977) social learning theory provides a framework for understanding youth crime through processes in which the child observes, models, and imitates others (Mazerolle & McGee, 2017). Children learn through life experiences such as watching their parents engage in antisocial and criminal behaviour, watching friends fight, or seeing violence in video games or in movies. It has been argued that children learn these patterns of behaviour from family and peers and may internalise them as acceptable. Thus, this pattern of social learning can contribute to the onset and maintenance of criminal behaviours (Blazei et al., 2006; Mazerolle & McGee, 2017; Miller, 2014).

Similar to social learning theory, differential association theory posits that juvenile crime is primarily learned through association with other antisocial peers (Sutherland & Cressey, 1978). Simourd and Andrews (1994) expanded on the theory and argued that behaviour develops through interactions with others and tends to reflect the values of the group that people spend the most time with (Mazerolle & McGee, 2017). The theory asserts that individuals are presented with both prosocial and antisocial pathways of behaviours through interactions with others. Pathway selection is dependent on whether the person possesses the necessary skills for committing the behaviour and whether they have received any positive reinforcement favouring that pathway (Mazerolle & McGee, 2017). Ultimately, this model argues that youth offending is the result of an attitude transference, whereby the young person adopts and absorbs the attitudes of their antisocial peers. Adolescents are more likely to engage in offending behaviour if it has previously been reinforced by others, and when continued reinforcement for such behaviour is anticipated (Mazerolle & McGee, 2017).

There is an extensive literature base that supports the tenets of social learning theory and differential association theory (Blazei et al., 2006). For example, one of the strongest predictors of continued juvenile offending is the number of delinquent or antisocial peers that a young person has (Beaver et al., 2009; Miller, 2014).

In addition to the influence of peers, family factors are also important in youth offending behaviour. A well-established observation in criminology is that criminal behaviour tends to run in families (Miller, 2014; Thornberry et al., 2003). The purported causal mechanisms involved in this phenomenon have been examined through family, twin, and adoption studies. Research has supported a genetic predisposition for antisocial behaviour that is subsequently strengthened by the family environment (Caspi et al., 2002; Foley et al., 2001; Jacobson et al., 2002; Thornberry et al., 2003). For example, if either parent has been diagnosed with antisocial personality disorder, there is a greater probability that their biological children will receive a diagnosis of conduct disorder, and this risk is higher for boys (Gard et al., 2019; Jacobson et al., 2002; Wesseldijk et al., 2018). Generally, twin studies have shown that genetic factors account for approximately 50% of the variance in the development of conduct disorder for adolescents, with the contribution of the shared family environment accounting for 10-17% (Polderman et al., 2015; Wesseldijk et al., 2018). Longitudinal twin studies indicate the stability of conduct and antisocial personality problems over time is mainly a reflection of genetic factors (Hicks et al., 2007; Meier et al., 2011; Wesseldijk et al., 2018). However, environmental factors are also important in the risk of developing antisocial behaviour in youth. For example, negative parent-child interactions characterised by maltreatment, harsh, inconsistent and/or abusive parenting have been strongly associated with offending behaviour in youth (Fairchild et al., 2019; Wesseldijk et al., 2018). Conversely, research has shown that more supportive family environments

(Fairchild et al., 2019; Salvatore & Dick, 2018) and adoptive mothers' positive parenting practices (Hyde et al., 2016) reduce the influence of genetic contribution.

Youth Offenders: Risk and Protective Factors

It is clear from the available research that the causes of youth offending are multifaceted and complex and include an interaction between genetic and environmental factors. Whilst there are differences in the causal explanations, research on youth crime has been dominated by what is commonly referred to as 'risk factor research'. Glueck and Glueck (1930) are credited with the first longitudinal developmental risk factor study that was fundamental in creating a systematic method for identifying and measuring risk factors associated with offending. Glueck and Glueck (1930) quantified behavioural observations to provide empirical evidence for risk factors and this approach has since been replicated numerous times to obtain further support for the relationship between risk factors, offending, and recidivism (Fearn, 2014). There is now a large base of empirical research identifying the factors that are statistically related to the development and maintenance of criminal behaviour, and this has been significant in the identification and management of offenders (see Bonta & Andrews, 2017; Farrington, 1998; Heilbrun et al., 2005; Vincent et al., 2009).

Research differentiates criminogenic risk factors into two categories: static and dynamic risk factors. Static risk factors are often referred to as 'unchangeable' risk factors as they refer to historical factors that cannot be altered such as number of prior convictions, age of first offence, or a history of failing to comply with legal sanctions. Conversely, dynamic risk factors are amenable to change (e.g., antisocial attitudes, peer relationships), and are often referred to as 'changeable' risk factors. Dynamic risk factors are further delineated into those that are considered stable (i.e., relatively persistent over time but amenable to change) and acute (i.e., have a tendency to fluctuate quickly). The likelihood of an individual engaging in criminal conduct is increased when criminogenic risk factors are present. Risk of

offending is generally additive in that an individual's risk of offending tends to increase with the amount of risk factors they possess (Bonta & Andrews, 2017; Fortune & Heffernan, 2019). Table 1 provides a summary of the empirically supported criminogenic risk factors for offending in adolescence adapted from Armytage and Ogloff (2017).

Table 1

Summary of Risk and Protective Factors for Offending in Adolescence

Domain	Risk Factors	Protective Factors
Individual		
Developmental	Pre/peri-natal problems Chronic illness Low birth weight Low resting heart rate	
Cognitive	Poor problem solving Poor concentration Low intelligence Impulsivity	Higher intelligence Positive coping skills
Attitudes/beliefs	Beliefs supporting aggression/violence Attribution bias (hostile/external locus of control) Low self-worth Lack of empathy Rebelliousness/defiance Dishonesty	Prosocial attitudes Religious involvement Attitudes intolerant of violence
Mental health	Conduct Disorder/externalising disorders Callous/unemotional traits, psychopathic traits Hyperactivity/ADHD	Absence of internalising disorders
Behaviour	Drug and alcohol use Poor social skills Risk taking/sensation seeking Early violence/aggression Involvement in non-violent crime	Strong social skills

Domain	Risk Factors	Protective Factors
Family		
Parental relationship	Low parental attachment/bonding Product of unwanted pregnancy Young mother Low parental involvement High permissiveness	Nurturing relationship with parent (warm, supportive) Strong parent/child communication
Sibling relationship	Delinquent siblings	
Parental management	Lack of parental monitoring Lack of clear guidelines Severe or inconsistent discipline Parental attitudes regarding crime, violence, and substance use Parental criminality/violence Physical abuse/neglect Involvement of supervisory services (e.g., DCPFS)	Good parental management Improved parental management Consistent expectations of punishment for bad behaviour
Family structure	Parental conflict Parent separation Parent/child separation Large family size	
Peer Relationships		
	Absence of peers Delinquent peers Gang involvement	Mixed gender peers Parental approval of peers Socially supportive friends Socially acceptable peers
School		
Academic	Poor academic performance Poor engagement with school	
Behaviour	Truancy Suspension	
Systemic	Low school involvement Low attachment to or poor relationships with teachers Poor quality school, overcrowding Poor classroom management Frequent school changes	Strong school ties Adult mentor within school or nurturing relationship with teacher

Domain	Risk Factors	Protective Factors
Community		
Crime	Victim of violent crime	
	High crime neighbourhood/violence exposure	
	Availability of drugs and guns/weapons	
Economic and social	Poverty	
	High transience	
	Exposure to racial prejudice	
	Community disorganisation	
	Low community participation	
Situational Context		
	Availability of weapon	
	Alcohol/drug consumption	
	Victim/offender relationship	
	Motivation	
	Behaviour of others	

Note. Summary of risk and protective factors for offending in adolescence adapted from Armytage & Ogloff (2017; Appendices, pp. 24-26).

Culturally Specific Risk and Protective Factors

The empirically supported risk and protective factors for youth offending are generally applicable across cultures. However, there is some research indicating that additional risk factors may be important in the prediction of recidivism for Indigenous offenders. There are some culturally specific factors that have also been found to reduce the likelihood of involvement with the justice system (i.e., protective factors). In a recent Australian sample, a strong sense of cultural identity in conjunction with active participation in traditional activities (cultural engagement) was shown to negatively predict violent recidivism (Shepherd et al., 2018). In an earlier study, Ferrante (2013a) found connection to community and cultural strength to operate as protective factors that tend to mitigate involvement in the justice system. Ferrante's (2013a) study provided empirical support to the

importance of social relationships and connections within Indigenous communities. Ferrante's (2013a) research also provided support for the role that socioeconomic disadvantage plays in the overrepresentation of Indigenous peoples in the criminal justice system.

Risk factors relating to family circumstances, parenting, accommodation, and substance use tend to be more prevalent for Australian Indigenous youth involved in the justice system. For example, research has shown that more Indigenous youth (61%) under juvenile justice supervision had involvement with child protective services compared to non-Indigenous youth (48%; AIHW, 2020a). Indigenous youth in Australia have also been found to be 14 times more likely to be engaged with both drug and alcohol services compared to non-Indigenous youth (AIHW, 2018). Studies examining Indigenous Canadian youth and adults have found that a history of victimisation and emotional problems, and lack of spiritual support from family or community elders were significant positive predictors of general recidivism (Gutierrez et al., 2013; Wilson, 2016). Although the factors outlined above are not unique to Indigenous youth in the justice system, they can be understood as uniquely related to historical injustices and intergenerational marginalisation experienced by Indigenous peoples (Lockwood et al., 2018; Milroy et al., 2021). Consequently, risk and protective factors for Indigenous youth must be considered within a context of social disadvantage and an oppressive relationship with a justice system that is characterised by systemic racism (Cunneen, 2014; Milroy et al., 2021).

Overrepresentation of Indigenous Youth

Overrepresentation refers to both *racial disparity* (i.e., legal system inequality in the treatment/sentencing of youth of colour compared to white youth) and *racial disproportionality* (i.e., rates of involvement in the criminal justice system exceed general population rates; Abrams et al., 2021; Fong et al., 2014). Young Indigenous people have been

significantly overrepresented in the justice system in Australia for decades (Allard et al., 2020; AIHW, 2021). According to the Australian Institute of Health and Welfare (2021), Indigenous youth comprise about 6% of the total Australian population but account for approximately 50% of the young people in detention or those under community supervision on any given day. This equates to a ratio difference of 16:1; that is, Indigenous youth are 16 times more likely to be under community supervision compared to non-Indigenous youth (AIHW, 2021). Western Australia had the highest rate of Indigenous youth under community supervision between 2019-2020 (201 per 10,000) compared to any other Australian state (AIHW, 2021). On average, Indigenous youth in Western Australia were almost 36 times more likely to be in detention compared to non-Indigenous youth on any given day (AIHW, 2021). Despite well-intentioned efforts and significant investments to reduce the overrepresentation of Indigenous people in the criminal justice system, the gap has continued to widen and Indigenous youth in Australia are now overrepresented in detention populations more than any other point in history (Allard et al., 2020).

A recent study by Allard and colleagues (2020) found significant differences in economic costs between chronic Indigenous youth offenders ($380,097) compared to chronic non-Indigenous youth offenders ($74,798) over the course of their adolescence. Allard and colleagues (2020) included police, court, and sanction/supervision costs in their analysis and noted the significant differences in costs was likely a reflection of the greater frequency and length of youth justice sanctions for the Indigenous cohort, particularly in regard to probation orders and detention. Given the relatively high costs associated with the Indigenous offending cohorts, Allard and colleagues (2020) argued that the cost estimates included in their analyses may be particularly useful for approaches that aim to reduce Indigenous overrepresentation in the justice system, such as prevention programs and justice reinvestment initiatives. To reduce Indigenous overrepresentation, the researchers identified the need to better understand

the causes of Indigenous overrepresentation and to ensure equitable processes at each stage of the criminal justice system.

The issue of Indigenous overrepresentation in the youth justice system is covered in more depth in chapter six. In brief, various factors have been identified as contributing to the overrepresentation of Indigenous youth in the justice system including: the oversurveillance and criminalisation of 'normal' adolescent behaviours (Henning, 2012), implicit and explicit biases held by those working in the legal system such as police and judges (Fader et al., 2014), and school policing and harsh disciplinary practices that target youth of colour (Hughes et al., 2020). In Australia, researchers have examined additional risk factors specific to Indigenous peoples, including dislocation, exposure to traumatic events, community dysfunction, and racism (Dudgeon et al., 2014; Ferrante, 2013a). These factors have been linked to the legacy of colonisation, intergenerational trauma and marginalisation, destruction of Indigenous economies and political structures, division of Indigenous families, and the systematic suppression of Indigenous views and culture (Dudgeon et al., 2014; Lockwood et al., 2018; Shepherd et al., 2015; Zubrick et al., 2014). Acknowledging the impact of colonisation, empowering elders, and incorporating Indigenous cultural norms and values into the court and justice system processes have been identified as potential strategies to transform the delivery of justice for Indigenous offenders (Marchetti, 2014).

The Risk-Need-Responsivity (RNR) Model

The most empirically examined and supported model of effective offender assessment and intervention is the Risk, Need, Responsivity model (RNR; Andrews et al., 1990; Bonta & Andrews, 2017). The RNR model identifies 'the central eight' criminogenic risk factors that are the most predictive of offending behaviour, supported by decades of empirical research (Bonta & Andrews, 2017). The central eight criminogenic risk factors include: criminal history (static), education/employment (dynamic), family/marital (dynamic),

leisure/recreation (dynamic), antisocial associates (dynamic), substance abuse (dynamic), procriminal attitudes/orientation (dynamic), and antisocial patterns (dynamic). Within the RNR model, the *risk principle* proposes that the intensity of intervention and services provided should be matched to the level of risk (e.g., high, moderate, low) posed by an offender. The *need principle* denotes that the focus of the interventions/services should be on the individual criminogenic needs (i.e., dynamic risk factors) that are identified. The *responsivity principle* states that any interventions/services should be tailored or adapted to accommodate for the individual learning style and needs of the offender to maximise their ability to engage.

The RNR model has been applied and carefully scrutinized over the past few decades, with its many strengths and weaknesses considered (Fortune & Heffernan, 2019; Hoge, 2016). The development of the RNR model was grounded in the available empirical data making its predictive accuracy, empirical adequacy, and scope, some of the model's biggest strengths (Brogan et al., 2015; Fortune & Heffernan, 2019; Hoge, 2016). The early development of the RNR model was informed by meta-analyses (see Gendreau et al., 1996) and there continues to be a strong reliance on meta-analyses and empirical evidence to further develop and evaluate the model (Bonta & Andrews, 2017; Fortune & Heffernan, 2019; Hoge, 2016). Research has strongly supported the assertion that correctional agencies and treatment/intervention services delivered in a manner consistent with the principles of RNR, tend to produce larger reductions in recidivism (Bonta & Andrews, 2017; Hoge, 2016). In addition, the RNR model has demonstrated a broad scope of application in its ability to inform interventions for specific offence types (e.g., violent, non-violent, and sexual offending) and across different demographic groups including adults, youth, western and non-western cultural groups, males and females (e.g., Bonta & Andrews, 2017; Brogan et al., 2015; Chu et al., 2012; Cuervo & Villaneuva, 2015; Hoge, 2016).

Despite its strong empirical base, critics have questioned the practical utility of the RNR model and its lack of specificity. Some researchers argue that the model pays insufficient attention to the importance of intrinsic factors (e.g., personal identity, autonomy) and relationship factors (i.e., rapport, building a strong therapeutic alliance), which makes it difficult to motivate offenders as the focus of intervention is primarily on risk reduction (Fortune & Heffernan, 2019; McNeill et al., 2012; Ward et al., 2007). Similarly, some critics have suggested that the focus of the RNR on addressing criminogenic risk factors leads to neglect of more basic human needs, such as pursuing intellectually satisfying goals (Brogan et al., 2015; Fortune & Heffernan, 2019; Hoge, 2016). Critics have further argued that the focus on addressing risk deters practitioners from addressing barriers that may impact young people's motivation for change such as low self-esteem and distrust (Brogan et al., 2015; Hoge, 2016). In response to these criticisms, Bonta and Andrews (2017) have continued to expand the RNR model to include strength/protective factors and additional principles that promote a humane and caring approach to assessment and intervention with youth offenders.

This chapter has examined youth crime, theories of youth offending, risk and protective factors associated with youth offending, and the RNR model. In the next chapter I build on this to examine how this research has contributed to contemporary risk assessment and risk management approaches with youth offenders.

Chapter 3: Literature Review of Risk Assessment Practices with Youth Offenders

This chapter provides an overview of the relevant history of youth risk assessment, a summary of the two major approaches to standardised risk assessment (i.e., structured and unstructured clinical judgment), and implications for practice and future research. The practice of conducting risk assessments with adult offenders is well supported by an extensive body of empirical research (see Bonta & Andrews, 2017; Guyton & Jackson, 2016). Decades of research has led to the identification of risk and protective factors for adult offenders, development of assessment and intervention frameworks, and development of risk assessment instruments that can reliably predict risk of reoffending (Bonta & Andrews, 2017; Guyton & Jackson, 2016). In contrast, research in the area of youth risk assessment has received less attention from researchers and policymakers (DeMatteo et al., 2016).

History of Youth Risk Assessment

Risk assessment is an integral clinical task that is required in many legal decisions, including those pertaining to juvenile offenders. In this context, *risk* refers to the potential for engaging in future or continued criminal activity and decisions often need to be made about whether the young person's risk is sufficiently great that some type of intervention is required (Hoge, 2012; Vincent et al., 2012). Risk assessment tools have been developed to evaluate a young person's risk of reoffending and to help answer the question "Is this young person at relatively low or relatively high risk for reoffending?" (Vincent et al., 2012).

Youth risk assessment and management frameworks are grounded in adult risk assessment frameworks and have been further developed by applying research specific to youth crime (DeMatteo et al., 2016; Hoge, 2012). Research on youth risk assessment initially lagged behind the field of risk assessment with adult populations, with the first risk assessment tools for youth being developed years after the first adult risk assessment instruments were introduced (Viljoen et al., 2016). When the field of youth risk assessment

first began emerging, researchers and practitioners raised concerns about the challenges of assessing adolescent's long-term risk given the considerable developmental changes that occur during adolescence (DeMatteo et al., 2016; Viljoen et al., 2016). For example, the American Psychological Association (2004) argued that mental health professionals' ability to reliably distinguish between youth who will continue offending as adults and youth who are just engaging in 'reckless experimentation' is limited. Despite this, subsequent research has supported the identification of specific risk and protective factors for youth offenders and contributed to the development of evidence-based, youth-specific risk assessment tools that are widely used today (DeMatteo et al., 2016; Hoge, 2012; Viljoen et al., 2016).

Contemporary youth risk assessment reflects the convergence of trends in the understanding and treatment of juvenile offenders as separate to adult offenders in the court and legal systems (DeMatteo et al., 2016; Viljoen et al., 2016). Although there are many similarities in risk assessment between adult and juvenile populations (e.g., using validated tools, collecting collateral information), there are some important differences. Most notably, there is a recognition that in order to meaningfully assess and interpret risk in youth, assessors must be knowledgeable about developmental factors that may contribute to offending behaviour (Viljoen et al., 2016). The increased rates of offending during adolescence are, in part, influenced by developmental factors including susceptibility to peer influence and brain development (Viljoen et al., 2016). Compared to adults, adolescents are much more susceptible to the influence of antisocial peers and as such, peer factors (e.g., peer delinquency) are particularly strong predictors of youth offending (Beaver et al., 2009; Miller, 2014; Viljoen et al., 2016). Young people also show greater sensitivity to rewards compared to adults, meaning that they tend to focus more on the potential rewards of antisocial behaviour (e.g., opportunity to impress peers, develop reputation) rather than the potential consequences (e.g., legal sanctions, punishment; Monahan et al., 2013; Viljoen et

al., 2016). Research on brain development in adolescence has shown that this heightened sensitivity to rewards is a reflection of increased dopaminergic activity that occurs in the prefrontal brain (Casey et al., 2008; Viljoen et al., 2016). In contrast, the executive functioning region of the brain that is responsible for planning and regulating behaviours/impulses is not fully developed until at least the mid-20s (Casey et al., 2008; Viljoen et al., 2016). Consequently, arousal and reward sensitivity increase at a time when adolescents have not yet developed the cognitive capacity to effectively control their behaviours and impulses.

Current best-practice approaches to youth risk assessment take into account the developmental context of youth offending, consider developmentally appropriate behaviours, and recognise that adolescence is a transformative period of growth. The biological, cognitive, and psychosocial changes that occur during adolescence can often make it difficult to determine whether a given risk factor is reflective of innate characteristics or simply developmentally driven (DeMatteo et al., 2016). Therefore, youth risk assessments should include an evaluation of whether identified risk factors are developmentally appropriate and whether or not they can be changed over time (DeMatteo et al., 2016). Many practitioners and researchers recommend adopting a 'dynamic' approach to risk assessment for youth, encouraging regular reassessment to account for the rapid changes that occur during adolescence (Mulvey et al., 2010; Vincent et al., 2012; Worling et al., 2012). In line with this approach, many of the standardised risk assessment tools that have been developed to assess risk of reoffending in youth have conceptualised risk as dynamic and therefore include more dynamic (changeable) risk factors (DeMatteo et al., 2016; Hoge, 2012; Viljoen et al., 2016).

Contemporary Approaches in Youth Risk Assessment

Using standardised measures to evaluate the risk of reoffending in youth is fundamental in aiding clinical judgement and decision-making. Prior to the late 1990s,

standardised risk assessment tools for youth were generally non-existent (Viljoen et al., 2016). Clinicians typically relied on their own unstructured clinical judgment when predicting risk of reoffending or future 'dangerousness' and these unstructured prediction estimates were proven to be wildly inaccurate (Singh, 2012). For example, an early study by Thornberry and Jacoby (1979) found that only 11% of individuals who clinicians had predicted would be violent were arrested for a violent crime within four years of discharge from an institution for mentally disordered offenders. Research has continued to show that standardised risk assessment tools outperform unstructured clinical judgments in predicting antisocial and offending behaviour (Ægisdóttir et al., 2006; Viljoen et al., 2016; Vincent et al., 2012). Fortunately, a number of well-validated risk assessment tools have since been developed and are widely used in contemporary youth risk assessment processes.

There are generally two broad categories distinguishing between the types of risk assessment tools available. The first refers to actuarial risk assessment tools that generally involve adding up scores on risk factors and using specific cut-offs to estimate the likelihood of future reoffending (Viljoen et al., 2016). Actuarial tools have proven to be effective in terms of predictive power and classifying who will and won't reoffend (see DeMatteo et al., 2016; Olver et al., 2009). However, actuarial tools typically only include static (unchangeable) risk factors and the focus therefore is on risk prediction, rather than risk management. Critics have argued that this approach has limited utility because predicting if someone will reoffend, in and of itself, has little value if nothing is done to manage the risk (Viljoen et al., 2018). The second category refers to risk instruments that are guided by structured professional judgement (SPJ) and involve the use of clinical judgements within a structured framework (Hoge, 2012; Viljoen et al., 2016). In this approach, the assessor considers the data collected from the risk assessment and utilises their professional discretion to formulate an estimate of reoffending risk. The SPJ approach allows the assessment to be

more individualised to some degree as the assessor is able to consider individual/case-specific factors that are important but may not be captured in the risk items included in the assessment tool (Viljoen et al., 2016). SPJ instruments offer more utility in managing and reducing risk by including dynamic (changeable) risk factors that can be targeted in intervention (Viljoen et al., 2018). Both actuarial and SPJ approaches have pros and cons and there has been some debate regarding the merits of each approach (Viljoen et al., 2016). Although both types of tools are supported by research (see Olver et al., 2009; Schwalbe, 2008; Yang et al., 2010), most contemporary risk assessment tools are based on the SPJ model and tend to be the preferred option for forensic psychologists (Viljoen et al., 2016).

Benefits of Using Standardised Risk Assessment Tools

The use of standardised risk assessment tools is considered one of the core components of best practice in the field of youth risk assessment and management. Since standardised tools have demonstrated superiority in predicting offending behaviour, proponents argue that risk assessment tools are essential in guiding sentencing and post-adjudication decisions (Ægisdóttir et al., 2006; DeMatteo et al., 2016; Elek et al., 2015; Thompson, 2017). In addition, risk assessment tools increase the consistency, objectivity, and transparency in decision-making processes as key decision-makers must consider the same inventory of empirically supported risk factors for each youth (Hoge 2012; Jonnson & Viljoen, 2021).

Standardised risk tools can also be used to guide interventions and assist with allocation of resources, particularly when the RNR principles are applied to the assessment and management of risk (Bonta & Andrews, 2017; DeMatteo et al., 2016; Viljoen, Brodersen et al., 2016). In line with the RNR model, research has shown that higher risk youth benefit most from intensive intervention and risk management strategies, whereas lower risk youth benefit most from diversion away from the youth justice system (Bonta & Andrews, 2017;

Lipsey, 2009; Singh et al., 2014). Given their utility in identifying low risk youth for diversion, standardised risk assessment tools have been indicated as one way to reduce overincarceration while protecting public safety (Jonnson & Viljoen, 2021; Vincent et al., 2016).

Limitations of Using Standardised Risk Assessment Tools

Although most researchers and clinicians appear to view risk assessment tools as beneficial in aiding risk management and reduction efforts, this viewpoint is not shared by all. Some critics have argued that risk assessment tools may be harmful to young offenders due to the potential for pejorative labelling (e.g., high-risk) which could lead to stigmatisation and contribute to overincarceration and 'warehousing' of individuals labelled as such (DeMatteo et al., 2016; Viljoen et al., 2018). Similarly, concerns have been raised about the potential for the inappropriate withdrawal of resources for youth identified as low risk, as these individuals might be incorrectly perceived as not needing any treatment or intervention (Viljoen et al., 2018).

It has been argued that risk assessment tools unfairly bias minority populations, as most assessment tools have been normed on the social and historical experiences of non-Indigenous offenders, primarily from North America (Muir et al., 2020). Consequently, critics have argued that marginalised groups will score higher on these assessment tools due to their increased exposure to risk and social inequality, as opposed to a higher propensity for crime (Hannah-Moffat, 2012; Lockwood et al., 2018). Several studies have found that actuarial risk assessments *do* introduce racial bias into decisions, as they tend to include more static risk factors that place people of colour at a disadvantage (see Barbaras et al., 2019; St John et al., 2020). However, there is evidence that SPJ assessment tools have equivalent accuracy in predicting reoffending across racial and ethnic groups and final risk decisions do *not* reflect racial bias (Muir et al., 2020; Munoz et al., 2021; Perrault et al., 2017). There is a

dearth of empirical research examining the cross-cultural utility of risk assessment tools for Australian youth, with further replicative work needed. Of the limited Australian studies available, the research tends to support the generalisability of SPJ assessment tools across racial and ethnic groups (see Frize et al., 2008; Shepherd et al., 2014; Thompson & McGrath, 2012). Generally, Indigenous Australian youth have been found to score higher on SPJ risk assessment measures compared to non-Indigenous youth although the research suggests that total scores are likely artificially inflated because of static factors associated with minority disadvantage (Frize et al., 2008; Shepherd et al., 2014; Thompson & McGrath, 2012). Consequently, there is an argument for the focus of risk assessments to move away from risk level and towards targeting individual risk factors for management purposes.

Summary and Conclusions

Although research on youth risk assessment has increased considerably over the past two decades, knowledge of best practice in the assessment of youth risk of reoffending is still somewhat limited. Fortunately, the research base continues to grow and professionals who conduct risk assessments with youth can refer to the available literature for emerging guidance (DeMatteo et al., 2016). Conducting risk assessments with youth offenders requires careful consideration of multiple factors. At a minimum, practitioners conducting youth risk assessments should be knowledgeable about developmental factors that contribute to antisocial and offending behaviour. Furthermore, risk assessments should be evidence-based; practitioners and policymakers who work in the youth justice field should select appropriate risk assessment tools that are standardised and empirically supported (DeMatteo et al., 2016). There is support for the use of standardised risk assessment tools, particularly those that are grounded in the SPJ approach as the focus of these instruments tends to be less on risk level and more on risk management. Current best practices indicate youth justice systems that utilise standardised procedures are more effective at reducing recidivism than those relying

solely on clinical or unstructured approaches. There is, however, an ongoing need to examine the effectiveness of youth risk assessment tools and procedures, particularly with minority and marginalised populations, to ensure continued evidence-based policy change. Ultimately, these practices should aim to increase public safety by reducing youth reoffending rates, diverting young people away from the justice system, and implementing supports to improve adolescents' quality of life.

This chapter has reviewed the relevant history of youth risk assessment, provided a summary of the two major approaches to standardised risk assessment (i.e., structured and unstructured clinical judgment), and implications for practice and future research. The next chapter builds on the need to examine the effectiveness of youth risk assessment tools and procedures, and includes a meta-analysis evaluating three standardised risk assessment tools for young offenders.

Chapter 4: Meta-Analysis of Three Standardised General Risk Assessment Tools for Youth Offenders

Chapter Introduction

This chapter contains the manuscript findings from a meta-analysis of three standardised risk assessment tools for youth, which has been submitted for publication in *Law and Human Behavior*. The meta-analysis was carried out as part of Study One (Figure 1). This chapter is presented in journal article format and readers wishing to cite this paper are encouraged to source the final published version.

Figure 1

Flow Diagram of Research Objectives Highlighting Study One and Objective One

Study One: Meta-analysis	Study Two: Empirical Evaluation	Study Three: Empirical Evaluation
• Objective one: to examine the effectiveness of general risk assessment tools for youth.	• Objective two: to evaluate the utility and validity of the YLS/CMI for West Australian youth.	• Objective three: to establish whether risk factors associated with recidivism differ between Indigenous and non-Indigenous youth in Western Australia.

Abstract

It is common practice for clinicians to use risk assessment tools when assessing risk of recidivism. While there are several youth risk assessment tools that are widely used, it has not been established whether there is a superior risk assessment tool for predicting general recidivism in youth. This meta-analysis examines three standardised risk assessment tools for the prediction of general recidivism in juvenile offenders: The Youth Level of Service/Case Management Inventory (YLS/CMI); the Youth Assessment and Screening Inventory (YASI) and the Youth Actuarial Risk Assessment Tool (Y-ARAT). The search process yielded 59 studies from 2010 to 2021 suitable for the analysis. Of these, 52 examined the YLS/CMI, one examined the Y-ARAT, and seven examined the YASI. Each of the studies was subjected to a quality assessment and results showed little variability in the total quality scores ($M = 23.8$, $SD = 2.35$; range = 17-29) out of a possible 32. A random-effects meta-analysis of the 59 included studies revealed a small-to-moderate summary effect size ($r = .261$, 95% CI = $.231 - .290$, $z = 16.739$ and $p < .001$) in predicting general recidivism. All three measures demonstrated similar levels of predictive validity, with no superior risk assessment tool identified. There was significant variability amongst effect sizes when comparing the different outcome measures (i.e., recidivism) and country of origin. The implications of these findings for clinical practice, correctional agencies, and future research are discussed.

Keywords: risk assessment; youth; recidivism; YLS/CMI; YASI; Y-ARAT

Classifying youth offenders based on their level of recidivism risk is a key task for juvenile justice systems. Classification of offenders based on risk often aids decision making in regard to the type and level of intervention required (Hoge, 2012). Assessments that focus on evaluation of recidivism risk (i.e., criminogenic risk) are also used in legal decision-making processes such as determining whether a young person should receive a custody or community sanction following a conviction. Risk assessments are generally used to identify problematic risk factors that are amenable to treatment, such as substance use, in order to mitigate the future recidivism risk. Assessing criminogenic needs is a key component in risk management practices, particularly when interventions are specified in the judicial action (Hoge, 2012).

Four generations have been identified in the development of risk assessment measures. First generation risk assessments are referred to as unstructured clinical judgement assessments and were based on the unstructured judgement of a professional and their knowledge and experience (Davis & Ogloff, 2008; Schwalbe, 2008). Research has shown that unstructured clinical judgements are relatively poor at predicting recidivism, with an accuracy rate of approximately one out of three (Davis & Ogloff, 2008; Hart 2003; Monahan, 1981). Second generation instruments, known as actuarial risk assessments, comprised mainly of static (unchangeable) risk factors, such as criminal history or age at first offence (Davis & Ogloff, 2008). Whilst actuarial risk assessments have been shown to predict the risk of reoffending with moderate levels of accuracy, they do not provide information on risk reduction strategies (Davis & Ogloff, 2008; van der Put et al., 2014). Third generation instruments are those that include static as well as dynamic (changeable) risk factors, thereby providing insight into potential strategies for managing the risk of recidivism (Bonta & Andrews, 2017; Davis & Ogloff, 2008). Finally, fourth generation risk assessments are those that include protective factors, in addition to static and dynamic risk factors, and they provide

a link between those factors and case management (Davis & Ogloff, 2008; van der Put et al., 2014). Research has continued to demonstrate that structured risk assessments (i.e., second, third, and fourth generation assessments), outperform clinical assessment in terms of predicting recidivism (Bonta & Andrews, 2017; Hoge, 2012).

Using standardised measures to evaluate the risk of reoffending in youth is fundamental in aiding clinical judgement and decision-making. Research on youth risk assessment initially lagged behind the adult risk assessment field, with the first risk assessment measures for youth developed five to ten years after the first adult risk assessment measures (Viljoen, Gray, & Barone, 2016). Youth risk assessment measures have since become widely used (Viljoen et al., 2010; 2016) and research shows that various tools have moderate-to-high predictive validity in predicting violent and general offending for youth (Olver, Stockdale, & Wormith, 2009; Viljoen et al., 2016). Despite this progress, there is still much to be learned about assessing risk in the adolescent offending population.

There is a well-established research base identifying familial, social, and environmental risk factors that increase the likelihood of offending behaviour (Bonta & Andrews, 2017; Eysenck & Gudjonsson, 1989; Farrington, 2005). Bonta and Andrews' (2017) psychology of criminal conduct (PCC) theory asserts that offending behaviour results from interactions between various cognitive, biological, emotional, and personality risk factors. According to the PCC theory, there are numerous pathways to offending, with the risk of engaging in antisocial behaviour increasing as the number of proximal risk factors increases (Bonta & Andrews, 2017; Lennings, 2008). Bonta and Andrews' (2017) identified 'the central eight' criminogenic risk factors that are considered to be theoretically and empirically the most predictive of offending behaviour. The central eight include: criminal history, family/marital, education/employment, antisocial associates, substance abuse, leisure/recreation, antisocial personality patterns, and procriminal attitudes. The central eight

criminogenic risk factors have become operationalised into various instruments designed to evaluate risk of reoffending with adolescents, such as the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2003), the Youth Assessment and Screening Instrument (YASI; Orbis Partners, 2000) and the Youth Actuarial Risk Assessment Tool (Y-ARAT; van der Put, 2014), amongst others.

While our understanding of youth criminogenic risk factors is constantly developing, there have been a few published reviews of youth risk assessment tools. A meta-analysis conducted by Pusch and Holtfreter (2017) found that the YLS/CMI was equally predictive for male and female youth, regardless of recidivism type (i.e., general or violent), geographical location, and sample characteristics. Though Pusch and Holtfreter's findings were largely consistent with an earlier meta-analysis on youth risk assessment tools conducted by Schwalbe (2008), the quality of the studies included in the review was not assessed and there was a specific focus on gender differences with only one assessment tool analysed (i.e., YLS/CMI). In his meta-analysis, Schwalbe (2008) found that third generation risk assessment tools generally had higher levels of predictive validity compared to second generation risk tools. However, Schwalbe (2008) also noted inconsistencies in effect sizes across studies using third generation risk instruments and highlighted the need for more research to identify patterns in predictive validity with more certainty. Prior to the meta-analysis by Pusch and Holtfreter (2017), the most comprehensive review of risk assessment measures for youth was conducted by Olver and colleagues in 2009. In their meta-analysis, Olver et al. (2009) evaluated the predictive validity of three youth risk assessment measures: the YLS/CMI, the Psychopathy Checklist Youth Version (PCL-YV; Forth et al., 2003) and the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006). Olver and colleagues found that each of the three measures were significant in predicting different types of recidivism (i.e., general, nonviolent, and violent recidivism), however, no single instrument

demonstrated superior prediction. This was an interesting finding given that the three tools examined were designed for different purposes, however, the researchers concluded that this was likely a reflection of their content-related overlap and high degree of convergence. Olver and colleagues (2009) argued that it may be more beneficial to consider other potential uses of a given measure (e.g., treatment planning) rather than focusing solely on the accuracy of risk prediction.

Several youth risk assessment tools have demonstrated validity; however, there is variability in the findings across studies and it is yet to be determined if there is a superior tool for predicting general reoffending with young offenders. The purpose of the current review is to examine the accuracy with which three standardised risk assessment tools can predict general recidivism in young offenders: the YLS/CMI (Hoge & Andrews, 2003), the YASI (Orbis Partners, 2000), and the Y-ARAT (van der Put, 2014). An initial scoping review focused on studies evaluating the predictive accuracy of standardised assessment tools developed to predict general recidivism for youth offenders. From the initial review, a number of different youth risk assessment tools were identified, however, the majority of these tools were developed by youth justice agencies for use in specific jurisdictions within the United States (e.g., North Carolina Assessment of Risk). There were also limited empirical studies available for these jurisdiction-specific tools, increasing the likelihood of publication bias. As such, the decision was made to focus on three standardised risk assessment tools (YLS/CMI, YASI, and Y-ARAT) that were not created for use with a specific jurisdiction, which would allow for the findings to be more generalisable. Our aim is to identify the risk assessment tool that is best at predicting general recidivism for youth offenders. Given the majority of youth crime consists of generalist offences, as opposed to sexual or violent offences, and specialist risk assessment tools have demonstrated comparable predictive validity with general risk assessment tools (see Olver et al., 2009), we have chosen

to focus on general risk assessment tools. We build on previous meta-analyses, which have focused solely on specific instruments (see Edens et al., 2007; Pusch & Holtfreter, 2017), and others that have been somewhat narrow in focus, failing to include several unpublished works (see Schwalbe, 2008). There has also been an increase in research (published and unpublished) since the most recent reviews that warrant inclusion. Therefore, the present study aims to provide an updated and comprehensive review of research on criminogenic risk factors for youth offenders and the predictive validity of three generalist risk assessment tools for this population.

Method

For this meta-analysis, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009) guidelines were used. The guidelines are designed to promote transparency in the reporting of results. Prior to the meta-analysis, a protocol including the search strategy, inclusion/exclusion criteria, and the quality assessment tool was developed.

Sample

The review included both retrospective and prospective study designs. The following inclusion/exclusion criteria was used:

a. Population: young offenders aged 10-18 years of age. This review was not limited by population type (e.g., psychiatric, specific offender types) or setting (e.g., prison, community).

b. Intervention: eligible studies must have examined the predictive accuracy of at least one of the three standardised risk assessment tools developed to predict general recidivism (i.e., YLS/CMI, the YASI, or the Y-ARAT).

c. Outcome: recidivism defined as rearrest and/or reconviction for any offence (official records and/or self-reported) was used as the outcome. For studies reporting specific

recidivism outcomes (e.g., violence/sexual recidivism), only data relating to

general/any recidivism was extracted, where possible.

d. Exclusion criteria: publications that did not report empirical data (e.g., editorials,

opinion papers) were excluded.

Risk Assessment Tools

Youth Level of Service/Case Management Inventory (YLS/CMI)

The YLS/CMI (Hoge & Andrews, 2003) is a risk/needs assessment tool that includes

42 risk items that are most predictive of offending behaviour in young people. The tool

includes both static (unchangeable) and dynamic (changeable) risk items and can be used to

assist in intervention planning and case management. The total risk score ranges from 0-42

and is indicative of the risk of continued criminal activity (i.e., recidivism) and provides a

corresponding risk level (i.e., low, moderate, high, or very high). Information to score the

YLS/CMI is gathered from a semi-structured interview with the young person and

supplemented by collateral sources of information where possible such as an interview with

the parents/guardians, school records, police records etc.

The YLS/CMI was normed on a North American population, although it has

demonstrated predictive validity across populations (e.g., Chu et al., 2015; Shepherd et al.,

2015; and Villaneuva et al., 2020). There is also an Australian adaptation of the tool, the

YLS/CMI-AA (Hoge & Andrews, 1995) that includes 47 items separated across the same

eight domains included in the original tool: (1) prior and current offences; (2) family

circumstances/parenting; (3) education/employment; (4) peer relations; (5) substance abuse;

(6) leisure/recreation; (7) personality/behaviour; and (8) antisocial attitudes/beliefs. The items

are scored similarly to the original version however, one item related to age of first court

order is scored 0, 1, or 2 with more weight given to younger offenders. Preliminary data

evaluating the Australian adaptation revealed the tool to be a valid measure for predicting

general recidivism risk for youth located in the state of New South Wales, Australia (Thompson & Pope, 2005).

Youth Actuarial Risk Assessment Tool (Y-ARAT)

The Y-ARAT (van der Put, 2014) was developed as a screening instrument for prediction of general recidivism and is based solely on police records. The tool was developed for use by police officers without clinical expertise and validated on a Dutch sample, demonstrating moderate predictive validity (AUC = .73). Whilst police are not responsible for treatment related decisions, the Y-ARAT is used as a screening tool to identify high-risk youth who require further assessment (van der Put, 2014). Using the Y-ARAT, a juvenile offender is classified into one of five risk groups (very low risk, low risk, moderate risk, high risk, or very high risk). The five risk groups are based on combinations of 10 variables extracted from police records such as police incidents in which the young person was a suspect, age at first incident, and number of incidents in which co-occupants at the young person's address were suspects.

Youth Assessment and Screening Instrument (YASI)

The YASI (Orbis Partners, 2000) is available in both pre-screen and full assessment versions. The pre-screen version includes a subset of 34 items from the full-length tool and is typically administered to all youth at the intake stage. The pre-screen version includes both static and dynamic risk and strength factors across nine domains. The full version of the tool is more comprehensive and includes 90 items with risk, need, and strength factors across 10 separate domains. A total score is generated and used to assess a young person's overall risk of general recidivism, classifying them as either low, moderate, or high risk. Each version of the YASI is scored on the basis of a semi-structured interview with the young person, with input frequently sought by parents/guardians and supplemented with collateral sources of information (e.g., police files, probation records, school records; Orbis Partners, 2000). The

YASI has been implemented in several jurisdictions across North America and the United Kingdom.

Search Strategy

This review was limited to 2010 onwards given that the most recent comprehensive review of all risk assessment tools was conducted by Olver and Colleagues in 2009. Electronic databases were searched from January 01st 2010 to the 01st April 2021 and included the following databases: PsycINFO (Ovid), CINAHL Plus (EBSCO), Informit, and ProQuest.

To ensure a comprehensive search, reference lists of key papers were reviewed, and grey literature was also included. The same general search strategy and keywords were applied to each of the databases and are summarised below:

youth OR juvenile OR teen* OR adolescen* OR young OR "young offender"

risk OR reoffen* OR re-offen* OR recidiv*

tool OR assess* OR measure OR instrument

predict* OR "predictive validity" OR likelihood

The databases were also searched using the names of the individual risk assessment measures. The title and abstracts from the initial search results were reviewed and any studies that were not relevant to the current review or were duplicates were removed. If the eligibility of the study could not be determined by the title or abstract, then the full research article was accessed and reviewed. All of the reference lists for the studies that met the eligibility criteria were also screened to identify any additional studies. Figure 2 provides a summary of the systematic review search strategy and results.

Figure 2

Systematic Review Search Strategy and Results
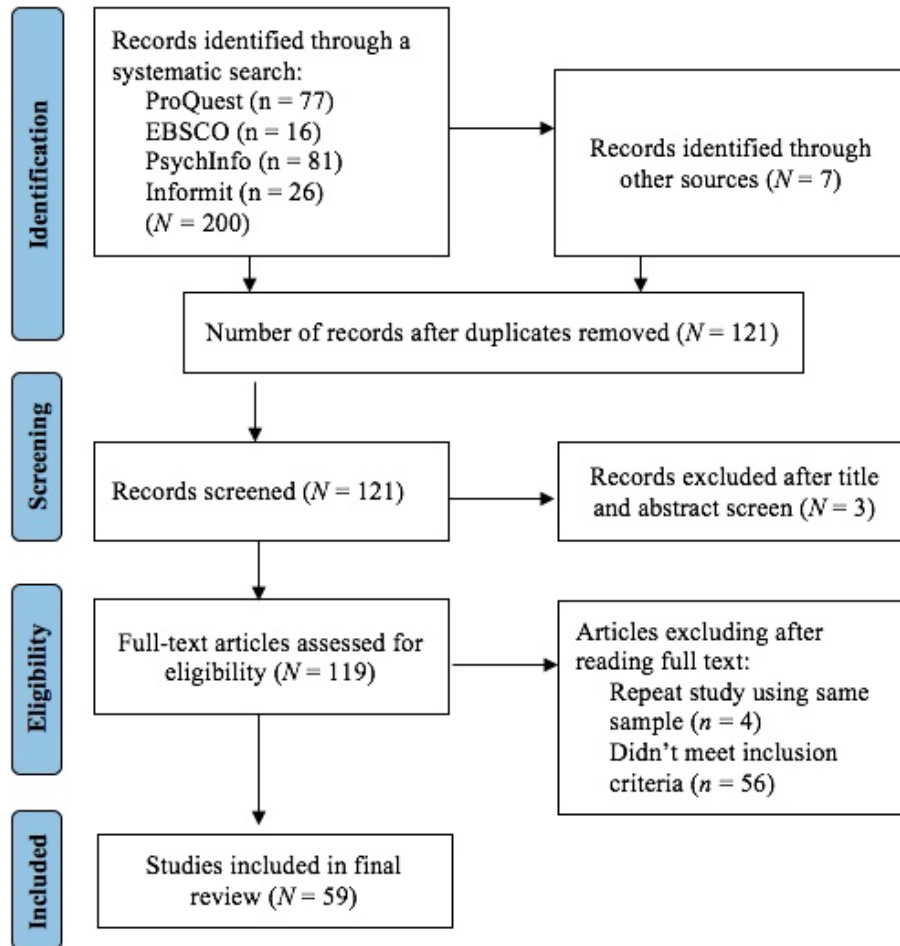
Procedure

Eligible studies were subjected to a quality assessment tool adapted from the Critical

Appraisal Skills Programme (CASP; 2018) online checklist and the tool developed by

Geraghty and Woodhams (2015). Following the procedure applied by Geraghty and

Woodhams, the quality assessment was completed in two steps. First, each eligible study had

to include the following: a clear description of the youth offenders, the risk assessment

instrument/s that were used, the outcome measure, and statistical analyses that were

conducted. Studies that met this threshold criteria were then subjected to a methodological

quality assessment using the adapted tool. The 16-item quality assessment tool includes

questions relating to methodological considerations of selection bias, measurement bias, attrition bias, and reporting bias (see Appendix B). The tool includes a scoring system for each question whereby 0 = *conditions were not met,* 1 = *conditions partially met,* and 2 = *conditions fully met*.

All studies included in the review were subjected to the quality assessment by the primary author. To ensure the reliability of the quality assessment, a second independent rater, also rated the quality of the articles. Any discrepancies were resolved through a third independent rater and consensus. The intraclass correlation coefficient (ICC) was used to evaluate inter-rater agreement. An ICC of .762 was found indicating acceptable agreement between the raters.

Effect Size Coding

Predictive accuracy statistics were coded in terms of *r*, which in most cases was a point-biserial correlation or r_{pb} (i.e., a correlation with a continuous predictor, such as the score on a risk measure, and a binary criterion variable, such as dichotomous recidivism coded as yes/no). For studies that only reported the AUC statistic from Receiver Operating Characteristic (ROC) analyses, the ROC value was converted into the equivalent r_{pb} using the tables provided in Rice and Harris (2005). If *r* was not reported, the appropriate formula provided by Lipsey and Wilson (2001) was applied to convert the reported statistic or descriptive information into *r*. In some studies, several dependent measures had been coded on a single sample (e.g., separate correlations coded for charges and convictions). For studies in which more than one effect size was reported, screening for serial correlation across effect sizes was undertaken using Moran's I Test. Screening indicated that there was no statistical evidence for dependencies within the data and as such, the effect sizes were analysed as independent estimates.

The Comprehensive Meta-Analysis (version 3) software program was used to run the analysis. In line with Rice and Harris' (2005) recommendations, an *r* of .1 signifies a small effect size, an *r* of .3 signifies a moderate effect size, and an *r* of .5 signifies a large effect size. The effect sizes, study name, and sample size were entered into the Comprehensive Meta-Analysis software and a mean effect size was calculated.

Homogeneity analysis were conducted by calculating the *Q*-statistics to assess whether effect sizes were distributed around their mean no greater than expected from sampling error alone. In accordance with Lipsey and Wilson (2001), a significant *Q*-statistic indicates that the there is significant effect size variability among studies. The random-effects model was used for the current analyses because we assume, as is typical in most meta-analyses, that the full population is not accounted for in each study. The random-effects model ensures that the standard error is not biased downward, which can occur in analyses with limited effect sizes.

Results

Study and Sample Characteristics

The search process yielded 59 studies suitable for the analysis. Of these, 52 examined the YLS/CMI, one examined the Y-ARAT, and seven examined the YASI. There were two studies that examined more than one of the three risk assessment tools under review. The 59 studies reported data relating to a total of 65207 participants (77.6% males). Based on the studies that provided the age of their samples, the overall mean age of participants included in the review was 15.64 (*SD* = 1.01, range = 13.7 – 18.4). The majority of studies were from the United States of America (*k* = 22, *n* = 29029, 44.5%), followed by Canada (*k* = 14, *n* = 7996, 12.3%), Spain (*k* = 7, *n* = 2072, 3.2%), Australia (*k* = 6, *n* = 9578 , 14.7%), Singapore (*k* = 4, *n* = 7275 , 11.2%), England (*k* = 2, *n* = 244 , 0.4%), Scotland (*k* = 2, *n* = 1276, 1.9%), the Netherlands (*k* = 1, *n* = 5000, 7.7%), Japan (*k* = 1, *n* = 389 , 0.5%), and Portugal (*k* = 1, *n* = 2348, 3.6%). The shortest mean follow-up period was 5.2 months for the YLS/CMI (Rennie

& Dolan, 2010) and the longest mean follow-up period was 10.4 years (for a study which also examined the YLS/CMI; Schmidt et al., 2011). Table 2 provides a summary of the sample size, mean participant age, origin, follow-up period, base rate of recidivism, effect size (*r*), and total quality score for each of the included studies.

Risk of Bias

Risk of bias was monitored via the quality assessment process. Quality assessment forms were completed for all 59 studies included in the review. There was little variability in the total quality scores between the studies. Of the included studies, the mean quality score was 23.8 (*SD* = 2.35; range = 17-29) out of a possible 32. All of the studies scored similarly with regard to selection bias and attrition bias; however, there was more variability observed across the studies regarding measurement and reporting bias. Consequently, it was difficult to draw comparisons within and across studies and to generalise from these findings. For studies that examined the YLS/CMI, quality scores did not differ significantly from studies that examined the YASI, as assessed by independent samples t-tests (*p* >.05). As there was only one study examining the Y-ARAT, a comparison of quality scores could not be made.

Table 2

Summary of Descriptive Statistics, Effect Size, and Total Quality Score for Studies Included in Meta-Analysis

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
YLS/CMI-AA	Thompson & McGrath (2012)	3568 (3009, 559)	16.5[M] 16.3[F]	Australia	12 months	50.7%[a]	.26	24
YLS/CMI	Onifade et al (2011)	1354 (956, 398)	14.4	United States	24 months	Not reported[b]	.26	18
YLS/CMI	Takahshi et al. (2013)	389 (389, 0)	16.9	Japan	6, 12, and 18 months	18%[d]	.38	22
	McLachlan et al. (2018)							
YLS/CMI	FASD Group	50 (40, 10)	17.6	Canada	12 months	72.3%[b]	.28	26
	Comparison Group	50 (41, 9)	17.5	Canada	12 months	52.4%[b]	.30	
YLS/CMI	Cuervo & Villanueva (2015)	210 (162, 48)	15.9	Spain	2 years	23.3%[a]	.56	22
YLS/CMI	Cookus (2020)	1136 (843, 290)	Not reported	United States	Unclear	31.4%[b] 15.9%[a]	.19 (arrest) .26 (conviction)	17
YLS/CMI	Viljoen et al (2017)	146 (101, 45)	16.4	Canada	3, 6, 12 months	23.4%[b]	.21	29
YLS/CMI	Perrault et al. (2017)	359 (266, 93)	15.5	United States	$M = 16.51$ months	21.4%[b]	.26	25
YLS/CMI	Vaswani & Merone (2013)	1138 (920, 218)	15.8	Scotland	12 months	73.6%[b]	.38	27
YLS/CMI	Shepherd et al. (2014)	139 (139, 0)	16.9	Australia	6-18 months	74.8%[b]	.38	23

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
YASI	Matz et al. (2021)	139 (90, 49)	Not reported	United States	3 years	53.2%[a]	.28	24
YLS/CMI	Papp et al. (2019)							25
	Offending group	1363 (1006, 357)	14.8	United States	2 years	46%[b]	.16	
	Truancy group	1073 (529, 544)	13.8	United States	2 years	35%[b]	.09	
YLS/CMI	Chu et al. (2015)	3264 (2951, 313)	15.4	Singapore	M = 1764.5 days	37.6%[b]	.25	23
YLS/CMI	Chu et al. (2012)	104 (104, 0)	15.2	Singapore	M = 1637 days	26%[b]	.26	26
YLS/CMI	Schmidt et al. (2011)	112 (71, 41)	14.6	Canada	M = 10.4 years	64.7%[a]	.28	26
YLS/CMI-AA	McGrath et al. (2018)	4401 (3681, 720)	16.6	Australia	12 months	37.4%[a]	.33	21
YLS/CMI	Khanna et al. (2014)	(109, 0)	16	England	12 months	Not reported[a]	.19 (CD) .16 (CD+ADHD)	20
YLS/CMI	Viljoen et al. (2017)	156 (107, 52)	16.4	Canada	2 years	44.2%[b]	.43	29
YLS/CMI	Shepherd et al. (2015)	207 (169, 38)	16.9	Australia	M = 9.13 months	78%[b]	.36	25
YASI	Fischer (2018)	1502 (1411, 90)	17.2	United States	M = 2.7 years	76%[b]	.032	29
YLS/CMI	Flores (2013)	950 (781, 169)	15.3	United States	6 years	36.2%[d]	.28	27
YLS/CMI	Anderson et al. (2016)	911 (448, 463)	13.7[M] 13.8[F]	United States	2 years	35.7%[b]	.12	23

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
YLS/CMI	Villanueva et al. (2020)	420 (345, 75)	16.1	Spain	2 years	24%[b]	.50	27
YLS/CMI	Li et al. (2015)	3744 (3327, 417)	15.3	Singapore	$M = 4.8$ years	39%[a]	.024	27
YLS/CMI	Huang et al. (2021)	398 (330, 70)	15.1	Canada	3 years	70.4%[a]	.25	23
	Basto-Pereira et al. (2021)							
YLS/CMI	Canada	196 (175, 21)	16.5	Canada	2 years	42.5%[a]	.43	24
	Portugal	2348 (1980, 368)	15.5	Portugal	2 years	26.2%[a]	.45	
	Onifade et al. (2014)							
YLS/CMI	Delinquency	1280 (960, 320)	15	United States	2 years	46%[b]	.21	24
	Dual status	128 (93, 35)	14.5	United States	2 years	49%[b]	.00	
YLS/CMI	Anderson (2012)	1100 (832, 278)	14.8[M] 14.9[F]	United States	2 years	49.5%[b]	.16	23
YLS/CMI	Giresi (2012)	4640 (2669, 1971)	15.6	United States	2 years	24%[b]	.12	22
YLS/CMI	Ortega-Campos et al. (2020)	594 (507, 87)	15.6	Spain	2 years	Not reported[b]	.44	23
YLS/CMI	Cuervo et al. (2020)	264 (216, 48)	16.5	Spain	$M = 13.7$ months	44.7%[a]	.38	24
YLS/CMI & YASI	Scott et al. (2019)	254 (148, 106)	17.6[M] 17.1[F]	Canada	2 years	57.5%[a]	.27 (YASI PS) .30 (YASI FS) .31 (YLS/CMI)	25

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
YLS/CMI	Hilterman et al. (2014)	105 (86, 19)	18.4	Spain	1 year	81.9%[c]	.36	25
YLS/CMI-AA	Nelson (2017)	1050 (838, 212)	Not reported	Australia	1 year	60.1%[a]	.39 (non-Indigenous) 20 (Indigenous)	22
	Villaneuva et al. (2019)							
YLS/CMI	Arab group	116 (102, 14)	15.8	Spain	Varied (between 2012-2017)	Not reported[b]	.36	22
	Non-Arab group	140 (95, 45)	15.9	Spain	Varied (between 2012-2017)	Not reported[b]	.43	
YLS/CMI	Rennie & Dolan (2010)	135 (135, 0)	16.1	England	$M = 5.2$ months post-release	69.4%[b]	.25	22
	Schmidt et al. (2016)							
YLS/CMI	Sexual offenders	204 (204, 0)	15.2	Canada	$M = 957.4$ days	34.8%[a]	.40	25
	Non-sexual offenders	185 (185, 0)	15.8	Canada	$M = 937$ days	63.2%[a]	.35	
YLS/CMI	Campbell et al. (2018)	628 (474, 154)	14.8	United States	$M = 48.4$ months	Not reported[b]	.13	22
YLS/CMI	Olver et al. (2012)	167 (93, 74)	15.7	Canada	$M = 6.8$ years post-release	73.9%[a]	.36	25
	Brown et al. (2020)							
YASI	Canada	4611 (4513, 982)	16.1	Canada	3 years	48.2%[a]	.19	21
	United States	1834 (1476, 358)	14.5	United States	18 months	31.1%[a]	.28	
YLS/CMI	Costaris (2019)	824 (726, 98)	16.2	Canada	3 years	54.2%[a]	.35	25

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
YLS/CMI	Anderson et al. (2016)	1720 (1267, 453)	14.8[M] 14.9[F]	Unites States	2 years	47.2%[b]	.18	23
YLS/CMI	Clarke (2015)	200 (172, 28)	15.1	Canada	$M = 4.1$ years	69%[b]	.41	25
YLS/CMI	Shepherd et al. (2014)	213 (175, 38)	16.8	Australia	6-18 months	77.5%[b]	.36	24
YLS/CMI	Chu et al. (2016)	163 (163, 0)	15.9	Singapore	$M = 1658.9$ days	54%[b]	.38	24
YLS/CMI	Lockwood (2016)	70 (50, 20)	15.4	Canada	2 years	68.6%[a]	.31	22
YLS/CMI	Onifade et al. (2010)	308 (144, 164)	13.8	United States	2 years	46%[b]	.21	23
YLS/CMI	Barnes et al. (2016)	360 (252, 108)	14.8	United States	12 months	35%[b]	.12 (initial score) .16 (exit score)	22
YASI	Jones et al. (2016)	464 (350, 114)	16.6	Canada	18 months	20.9%[b]	.50	24
Y-ARAT	van der Put (2014) Construction	2501 (1969, 532)	15.3	Netherlands	3 years	52.6%[b]	.41	26
	Validation	2499 (1655, 844)	15.3	Netherlands	3 years	51.3%[b]	.39	
YLS/CMI	Fearn (2014)	138 (116, 22)	15	Scotland	$M = 26.5$ months	74.6%[b]	.53	25
YLS/CMI	Barnes (2013)	211 (150, 61)	14.6	United States	12 months	64% (initial)[b] 77.3% (exit)[b]	.16 (initial score) .14 (exit score)	22
YASI	Skeem et al. (2013)	846 (846, 0)	17	United States	$M = 10.4$ months	71%[b]	.28	22

Risk Tool	Study	Sample Size (M, F)	M Age (Years)	Origin	Follow-up period	Rate of recidivism	r	Quality Score
	Papp et al. (2016)							
YLS/CMI	Drug offenders	198 (166, 32)	15.4	United States	3-9 years	47%[b]	.20	24
	Non-drug offenders	1449 (1043, 406)	14.7	United States	3-9 years	40%[b]	.14	
	Gomis-Pomares (2021)							
YLS/CMI	Roma group	88 (60, 28)	15.9	Spain	M = 30.1 months	42%[b]	.35	24
	Non-Roma group	135 (90, 45)	15.9	Spain	M = 30.1 months	30.4%[b]	.43	
YLS/CMI	Frick (2017)	215 (150, 65)	Not reported	United States	Min 6 months	40.9%[b]	.02	21
YLS/CMI	Petersen (2011)	58 (58, 0)	14.6	United States	12 months	13%[b]	.23	24
	Baird et al. (2013)							
YLS/CMI & YASI	YLS/CMI Arkansas	1674 (Not reported)	Not reported	United States	9 months	22%[d]	.00	22
	YLS/CMI Nebraska Probation	1077 (735, 342)	Not reported	United States	12 months	17%[b]	.07	
	YLS/CMI Nebraska Commitment	597 (461, 136)	Not reported	United States	12 months	25%[b]	.06	
	YASI Virginia	1919 (1405, 507)	Not reported	United States	12 months	40.8%[b]	.29	
YLS/CMI	Vitopoulos et al. (2012)	76 (39, 37)	16	Canada	M = 807 days	40.8%[a]	.03	25

Predictive Validity of General Risk Assessment Tools

Meta-analysis for all of the included studies revealed significant variability in effect sizes among studies as indicated by the Q-statistic ($Q = 77.78$, $df = 79$, $p < .001$). A random-effects meta-analysis of the 59 studies revealed a small-to-moderate summary effect size across the studies ($r = .261$, 95% CI $= .231 - .290$, $z = 16.739$ and p-value of $<.001$). Thus, there is evidence that on average, the three included general risk assessment tools accurately predict general recidivism.

The YLS/CMI was the most widely evaluated instrument ($k = 53$, 88%), followed by the YASI ($k = 7$, 11.8%). The Y-ARAT featured in only one study (.2%) and yielded a moderate effect size ($r = .406$, $p < .001$ $z = 30.45$, CI $= .383 - .429$). The effect sizes of the tools were compared, with the YLS/CMI effect sizes ($r = .000 - .527$) ranging from small to large. A significant low-to-moderate summary effect size was found for the YLS/CMI ($r = .269$, $p = <.001$ $z = 17.61$, 95% CI $= .240 - .297$) and for the YLS/CMI-AA version ($r = .291$, $p = <.001$, $z = 10.71$, 95% CI $= .240 - .340$). The predictive validity of the YASI also had small-to-moderate effect sizes ($r = .032 - .415$). A significant low to moderate summary effect size was also found for the YASI ($r = .265$, $p = < .001$, $z = 8.89$, 95% CI $= .209 - .320$), although the YASI full-screen version had a slightly higher effect size ($r = .300$, 95% CI $= .183 - .408$, $z = 4.88$, $p < .001$) compared to the pre-screen version ($r = .270$, 95% CI $= .152 - .380$, $z = 4.39$, $p < .001$).

Higher rates of recidivism did not appear to result in better predictive validity for any of the tools. Similarly, larger sample sizes and longer follow-up periods did not appear to result in increased ability to predict general recidivism.

Moderator Variables

There was some variability amongst effect sizes when comparing the different outcome measures (i.e., recidivism) and a mixed-effects analysis indicated the difference was

significant ($Q = 23.89$, $df = 4$, $p < .001$). One study (Hilterman et al., 2014) used participant self-report to measure recidivism and this yielded the highest effect size ($r = .364$, $p < .001$, $z = 3.85$, 95% CI = .185 - .519). Studies that used reconviction as the recidivism outcome yielded slightly higher average effect sizes ($r = .292$, $p < .001$, $z = 10.01$, 95% CI = .237 - .345) compared to studies that used arrest as the recidivism outcome ($r = .252$, $p < .001$, $z = 12.77$, 95% CI = .215 - .289). Studies utilising reincarceration as the recidivism outcome yielded the lowest average effect size ($r = .225$, $p = .001$, $z = 3.32$, 95% CI = .094 - .349).

A mixed-effect analysis found significant variability of effect sizes between the different countries of origin ($Q = 216.74$, $df = 9$, $p = <.001$). Studies originating from Scotland yielded the highest effect sizes, followed by Spain and Portugal. Despite having the highest number of studies included in the review, studies originating from the United States yielded the lowest effect sizes, which is an interesting finding given the two most reviewed tools (YLS/CMI and YASI) were both developed and normed in the United States. Table 3 shows pooled correlation coefficients and significance levels by country for all studies included in the review.

Table 3

Meta-Analysis of Pooled Effect Outcomes for Country of Origin in Predicting General Recidivism

Country of Origin	k	r	95% CI	z	p
Australia	6	.309	.265 - .351	13.19	<.001
Canada	14	.313	.262 - .363	11.30	<.001
Netherlands	1	.406	.383 - .429	30.45	<.001
England	2	.218	.094 - .336	3.40	.001
Japan	1	.313	.220 - .400	6.36	<.001
Portugal	1	.416	.382 - .449	21.45	<.001
Scotland	2	.443	.290 - .574	5.25	<.001

Country of Origin	k	r	95% CI	z	p
Singapore	4	.205	.037 - .363	2.38	.017
Spain	7	.430	.394 - .465	20.79	<.001
United States	22	.168	.137 - .198	10.51	<.001

Note. Number of studies exceeds total studies included as some studies evaluated more than one of the included risk assessment tools. k = number of studies, r = pooled correlation coefficient, CI = confidence intervals, z = Fishers Z transformation, p = significance value of z.

Discussion

A key task in juvenile justice is the assessment and classification of recidivism risk. The accurate assessment of risk is imperative for the development and implementation of appropriate interventions designed to reduce reoffending. The aim of this review was to assess the predictive accuracy of three standardised youth risk assessment tools for general recidivism with the aim of identifying the superior risk assessment tool. This was not a straightforward task given the variation in definitions of recidivism between studies and differences in recidivism outcomes that limited the grouping of data across studies. The difference in mean follow-up period used in the included studies (range = 5.2 months to 10.4 years) also likely impacted predictive validity given that longer follow-up periods provide more opportunity to a person to reoffend (Caldwell, 2002; Koh et al., 2020). Lastly, most of the studies included in the review were conducted in only four countries: United States of America, Canada, Spain, and Australia. Although studies conducted in other countries reported similar levels of predictive validity, there is still a need to conduct more local validation studies given the variations in base rates of offending, sentencing and supervision practices, socioenvironmental factors, and availability of interventions and resources to target offending behaviour (Koh et al., 2020). There remains a need to evaluate risk assessment

measures across different populations within each country before the results of international studies can be meaningfully generalised.

Collectively, each of the three risk assessment tools included in the review were found to accurately predict general recidivism with similar effect sizes. It therefore does not appear that any of the risk instruments is superior in terms of predictive validity. The Y-ARAT only featured in one study and although the tool yielded a moderate effect size ($r = .406$), it is difficult to draw meaningful comparisons with the other included risk tools. It is noteworthy the Y-ARAT includes only static risk items (i.e., risk factors that are historical/unchangeable) and as such, it can be argued that this second-generation risk assessment tool has less utility in terms of reducing youth reoffending than third and fourth generation risk assessment tools as it does not offer any insights into changeable/dynamic risk factors that could be targeted via intervention. The YLS/CMI and the YASI both produced a wide range of effect sizes when predicting general recidivism, from small to large (YLS/CMI) and small to moderate (YASI). The wide range of effect sizes for both tools may have been influenced by the differences in population samples, recidivism outcome definitions, and length of follow-up period and remains an important consideration when using these tools in practice. In line with the assertion made by Olver and colleagues (2009), the YLS/CMI and the YASI are likely more beneficial for practitioners in terms of other potential uses, such as treatment planning and case management, rather than focusing solely on benefits to be gained in their predictive accuracy. The YLS/CMI and YASI risk assessment tools also allow for the evaluation of change in risk level over time which increases the utility of the measures for tracking risk reduction efforts (Viljoen, Gray, & Barone, 2016).

Our results suggest that tailoring risk assessment tools to specific jurisdictions/populations may improve predictive validity, as evidenced by the higher average effect size found for studies utilising the Australian adaptation of the YLS/CMI, which was

initially tailored specifically for the New South Wales juvenile offender population. This is consistent with previous research that demonstrated the benefits of jurisdiction-specific adjustments that have been made to standardised risk assessment tools to better reflect the population and localised context of agency needs (Duwe, 2019; Hamilton et al., 2016; 2020). The definition of recidivism was found to have a significant impact on effect size, with self-reported recidivism yielding the highest overall effect size, followed by reconviction and then re-arrest. Research has consistently noted official records to underestimate the true rates of reoffending (Bonta & Andrews, 2017; Hoge, 2012) and it is worth noting that not all recidivism is detected. Consequently, a juvenile who is classified as a non-recidivist in the included studies may actually have reoffended and avoided detection.

Despite having the highest number of studies included in the review, studies originating from the United States yielded the lowest pooled effect size. This is an interesting finding given that the two most reviewed tools (YLS/CMI and YASI) were both developed and normed in the United States. It is noted that there were several studies originating from the United States that revealed very small effect sizes which may have impacted the results (Baird et al., 2013; Barnes et al., 2016 – initial scores; Frick, 2017; Onifade et al., 2014 – dual-status group; and Fischer, 2018). The Arkansas subgroup included in Baird et al. (2013) study was relatively small ($N = 119$), and the follow-up period was only 9-months, which may account for the particularly low reoffense rates (11%) and effect size ($r = .00$). Baird and colleagues (2013) noted the variability in staff application of the YLS/CMI across the different sites included in their study which may have also contributed to the small effect size. The study by Frick (2017) had a minimum follow-up period of 6-months which is considered inadequate for predictive validity studies (see Geraghty & Woodhams, 2015). Fischer (2018) was only able to assess predictive validity of the YASI pre-screen due to missing data limiting the analysis that could be completed with the full-screen measure which

likely contributed to the lower effect size as our results show that the full-screen measure provides higher validity estimates. Onifade and colleagues (2014) found that the YLS/CMI was not predictive of recidivism for the dual-status sample in their research – they defined dual-status as those whose parent/guardian had a history of at least one neglect/abuse petition prior to their own delinquent petition/arrest. The researchers acknowledged the relatively small sample size of the dual-status group and suggested that the YLS/CMI fails to account for additional system-level factors that may be predictive and more relevant for dual-status youth compared to delinquent-only youth, thereby reducing the predictive validity estimates for dual-status youth. In terms of measurement bias, the variability in outcome definitions and follow-up periods between the studies originating from the United States may have contributed to some of the differences in validity estimates between studies. Further research is needed to better understand the differences in predictive validity of the tools between international samples.

Limitations and Future Directions

A systematic approach was used for this review to identify studies in a comprehensive manner. However, as with all meta-analyses and reviews, there is a risk that unpublished papers were missed. Publication bias is also a risk given that this review assessed published AUC outcomes and AUC outcomes supportive of the risk assessment tools are more likely to be published. For this meta-analysis, quantitative risk scores were used to examine predictive validity. Risk ratings/categories are typically not reported when assessing predictive validity, despite the clinical application of these risk ratings for each of the assessment tools. Whilst studies of predictive validity are useful in understanding associations between risk factors and measures of general recidivism, we acknowledge that this method does not fully assess the practical uses of risk instruments. Therefore, further exploration of the tools beyond the

element of predictive efficacy, such as the effectiveness of risk management plans, is recommended.

Across the studies included in the current review, a variety of methods were used to collect information pertaining to recidivism and various definitions of recidivism were applied. This variation in measurement may have impacted the results for each study. As there is no universally accepted definition of recidivism and one is unlikely to be developed due to differences in legal systems, cultural and societal influences, meta-analyses exploring recidivism are susceptible to statistical weaknesses. Further research utilising a systematic approach to the evaluation of risk assessment tools, such as the Risk Assessment Guidelines for the Evaluation of Efficacy (RAGEE; Singh et al., 2015) statement checklist, is needed. A more consistent and systematic approach to the exploration of risk assessments for youth would likely assist in developing a larger base of standardised outcomes (e.g., recidivism) for future analysis.

Conclusion

This meta-analysis provides an update to current research on three standardised risk assessment tools, the YLS/CMI, YASI, and Y-ARAT, used to assess general reoffending risk in youth. Overall, the three risk assessment tools included in the review performed similarly in terms of predictive validity. The implication for clinical practice is that the use of these tools may be appropriate for youth offenders when predicting general risk but should be interpreted and applied with caution. Although the YLS/CMI is the most widely used and most empirically researched tool, its ability to predict general reoffending in youth has been identified to be in the moderate range. The YASI is a newer tool that has shown promise, but currently lacks sufficient validation across different countries and populations for the results to be meaningfully generalised. The Y-ARAT, whilst yielding a moderate-to-large effect size, also lacks sufficient validation and is further limited in that the tool does not guide

intervention planning as it only captures static/historical risk factors. The YLS/CMI and the YASI may be more useful in terms of intervention because they include dynamic (changeable) risk factors that can be targeted to reduce recidivism risk. Correctional agencies must be aware of the limitations in predictive validity for each of the tools and consider the influence of differences in culture, justice systems, and interventions for youth offenders in the assessment and management of risk. Future research that builds on analyses of predictive validity could provide insight into how various risk factors interact to create specific risk profiles (Boppre et al., 2016; Pusch & Holtfreter, 2017). Techniques such as conjunctive analysis, could increase understanding of situational factors that are related to specific risk profiles and may allow for more tailored risk reduction efforts. Collectively, there is a need for further research into the general risk assessment tools, particularly the YASI and the Y-ARAT, to gain a better understanding of their psychometric properties and practical utility.

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Conclusion of this Chapter

In this chapter, I have provided a manuscript of findings from a meta-analysis of three standardised risk assessment tools for youth, which has been submitted for publication in *Law and Human Behavior*. The next chapter will present the second study included in this body of research, designed to meet the second objective of the research, which was to evaluate the utility and validity of the YLS/CMI for West Australian youth.

Chapter 5: Validation of the Youth Level of Service/Case Management Inventory (YLS/CMI) on the Western Australian Juvenile Offending Population

Chapter Introduction

This chapter contains the manuscript findings from an empirical evaluation of the reliability and validity of the YLS/CMI in a cohort of 4653 youth offenders in Western Australia. This empirical evaluation was carried out as part of Study Two (Figure 3). The manuscript has been accepted for publication in the *International Journal of Offender Therapy and Comparative Criminology*. This chapter is presented in journal article format and readers wishing to cite this paper are encouraged to source the final published version.

Figure 3

Flow Diagram of Research Objectives Highlighting Study Two and Objective Two

Study One: Meta-analysis	**Study Two: Empirical Evaluation**	**Study Three: Empirical Evaluation**
• Objective one: to examine the effectiveness of general risk assessment tools for youth.	• Objective two: to evaluate the utility and validity of the YLS/CMI for West Australian youth.	• Objective three: to establish whether risk factors associated with recidivism differ between Indigenous and non-Indigenous youth in Western Australia.

Abstract

There is a wealth of research that shows juvenile justice systems that utilise structured and validated assessment tools, such as the YLS/CMI, are far more effective at reducing rates of recidivism than those who do not. In line with this research, the Department of Justice (DoJ) in Western Australia adopted the YLS/CMI as the standard risk assessment tool for evaluating the criminogenic risk and needs of youth entering the justice system. While there is evidence supporting the utility of the YLS/CMI in predicting recidivism, there is little research demonstrating its effectiveness in Australian juvenile populations and no such research in a West Australian population. There is also a lack of research on the utility of the tool with young Indigenous offenders, which is particularly concerning given the significant overrepresentation of Indigenous people in the Australian criminal justice system. Our study was the first to examine the reliability and predictive validity of the YLS/CMI on a sample of West Australian juvenile offenders. In this paper, we present the results of two analyses. The first examines the properties of the YLS/CMI in a cohort of 4653 juvenile offenders in Western Australia, including factor structure, internal consistency, and differences between male and female youth and between Indigenous and non-Indigenous youth. Consistent with our hypotheses, the tool demonstrated excellent internal consistency ($\alpha = .91$) and cross-validation analyses identified significant differences between groups on total YLS/CMI scores and risk domains. The second analysis examines the predictive validity of the YLS/CMI in a subsample of 921 youth with a minimum follow-up period of two years. The overall recidivism rate was 74.8% and there were differences in scores and recidivism rates for Indigenous compared to non-Indigenous youth, although the predictive accuracies in terms of AUC were similar ($c. = .65$ and $c. = .66$ respectively).

Keywords: YLS/CMI, predictive validity, recidivism, risk assessment, Indigenous youth

The age-crime curve posits that adolescents and young adults are more likely than any other age group to engage in offending and delinquent behaviour (Farrington, Loeber, & Jolliffe, 2008; Viljoen et al., 2016). A key task for the juvenile justice system is to classify young offenders based on their level of risk of reoffending in order to make important decisions regarding the type and level of intervention required (Hoge, 2012). Recent advances in the development of psychometric risk assessment tools have encouraged a standardised approach to evaluating risk factors for antisocial behaviour. Risk assessment measures were designed to improve clinical judgment and decision making in predicting recidivism (Hoge, 2012; Lennings, 2008). Initially, research on adolescent risk assessment lagged behind the adult risk assessment field, with the first adolescent risk assessment measures developed five to ten years after the first adult risk assessment measures (Viljoen, Gray, & Barone, 2016). Research shows that various adolescent risk assessment tools have demonstrated moderate-to-high predictive validity in predicting violent and general offending (Olver et al., 2009; Viljoen et al., 2016), and have become widely used over a short period of time (Viljoen et al., 2016). Despite this progress, there is still much to be learned about assessing risk in the adolescent offending population.

There is an extensive literature base exploring various risk factors that are posited to increase the likelihood of antisocial behaviour (Bonta & Andrews, 2017; Eysenck & Gudjonsson, 1989; Farrington, 2005). Andrews and Bonta (2006) psychology of criminal conduct (PCC) theory asserts that criminal behaviour results from complex interactions between cognitive, emotional, personality, and biological risk factors. Andrews and Bonta (2006) identified 'the big eight' criminogenic risk factors that are considered to be theoretically and empirically the most predictive of offending behaviour (Lennings, 2008). The big eight include: criminal history, education/employment, family/marital, leisure/recreation, antisocial associates, substance abuse, procriminal attitudes/orientation,

and antisocial patterns. These criminogenic risk factors have become operationalised into various assessment measures examining the risk of reoffending within youth justice, such as the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2003) and the Structured Assessment of Violence Risk in Youth (SAVRY; Borum et al., 2006), amongst others.

There are several published reviews that have examined the predictive validity of youth risk assessment tools, with the majority of these conducted over five years ago. One of the earliest reviews, a meta-analysis by Schwalbe (2007), reviewed 28 studies that examined the predictive validity of 28 risk assessment instruments. The weighted average effect size across all studies (AUC = .640, SD = .042) corresponded to a medium effect size according to Rice and Harris (2005). Utilising Rice and Harris' conversion procedures, the average AUC was equivalent to r = .25. Schwalbe found that weighted average effect sizes for second generation instruments (r = .24) were slightly smaller than third generation instruments (r = .26). The YLS/CMI was the most frequently cited instrument included in the meta-analysis and Schwalbe found the pattern of effect sizes for the YLS/CMI to be similar to that for the overall sample. A subsequent meta-analysis by Olver et al. (2009) aggregated data from a total of 49 studies examining the predictive validity of three assessment tools: the YLS/CMI, SAVRY, and the Psychopathy Checklist: Youth Version (Forth et al., 2003). The meta-analysis found that all three tools were able to predict violent recidivism with similar accuracy. However, the YLS/CMI and the PCL-YV were both found to be better at predicting general recidivism (mean r_w = .38 and .28, respectively) than violence (mean r_w = .26 and .25, respectively), whereas the SAVRY demonstrated similar predictive accuracy for both general recidivism (mean r_w = .32) and violent recidivism (mean r_w = .30). Studies published since these earlier reviews have generally found similar predictive validity for violence risk

assessment tools such as the SAVRY (see Koh et al., 2020) and general offending/case management tools such as the YLS/CMI (see Chu et al., 2016; Viljoen et al., 2017).

There is a wealth of research that shows juvenile justice systems that utilise structured and validated assessment tools, such as the YLS/CMI, are far more effective at reducing rates of recidivism than those who do not (Hoge, 2012). In line with this research, the Department of Justice (DoJ) in Western Australia adopted the YLS/CMI as the standard risk assessment tool for evaluating the criminogenic risk/need factors of youth entering the justice system. Currently, there is a dearth of research examining the generalisability of such risk assessment tools in an Australian juvenile offending context. Of the studies that have been published, risk assessment tools, including the YLS/CMI, have demonstrated good to excellent reliability and adequate capability to predict both general and violent recidivism (McGrath & Thompson, 2012; Shepherd et al., 2014; Shepherd et al., 2015). However, there is a significant lack of research investigating the applicability of these risk assessment tools for young Indigenous offenders.

There is ongoing debate about the application of standard risk assessment tools for use with Indigenous offenders. Criticisms are based on the fact that most risk/need tools have been developed on the social and historical experiences of non-Indigenous offenders (Muir et al., 2020). Consequently, scholars have argued that marginalised groups may score higher on these assessment tools due to their increased exposure to risk and social inequality, as opposed to a higher propensity for crime (Hannah-Moffat, 2012; Lockwood et al., 2018). The lack of research on the utility of the YLS/CMI with young Indigenous offenders is particularly concerning given the significant overrepresentation of Indigenous people in the Australian criminal justice system. According to the Australian Institute of Health and Welfare (AIHW; 2020b), young Indigenous Australians are 21-26 times more likely to be in detention on an average night compared to young non-Indigenous Australians. In Western

Australia, Indigenous people comprise only 3.9% of the overall population; however, almost 30% of the adult offender population and around 50% of the youth offender population are Indigenous (Australian Bureau of Statistics, 2020). Indigenous Australians in the criminal justice system often experience additional complex risk factors such as dislocation, racism, community dysfunction, and exposure to traumatic events (Dudgeon et al., 2014; Ferrante, 2013). These risk factors have been associated with intergenerational marginalisation and disadvantage and are frequently compounded by a lack of culturally appropriate service delivery and limited access to appropriate health care services (Dudgeon et al., 2014; Shepherd et al., 2015; Zubrick et al., 2014). Given the lack of current literature investigating the link between these identified risk factors and future antisocial behaviour, it is necessary to understand the patterns of offending amongst Australian youth. With Western Australia's particularly high rate of Indigenous young offenders, it is imperative to determine whether the YLS/CMI has the capacity to appropriately identify the unique risk and need factors for this population.

The current research sought to assess the reliability and validity of the YLS/CMI as it used in the West Australian population to determine questions regarding generalisability and classification accuracy. We also sought to provide insight into the specific nature or presentation of factors associated with future offending risk in a West Australian juvenile population for the purposes of understanding how well the tool meets the needs of this population as well as guiding future research efforts. Given the absence of any literature supporting the use of the YLS/CMI in a West Australian juvenile population, two primary research questions were addressed in this study:

1. Is the YLS/CMI a reliable and valid measure of risk of reoffending in a West Australian juvenile offending population?

2. Which YLS/CMI scales contribute to the risk of reoffending and are the risk factors different for Indigenous and non-Indigenous youth?

The following hypotheses were proposed:

1. The mean total scores for the custodial group are expected to be higher than the mean total scores for the community group

2. The mean total scores are expected to be higher for males than for females

3. Mean total scores for Indigenous youth are expected to be higher than mean scores for non-Indigenous youth

4. Males are expected to recidivate at a higher rate than females

5. Recidivism rates are expected to be higher for Indigenous youth than recidivism rates for non-Indigenous youth

6. Total scores are expected to show higher predictive validity for non-Indigenous youth than Indigenous youth

7. Differences in predictive validity of the eight YLS/CMI domains were expected between Indigenous and non-Indigenous youth

Research Method

Sample

The data were provided by the Western Australian Department of Justice (DoJ) and included all YLS/CMI assessments completed with juvenile offenders from 2016-2020 ($N =$ 4653). All demographic information, including ethnicity, is collected from the young person and their responsible adult when a young person first enters the system. Youth justice staff are then responsible for entering this information into the DoJ database. Thirteen cases were excluded from the dataset due to the age of participants being over 18 years. Of the sample, only 5.1% of the offenders were classified as custodial and 94.9% were classified as community. The setting is determined by the status of the youth at the time of the assessment

(i.e., if the young person is on remand or is sentenced and in a custodial facility at the time of the assessment then they are classified as custodial). The ethnic composition of the sample was predominately Indigenous Australian (52.14%), with representation from Caucasian (15.2%), African (1.5%), Maori (2.1%), and multiracial groups as well. The majority of the sample was classified as being on a Statutory Order (68.6%) and over half of the sample (57.69%) was living in the Perth Metropolitan area[2] at the time of the assessment. Overall, 17.22% of the sample had a recorded cognitive impairment with the most common being Foetal Alcohol Spectrum Disorder (FASD; 11.35%). Of the community sample, 16.46% had a cognitive impairment compared to 28.82% of those in the custodial sample indicating that young offenders with cognitive impairments are much more likely to end up in custodial than community settings. This is consistent with previous research that found a high prevalence of FASD and cognitive impairments amongst young people in detention in Western Australia (see Bower et al., 2018). The full demographic description of the sample is listed in Table 4.

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[2] Perth is the capital city of Western Australia

Table 4

Summary of Population Demographic Descriptive Statistics

	Male						Female							Total	
	Custodial		Community		Total		Custodial		Community		Total			Total	
Ethnicity	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*N*	%
Indigenous	134	62.7	1767	51.4	1901	51.31	20	76.9	480	51.7	500	52.74	2401	51.60
Non-Indigenous	77	36.9	1540	43.4	1617	43.64	6	23.1	404	43.5	410	43.25	2027	43.56
Undefined	1	0.5	186	5.2	187	5.05	0	0	38	4.8	38	4.01	225	4.84
Age														
10	0	-	23	0.67	23	0.63	0	-	4	0.43	4	0.42	27	0.6
11	0	-	56	1.63	56	1.53	0	-	10	1.08	10	1.05	66	1.4
12	4	1.84	179	5.10	183	4.92	0	-	37	3.99	37	3.88	220	4.7
13	9	4.15	369	10.60	378	10.23	3	11.54	94	10.13	97	10.17	475	10.2
14	27	12.44	507	14.39	534	14.27	9	34.62	165	17.78	174	18.24	708	15.2
15	34	16.13	675	19.27	709	19.08	1	3.84	197	21.77	198	21.28	907	19.5
16	53	24.42	731	20.89	784	21.09	3	11.54	193	20.91	196	20.65	980	21.1
17	71	32.72	803	22.88	874	23.45	9	34.62	190	20.47	199	20.86	1073	23.1
18	14	1.47	150	4.32	164	0.77	1	3.84	32	3.45	33	3.46	197	4.2
Location														
Metro	107	50.47	2003	57.34	2110	56.95	22	84.6	561	60.85	583	61.5	2693	57
Regional	105	49.53	1490	42.66	1595	43.05	4	15.4	361	39.15	365	38.5	1960	43
Total	212		3493		3705	79.63	26		922		948	20.37	4653	100

Measures

YLS/CMI

Youth Justice Services in Western Australia adopted the YLS/CMI as the predominant risk/needs assessment tool in August 2016. The tool is administered at the pre-sentence stage to inform sentencing and to assist in the development of case management plans. The YLS/CMI is administered by the young person's allocated Youth Justice Officer who is required to undergo standardised training in completion of the tool. Completed YLS/CMI assessments are also then reviewed and endorsed by senior supervisors who may override the risk rating.

Part I of the tool provides a survey of all the risk and need factors that might be displayed by the young person. It includes 42 risk items that have been identified in the literature as most predictive of criminal activity in young people and the scores from this section of the assessment are indicative of the risk of continued criminal activity (i.e., recidivism). The majority of the items are also criminogenic needs and as such, it follows that any favourable changes to these items would also result in a reduced risk of antisocial behaviour. The 42 items are subdivided into the following eight domains:

1. Prior and Current Offences/Dispositions

2. Family Circumstances/Parenting

3. Education/Employment

4. Peer Relations

5. Substance Abuse

6. Leisure/Recreation

7. Personality/Behaviour

8. Attitudes/Orientation

Of the eight domains, the first (prior and current offences/dispositions) includes only static factors (i.e., historical factors that cannot be altered) whereas the remaining seven domains include dynamic risk factors (i.e., criminogenic needs that are amenable to change and should be targeted in intervention).

The assessor marks the items that apply to the young person within each domain, with items being scored as *present, absent,* or *omit*. Each item marked as present is equivalent to a score of 1 point and the assessor records the total number of items marked present within each domain and the overall level of risk represented in each of the domains (i.e., low, moderate, or high).

Part II of the tool provides the assessor with a final risk/need score, ranging from 0-42, and a summary of the domain Risk/Need levels recorded in Part I. The higher the total score, the higher the risk of continued criminal activity. Scores and risk/need levels (Low, moderate, or high) from each domain are recorded and the total risk/need score is calculated by summing across the eight domains. From the total score, the assessor determines which of the four categories of total risk/need level the young person falls under: low, moderate, high, or very high.[3]

Recidivism

Official recidivism data were available for 921 young offenders with a minimum follow-up period of two years (*M* = 988.81 days*, SD*= 135.74). Adolescent and adult offending records were used to determine recidivism. Recidivism was defined as any re-arrest during the follow-up period and the types of offences were also recorded: violent, sexual, substance related, property (stealing included), and all other offence types fell under the category 'other'.

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[3] The score ranges are different for females and males and across settings (custody vs. community).

Ethics

This study was approved by the Department of Justice Research Applications and Advisory Committee and the Curtin University Human Research Ethics Committee. As part of the ethics process, regular consultation with Indigenous peoples was conducted to ensure the research was culturally appropriate and in line with the Ethical Conduct in Research with Aboriginal and Torres Strait Islander Peoples and Communities (National Health and Medical Research Council, 2018). Approval was granted to access the de-identified dataset that included scores for all items of all YLS/CMI assessments completed from August 2016 to March 2020.

Statistical Analyses

All data were analysed using the SPSS v. 26.0 software program. The analyses were completed in three separate stages. Stage one included descriptive statistics: The Mean and Standard Deviation of the YLS/CMI total scores and subcomponent scores separated by gender, offender type (i.e., custodial or community offender), and ethnicity (i.e., Indigenous or non-Indigenous). Stage two encompassed reliability analysis to determine the internal consistency of the tool. Assuming that the YLS/CMI could be treated as a unidimensional psychometric measure consisting of a set of items, then it could be conceptualised as a latent variable that 'drives' responses to those items. From this perspective, the Composite Reliability Index (CRI) is the appropriate estimate of internal consistency reliability. The CRI is a more accurate estimate of internal consistency than Cronbach's alpha (Peterson & Kim, 2013).

The final stage included validity analyses. Known group's validity was examined by comparing the mean scores between custodial and community samples for both genders; scores for the custodial group were expected to be higher than scores for the community group and scores for male offenders were expected to be higher than scores for female

offenders. This analysis included a 2 (sample) x 2 (ethnicity) analysis of covariance (ANCOVA) with age as the sole covariate. Given the research that shows a large discrepancy in offending rates between genders (AIHW, 2020), males and females were examined separately to assess potential moderators and any sub-group differences in criminogenic factors. In addition, due to the over-representation of Indigenous young people involved with the criminal justice system, Indigenous and non-Indigenous offenders were also examined separately. For the subcomponents, a corresponding 2 x 2 multivariate analysis of covariance (MANCOVA) was conducted.

Predictive validity was assessed by examining YLS/CMI total scores as a predictor of recidivism defined 'as reconviction and/or rearrest for any offence' during a two-year follow-up period. Predictive validity for recidivism was assessed using Receiver Operating Characteristic (ROC) analysis and reported using the area under the curve (AUC) values. The ROC score examines the probability that a randomly selected recidivist would score higher on the YLS than a randomly selected non-recidivist. To test for significant differences in AUC scores between groups, the Hanley and McNeil (1982) test was used. As recommended by Singh et al. (2013) we also assessed the tool's ability to specifically identify high and low risk groups. To do this, we calculated sensitivity (i.e., the proportion of recidivists who were rated as high risk) and specificity (i.e., the proportion of non-recidivists rated low risk). For these analyses, we utilised the YLS/CMI total score, as the primary goal of the tool is to predict general recidivism. We excluded youth who were rated as moderate ($n = 437$) because it was unclear what would constitute a false positive or false negative in these cases (see Viljoen et al., 2008). Survival analysis was used to examine length of time to reoffending within the two-year follow-up period. Cox regression analysis with any recidivism (yes/no) as the outcome variable was also conducted to determine if gender or Indigenous status independently predicted recidivism after accounting for total YLS/CMI scores.

Results

Data Diagnostics

Prior to conducting analyses, a visual overview of the dataset revealed that there were no data entry errors and a missing value analysis showed that there were no missing data. A frequency analysis revealed that the kurtosis and skewness values for each of the variables did not exceed the critical value of +/- 3.0. A boxplots analysis indicated the presence of multiple univariate outliers; however, as the scores were within the confines of the scales measured, the cases were retained in the dataset. The cases were considered to be representative of the referent population and were of interest to the research questions. The assumption of homogeneity of variance-covariance matrices was violated for the total sample, $F(3, 4424) = 10.40$, $p = <.001$. However, ANCOVA analysis is fairly robust to violations and it was therefore decided that no transformations were necessary (Tabachnick & Fidell, 2019). The assumptions of multicollinearity, linearity, and normality were met. An alpha level of .05 was selected to signify statistical significance of results. Descriptive statistics for the total and subcomponent scores can be seen in Table 5.

Table 5

Descriptive Statistics for the YLS/CMI Subcomponents and Total Scores

	Max Score	Custodial (N = 238)		Community (N =4415)		Male (N = 3705)		Female (N =948)		Recidivists (N = 689)		Non-Recidivists (N =232)		Indigenous (N = 2401)		Non-Indigenous (N =2027)	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Prior & Current Offences/Dispositions	5	3.49	1.45	1.41	1.62	1.63	1.71	1.08	1.44	1.36	1.60	0.35	0.88	1.99	1.72	1.03	1.46
Family Circumstances/Parenting	6	3.33	1.59	2.34	1.79	2.38	1.80	2.42	1.76	2.40	1.77	1.54	1.65	2.80	1.76	1.96	1.73
Education/Employment	7	2.96	1.91	2.30	1.89	2.35	1.90	2.23	1.88	2.23	1.77	1.64	1.75	2.46	1.80	2.21	1.99
Peer Relations	4	3.53	0.85	2.49	1.39	2.58	1.38	2.39	1.40	2.59	1.32	1.61	1.39	2.89	1.22	2.19	1.45
Substance Abuse	5	3.13	1.58	1.85	1.66	1.94	1.68	1.80	1.66	1.79	1.65	1.30	1.49	2.07	1.71	1.76	1.63
Leisure/Recreation	3	1.69	0.90	1.47	1.06	1.45	1.05	1.58	1.06	1.46	1.06	1.10	1.11	1.59	1.01	1.37	1.08
Personality/Behaviour	7	2.93	1.84	1.93	1.92	1.84	1.87	2.05	1.80	1.79	1.78	1.26	1.54	2.07	1.84	1.92	1.89
Attitudes/Orientation	5	2.25	1.27	1.49	1.49	1.27	1.29	1.43	1.22	1.45	1.19	0.97	0.96	1.69	1.28	1.38	1.26
YLS/CMI 2.0 Total	42	23.30	6.67	15.27	8.51	15.85	8.71	15.00	8.17	15.06	8.13	9.79	7.08	17.57	8.10	13.83	8.69

Reliability Analyses

Confirmatory Factor Analysis (CFA) established the YLS/CMI as a unidimensional construct, with all items contributing to the scale (.33-.59). The Composite Reliability Index (CRI) was .88 and Cronbach's alpha was .91, demonstrating excellent internal consistency. This is consistent with previous research that has found alpha values for the YLS/CMI total risk/need score and subcomponents ranging from .88 to .90 (Hoge & Andrews, 2003).

Validity Analyses

As expected, the mean total scores on the YLS/CMI for the custodial group ($M = 23.30$, $SD = 6.67$) were higher than those for the community group ($M = 15.27$, $SD = 8.51$), indicating that young people who are assessed in a custodial setting (i.e., those on remand or serving a term of detention in custody) are rated as at higher risk of continued criminal activity than young people in the community. This difference was statistically significant, $F(1, 4427) = 205.692, \eta_p^2 = .044, p < .001$.

A two-way between-subjects ANCOVA was conducted with the dependent variable as the YLS/CMI total score. Participant age was used as the sole covariate. The two independent variables were ethnicity (Indigenous vs. non-Indigenous) and gender (male vs. female). There were 225 cases that were excluded from the analyses due to having 'undefined' ethnicity recorded ($N = 4428$).

As predicted, after adjusting for age, there was a significant main effect of gender on YLS/CMI total score, $F(1, 4427) = 9.092, \eta_p^2 = .002, p = .003$. Males in the sample recorded higher total scores ($M = 16.04$, $SD = 8.67$) than females ($M = 15.14$, $SD = 8.18$), indicating that juvenile male offenders in WA are rated as at higher risk of reoffending than juvenile female offenders. Previous research has found comparable patterns of scores between juvenile males and females, although females have tended to score slightly higher than males in other studies (see Schmidt et al., 2011; Shepherd et al., 2014). Consistent with the hypotheses, there was

also a significant main effect of ethnicity on total score, $F(1, 4427) = 141.563$, $\eta_p^2 = .031$, p <.001. Indigenous participants in the sample recorded higher scores ($M= 17.57$, $SD= 8.10$) than non-Indigenous participants ($M= 13.83$, $SD= 8.69$), indicating that juvenile Indigenous offenders in WA are at a significantly higher risk of reoffending than non-Indigenous juvenile offenders.

MANCOVA

A two-way between-subjects MANCOVA was conducted for the eight subcomponents of the YLS/CMI. Participant age was the sole covariate, and the two independent variables were ethnicity (Indigenous vs. non-Indigenous) and Gender (male vs. female). Results were interpreted using the Wilk's Lambda statistic (Λ), partial eta squared (η_p^2) was used as the measure of effect size and all effects are reported as significant at a .05 alpha level. As predicted, after adjusting for participant age, there was a significant main effect of gender on the eight subcomponents of the YLS/CMI, $\Lambda = .962$, $F(8, 4416) = 21.619$, $\eta_p^2 = .038$, $p = <.001$. According to J. Cohen (1988) guidelines, this indicates a medium effect size.

Follow-up univariate analysis revealed that gender had a significant effect on six of the eight subcomponents and the descriptive statistics can be seen in Table 6. Consistent with our hypotheses, after adjusting for participant age, there was a significant main effect of ethnicity on the eight subcomponents of the YLS/CMI with a medium effect size, $\Lambda = .906$, $F(8, 4416) = 57.013$, $\eta_p^2 = .094$, $p = <.001$. Follow-up univariate analysis revealed that ethnicity had a significant effect on all of the eight subcomponents, refer to Table 6 for descriptive statistics. The Bonferroni correction was applied to univariate follow-up analyses.

Table 6

Results of Follow-Up Univariate Analyses on YLS/CMI Subcomponents Descriptive Statistics

YLS/CMI Subcomponent	Male M	Male SD	Female M	Female SD	Indigenous M	Indigenous SD	Non-Indigenous M	Non-Indigenous SD
Prior & Current Offences	2.14**	1.75	1.48	1.54	2.01**	1.73	1.03	1.46
Family Circumstances & Parenting	2.41	1.80	2.43	1.77	2.80**	1.76	1.95	1.73
Education/Employment	2.38*	1.90	2.23	1.88	2.47**	1.81	2.20	1.99
Peer Relations	2.61**	1.37	2.41	1.40	2.89**	1.23	2.19	1.45
Substance Abuse	1.97*	1.68	1.82	1.66	2.08**	1.71	1.76	1.63
Leisure/Recreation	1.46	1.04	1.58**	1.06	1.59**	1.01	1.37	1.08
Personality/Behaviour	1.99	1.88	2.06	1.81	2.08*	1.84	1.92	1.89
Attitudes/Orientation	1.58**	1.29	1.45	1.23	1.70**	1.28	1.38	1.26

*$p = .{<}05$, **$p = {<}.01$

Recidivism Data

Recidivism was defined as any re-arrest during the follow-up period and the types of offences were also recorded: violent, sexual, substance related, property (stealing included), and all other offence types fell under the category 'other'. Official recidivism data were available for 921 young offenders with a minimum follow-up period of two years ($M = 988.81$ days, $SD = 135.74$) and the overall recidivism rate was 74.8%. Comparatively, the overall recidivism rate in our sample is much higher than international recidivism rates which tend to be around 50% (see Olver et al., 2009). Within Australia, the average recidivism rate is also around 50% although there is some variability within states and territories (AIHW, 2018). Table 7 shows the breakdown of recidivists in our sample ($n = 689$) in terms of new offences committed during the follow-up period, separated by gender and Indigenous status. When age groups were compared, younger offenders tended to reoffend quicker with those

aged 14 years at the time of the YLS/CMI assessment being the quickest to reoffend ($M =$ 170.41 days). For those offenders aged 16 and above at the age of the YLS/CMI assessment it took more than 200 days on average to reoffend.

Table 7

Descriptive Statistics for Type of Recidivism for Recidivist Sample and Subgroups

Recidivism	Male ($n = 577$)		Female ($n = 107$)		Indigenous ($n = 416$)		Non-Indigenous ($n = 268$)		Total ($N = 684$)	
	n	%	*n*	%	*n*	*%*	*n*	*%*	*N*	*%*
Violent	127	22	21	19.6	93	22.4	55	20.5	148	21.6
Sexual	6	1	0	0	4	0.9	2	0.7	6	0.8
Property	364	63	62	58	264	63.5	162	60.4	426	61.8
Substances	43	7.5	10	9.3	23	5.5	30	11.2	53	7.7
Other	37	6.5	14	13.1	32	8.6	19	7.9	51	7.4

Note. Participants who did not reoffend ($n = 237$) are not included in the above table.

Participants who were identified as having a violent or sexually violent offence at the time of their initial YLS/CMI assessment also reoffended at a higher rate, with 79.2% of violent offenders and 85% of sexually violent offenders committing further offences during the follow-up period. The most common type of re-offence was property (61.8%), followed by violent (21.8%) offences. In terms of risk ratings, those with higher risk ratings reoffended at a higher rate than those with low risk ratings. Indigenous youth reoffended at a higher rate than non-Indigenous youth, with 84.8% of Indigenous youth committing further offences during the follow-up period compared to 63.3% of non-Indigenous youth. Further analysis to examine whether the relationship between total YLS/CMI scores and recidivism (yes/no) differed depending on Indigenous status was conducted using Cox regression. The results indicated that Indigenous status did not contribute significantly to the model and neither did the Indigenous status by total risk interaction term.

In predicting general recidivism, more Indigenous youth were correctly identified as high risk (51.46%) compared with non-Indigenous youth (28.03%; see Table 8). More females in our sample were also correctly identified as high risk (51.85%) compared with males (40.49%). However, fewer Indigenous youth were correctly identified as low risk (77.78%) compared to non-Indigenous youth (89.10%).

Table 8

Proportion of Recidivists and Non-Recidivists According to YLS/CMI Risk Level and Initial Offence Category

	Reoffended (*n* = 689)	Didn't Reoffend (*n* = 232)	Total (*n* = 921)
Risk Level			
Low	195 (60.7%)	126 (39.3%)	321
Moderate	351 (80.3%)	86 (19.7%)	437
High	134 (87.6%)	19 (12.4%)	153
Very High	9 (90%)	1 (10%)	10
Initial Offence Category			
Violent	304 (79.2%)	80 (20.8%)	384
Sexual	11 (57.9%)	8 (42.1%)	19
Sexual Violence	17 (85%)	3 (15%)	20
General	357 (71.7%)	141 (28.3%)	498

For general recidivism, positive predictive values (PPVs) were higher for Indigenous youth (92.98%) and for males (91.27%) than for non-Indigenous youth (75.51%) and females (75.68%; see Table 9). In other words, more of the high-risk Indigenous youth and high-risk males in our sample went on to reoffend compared with the high-risk non-Indigenous youth and high-risk females. Similarly, negative predictive values (NPVs) were lower for

Indigenous youth (21.88%) and males (34.24%) compared to non-Indigenous youth (50.78%) and females (59.38%) in our sample. More of the low-risk Indigenous youth and low-risk males in our sample went on to reoffend than the low-risk non-Indigenous youth and low-risk females.

Table 9

PPV, NPV, Sensitivity, and Specificity of the YLS/CMI Total Scores in Predicting General Recidivism

Group	False Positives	False Negatives	PPV	NPV	Sensitivity	Specificity
Total Sample	13.70	57.70	87.73	39.25	42.31	86.30
Males	11.11	59.51	91.27	34.24	40.49	88.89
Females	19.15	48.15	75.68	59.38	51.85	80.85
Indigenous	22.22	48.54	92.98	21.88	51.46	77.78
Non-Indigenous	10.91	71.97	75.51	50.78	28.03	89.10

Note. All values expressed as percentages. PPV = positive predictive value; NPV = negative predictive value.

ROC Analyses

The results of ROC analysis and Pearson's point-biserial correlations for the overall sample and subgroups can be seen in Table 10 for general recidivism and Table 11 for violent recidivism. ROC analyses were used to determine the predictive ability of the YLS/CMI and correlations were used to examine effects sizes between the scores and the recidivism outcome (i.e., general/violent recidivism). For general recidivism, the predictive analysis yielded an AUC of .683 for the total sample, meaning that the probability that a randomly selected recidivist had a higher YLS/CMI score than a randomly selected non-recidivist was 68.3%. As expected, differences in the predictive validity of the eight risk domains were identified between Indigenous and non-Indigenous youth. Although there were differences in

AUC values between Indigenous (AUC = .646) and non-Indigenous (AUC = .660) youth, a comparison of the ROC curves found that this difference was nonsignificant ($p = .367$).

Table 10

AUC Scores Predicting General Recidivism Using YLS/CMI Total Score and Risk Domains

Group and Score	r_{pb}	AUC (*SE*)	95% CI
Total (*N* = 921)			
YLS/CMI Total Score	.32	.683 (.02)***	0.64 – 0.72
YLS/CMI: Prior & Current Offences/Dispositions	.34	.696 (.02)***	0.66 – 0.73
YLS/CMI: Family Circumstances/Parenting	.24	.636 (.02)***	0.59 – 0.68
YLS/CMI: Education/Employment	.17	.597 (.02)***	0.55 – 0.64
YLS/CMI: Peer Relations	.33	.688 (.02)***	0.65 – 0.73
YLS/CMI: Substance Abuse	.16	.589 (.02)***	0.55 – 0.63
YLS/CMI: Leisure/Recreation	.15	.586 (.02)***	0.54 – 0.63
YLS/CMI: Personality/Behaviour	.15	.582 (.02)***	0.54 – 0.62
YLS/CMI: Attitudes/Orientation	.19	.607 (.02)***	0.57 – 0.65
Males (*n* = 737)			
YLS/CMI Total Score	.33	.689 (.02)***	0.64 – 0.74
YLS/CMI: Prior & Current Offences/Dispositions	.35	.697 (.02)***	0.66 – 0.74
YLS/CMI: Family Circumstances/Parenting	.27	.650 (.03)***	0.60 – 0.70
YLS/CMI: Education/Employment	.16	.592 (.03)***	0.54 – 0.65
YLS/CMI: Peer Relations	.33	.689 (.03)***	0.64 – 0.74
YLS/CMI: Substance Abuse	.18	.604 (.03)***	0.55 – 0.65
YLS/CMI: Leisure/Recreation	.20	.612 (.03)***	0.56 – 0.66
YLS/CMI: Personality/Behaviour	.13	.572 (.03)**	0.52 – 0.62
YLS/CMI: Attitudes/Orientation	.20	.613 (.02)***	0.57 – 0.66
Females (*n* = 184)			
YLS/CMI Total Score	.29	.667 (.04)***	0.59 – 0.75
YLS/CMI: Prior & Current Offences/Dispositions	.29	.667 (.04)***	0.59 – 0.74
YLS/CMI: Family Circumstances/Parenting	.20	.616 (.04)**	0.53 – 0.70
YLS/CMI: Education/Employment	.17	.594 (.04)*	0.51 – 0.68
YLS/CMI: Peer Relations	.35	.697 (.04)***	0.62 – 0.78
YLS/CMI: Substance Abuse	.08	.545 (.04)	0.46 – 0.63
YLS/CMI: Leisure/Recreation	.09	.551 (.04)	0.47 – 0.64
YLS/CMI: Personality/Behaviour	.19	.605 (.04)*	0.52 – 0.69
YLS/CMI: Attitudes/Orientation	.13	.575 (.04)	0.49 – 0.66

Group and Score	r_{pb}	AUC (SE)	95% CI
Indigenous (n = 493)			
YLS/CMI Total Score	.25	.646 (.03)***	0.58 – 0.71
YLS/CMI: Prior & Current Offences/Dispositions	.33	.688 (.03)***	0.63 – 0.75
YLS/CMI: Family Circumstances/Parenting	.20	.614 (.04)***	0.54 – 0.68
YLS/CMI: Education/Employment	.13	.575 (.04)*	0.50 – 0.65
YLS/CMI: Peer Relations	.19	.611 (.04)**	0.54 – 0.69
YLS/CMI: Substance Abuse	.09	.552 (.03)	0.49 – 0.62
YLS/CMI: Leisure/Recreation	.09	.554 (.04)	0.48 – 0.63
YLS/CMI: Personality/Behaviour	.09	.555 (.04)	0.49 – 0.62
YLS/CMI: Attitudes/Orientation	.14	.579 (.03)*	0.51 – 0.64
Non-Indigenous (n = 428)			
YLS/CMI Total Score	.28	.660 (.03)***	0.61 – 0.71
YLS/CMI: Prior & Current Offences/Dispositions	.25	.640 (.03)***	0.59 – 0.69
YLS/CMI: Family Circumstances/Parenting	.17	.593 (.03)***	0.54 – 0.65
YLS/CMI: Education/Employment	.16	.589 (.03)**	0.53 – 0.65
YLS/CMI: Peer Relations	.31	.677 (.03)***	0.63 – 0.73
YLS/CMI: Substance Abuse	.19	.606 (.03)***	0.55 – 0.66
YLS/CMI: Leisure/Recreation	.14	.578 (.03)**	0.52 – 0.64
YLS/CMI: Personality/Behaviour	.16	.590 (.03)***	0.54 – 0.65
YLS/CMI: Attitudes/Orientation	.16	.591 (.03)***	0.54 – 0.65
YLS/CMI Total Score and violent recidivism	.10	.556 (0.05)	0.47 – 0.64

*p = <.05, **p = <.01, ***p = <.001*

Table 11

AUC Scores Predicting Violent Recidivism Using YLS/CMI Total Score for Total Sample and Subgroups

YLS Total Score	n	r_{pb}	AUC (SE)	95% CI
Group				
Total	921	.04	.522 (.03)	0.47 – 0.58
Males	737	.03	.515 (.03)	0.46 – 0.57
Females	184	.11	.564 (.07)	0.42 – 0.71
Indigenous	493	.00	.495 (.04)	0.43 – 0.56
Non-Indigenous	428	.10	.556 (0.05)	0.47 – 0.64

*p = <.05, **p = <.01, ***p = <.001*

Time to Re-Offence

Higher risk youth (based on YLS/CMI scores) were found to reoffend earlier than lower risk youth. Overall, log rank tests showed no significant differences in mean survival time between the different risk groups $\chi^2(3) = 6.13$, $p = .106$. Across ethnicity, no significant differences in mean survival time between the different risk groups were obtained for general recidivism. In regard to gender, higher risk males yielded significantly lower mean survival times (time to reoffend) compared to lower risk males $\chi^2(3) = 11.78$, $p = .008$ (see Figure 4). No significant differences between the risk categories were found for females.

Figure 4

Survival Curve for General Recidivism as a Function of YLS/CMI Risk Rating for Males
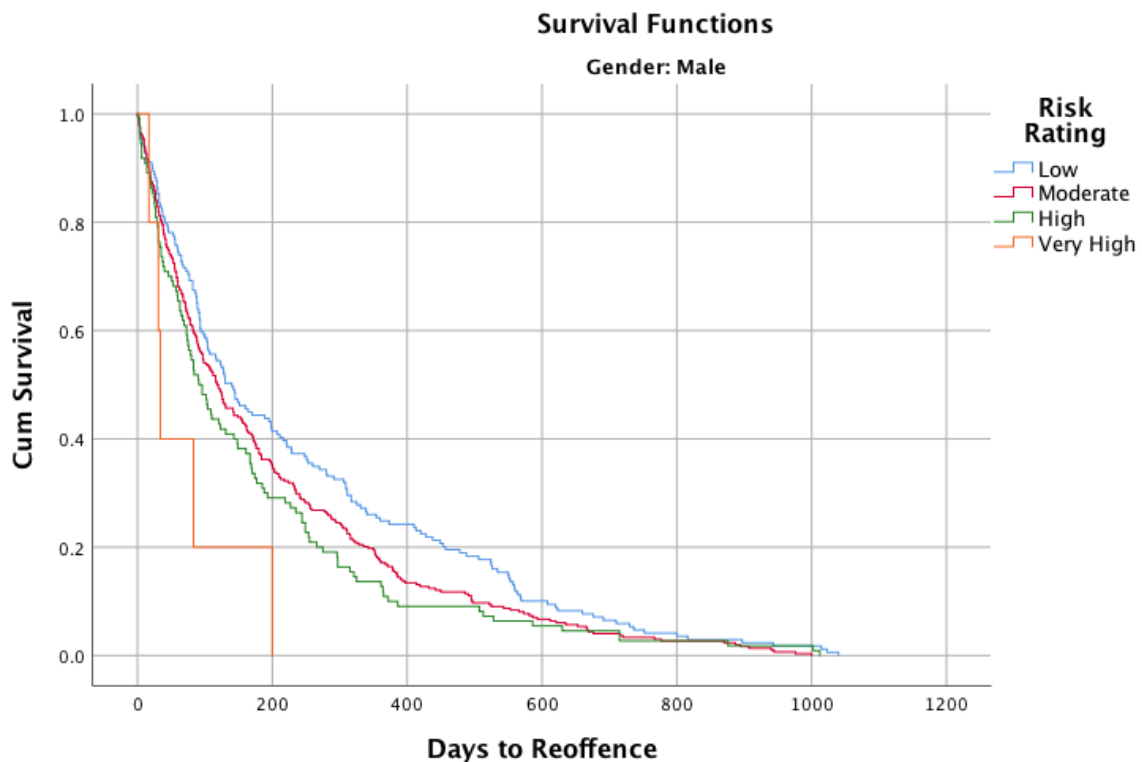
Discussion

The current study investigated the capacity of the YLS/CMI to identify the risks and need characteristics, as well as predict reoffending, for West Australian juvenile offenders. Our research objectives addressed several gaps in the literature, most notably the absence of

any literature supporting the use of the YLS/CMI in a West Australian juvenile population. Moreover, there is limited research exploring the utility of the YLS/CMI for Australian Indigenous youth and no such empirical research examining any differences in risk factors for reoffending between Indigenous and non-Indigenous youth in a West Australian context.

Results of our study are consistent with prior research demonstrating fair to good predictive validity of the YLS/CMI total score for assessing general recidivism risk in adolescent populations. As anticipated, group differences across instrument total scores were observed. The custodial group obtained a higher mean total score than the community group, indicating that young people who are assessed in a custodial setting (i.e., those on remand or serving a term of detention in custody) are rated at higher risk of continued criminal activity than young people in the community. Commensurate with extant literature on juvenile offending, the mean total scores were higher for males than for females, indicating that males are rated at a higher risk of reoffending than females. Finally, mean total scores for Indigenous youth were significantly higher than mean scores for non-Indigenous youth, indicating that Indigenous young people in the WA juvenile justice system are rated at higher risk of reoffending than non-Indigenous youth. Although there were statistically significant differences between Indigenous and non-Indigenous total scores, it should be noted that the mean scores for both groups fall within the same risk rating (i.e., moderate). A comparable pattern has been observed in previous Australian studies (McGrath & Thompson, 2012; Shepherd et al., 2015). The higher total scores for Indigenous youth are likely a reflection of the additional complex risk factors experienced by Indigenous Australians involved in the criminal justice system that have been linked to intergenerational marginalisation and disadvantage (Dudgeon et al., 2014; Ferrante, 2013; Shepherd et al., 2015). These antecedents to offending behaviour have also been associated with the consequences of intergenerational trauma and the impacts of colonisation (Dudgeon et al., 2014; Zubrick et al., 2014). Additionally, young Indigenous

people in the West Australian justice system have been found to have higher rates of

neurodevelopmental disorders such as FASD (Bower et al., 2018). It is plausible to assume

that these factors increase the likelihood of engagement in crime and thereby contribute to the

significant overrepresentation of Indigenous youth in the justice system. As such, the

YLS/CMI seems to accurately account for the increased exposure to risk factors for

Indigenous youth, despite the additional complex risk factors not actually being included in

the tool itself (i.e., dislocation, racism, community dysfunction, and exposure to traumatic

events). Incorporating these additional risk factors for Indigenous youth may be more

effective in the intervention stage or as responsivity factors to consider as part of risk

management.

Results of the AUC analyses for general recidivism suggest that randomly selected

recidivists were rated as having higher scores on the YLS/CMI than randomly selected non-

recidivists. This was true across both genders and for both Indigenous and non-Indigenous

youth. However, the predictive validity of the YLS/CMI total scores for general recidivism

were slightly higher for the male subgroup and for the non-Indigenous subgroup. In addition,

several YLS/CMI domains were not significantly predictive of reoffending for the female

subgroup and for the Indigenous subgroup. For the female subgroup, the substance abuse,

leisure and recreation, and attitudes and orientation domains were not significantly predictive

of reoffending and for the Indigenous subgroup, the substance abuse, leisure and recreation,

and personality and behaviour domains were not significantly predictive of reoffending. In

comparing the Indigenous and non-Indigenous subgroups, there were differences observed in

the importance of particular domains (i.e., dynamic risk factors) that suggest areas of focus

for intervention. For the non-Indigenous subgroup, the most important domains were peer

relationships and substance abuse. In contrast, peer relationships and family

circumstances/parenting were the most important domains for the Indigenous subgroup. We

have explored and outlined the relevance of these observed differences between subgroups in a subsequent study (Dellar et al., 2020). We particularly focused on the importance of these differences in regard to appropriate treatment and intervention efforts for Indigenous youth.

Positive predictive power was higher for Indigenous than non-Indigenous youth and for males compared to females in our sample. Youth justice staff appeared to be more successful in identifying Indigenous youth and males who were high risk for reoffending than non-Indigenous youth and females who were high risk of reoffending. For instance, of the male and female youth that were rated as high risk for recidivism, 91.27% of males were charged with subsequent offences. Given that positive predictive values are base rate dependent (Singh, 2013), the higher positive predictive power for Indigenous youth may arise from differences in the rates of recidivism across groups. It is also plausible that the biases in the detection and measurement of reoffending contribute to the higher predictive accuracy for high-risk Indigenous youth. For example, because Indigenous youth are perceived as being higher risk by law enforcement, they may be monitored more closely, subsequently resulting in more charges/arrests (i.e., racial profiling). Research on arrest rates in Australia has shown that Indigenous people are more likely to be arrested than non-Indigenous people and the overrepresentation rate in Western Australia is particularly high (Australian Law Reform Commission, 2018).

Practical Implications

The practical implications of these findings for juvenile justice are many. Firstly, the results provide empirical support for the use of the YLS/CMI as a reliable method for conducting general risk assessments with young West Australian offenders. The YLS/CMI was found to identify with reasonable accuracy which youth will reoffend, although the predictive validity of the tool was slightly lower for Indigenous youth. Secondly, the results also highlight the significance of particular risk factors and domains for specific subgroups of

youth offenders, therefore indicating where resources and interventions should be allocated to target those risk factors with the aim of reducing rates of reoffending. A final important implication is the identification of the unique influence of particular risk factors on recidivism for minority groups, such as the female and Indigenous youth subgroups in this study. Forensic clinicians must be acutely aware of the prejudicial impact of risk assessment tools if they are misused, particularly given the decreased predictive validity for these minority populations (Shepherd et al., 2015). It is important to note that the focus of risk assessment should be on specifically identifying problematic risk factors for individuals for the purposes of risk management. Commensurate with previous research, the Indigenous group in this study received higher YLS/CMI total scores compared to the non-Indigenous group. However, total scores may be artificially inflated for Indigenous youth due to additional complex risk factors associated with the Indigenous minority population. Given that the knowledge base on specific cultural factors related to offending for Indigenous youth is limited, challenges remain for clinicians in completing balanced risk assessments with this group.

Limitations

Although this research is one of the first to examine the predictive validity of the YLS/CMI among West Australian youth, it has some limitations. First, recidivism was measured through official records and we used charges as opposed to convictions, as charges are considered to be a more sensitive measure. However, many offences are not detected through official records and may reflect ethnic and cultural biases (Farrington et al., 2008). Second, the custodial subgroup ($n = 238$) included in the overall sample and the female subgroup used in the reoffending analysis ($n = 184$) were both small and any specific findings should therefore be interpreted with caution. Third, this study may not generalise to other jurisdictions due to the unique West Australian population (i.e., high number of young

people from rural and remote areas). Finally, we did not examine the predictive validity of the YLS/CMI for other minority groups (e.g., African youth) due to small sample sizes; however, this is an important area for future research.

Future Research

Although YLS/CMI scores generally showed acceptable predictive validity for Indigenous youth, additional research could improve prediction and increase our understanding of the causal factors of offending among Indigenous youth by examining the influence of culturally specific risk factors. Further exploration into the differences in risk/need profiles between Indigenous and non-Indigenous youth is needed. Further research could assist in identifying and understanding some contributing factors to the significant overrepresentation of Indigenous young people in the youth justice system. Future research should include a focus on the impact and influence of neurodevelopmental impairments such as FASD on rates of reoffending, particularly for Indigenous youth. Although risk categorisation is undeniably a pertinent part of the risk assessment process, replicative work needs to be undertaken before we can conclude that the YLS/CMI satisfactorily predicts Indigenous youth risk of reoffending. It is possible that different combinations of the YLS/CMI risk factors are more predictive for Indigenous youth. Further research on this front is warranted.

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Conclusion of this Chapter

In this chapter, I have provided a manuscript of findings from an empirical evaluation of the reliability and validity of the YLS/CMI in a cohort of 4653 youth offenders in Western Australia. The next chapter will present the final study included in this body of research, designed to meet the third objective of the research, which was to establish whether risk factors associated with recidivism differ between Indigenous and non-Indigenous youth in Western Australia.

Chapter 6: Overrepresentation of Young Indigenous Offenders: Differences in Criminogenic Risk/Needs and Implications for Practice

Chapter Introduction

This chapter contains the manuscript findings from an empirical evaluation of differences in criminogenic risk and need factors between Indigenous and non-Indigenous youth and the predictive validity of a shortened version of the YLS/CMI, utilising the same dataset from the preceding chapter. This empirical evaluation was carried out as part of Study Three (Figure 5). The manuscript is under review (following minor amendments) for publication in the *International Journal of Offender Therapy and Comparative Criminology*. This chapter is presented in journal article format and readers wishing to cite this paper are encouraged to source the final published version.

Figure 5

Flow Diagram of Research Objectives Highlighting Study Three and Objective Three

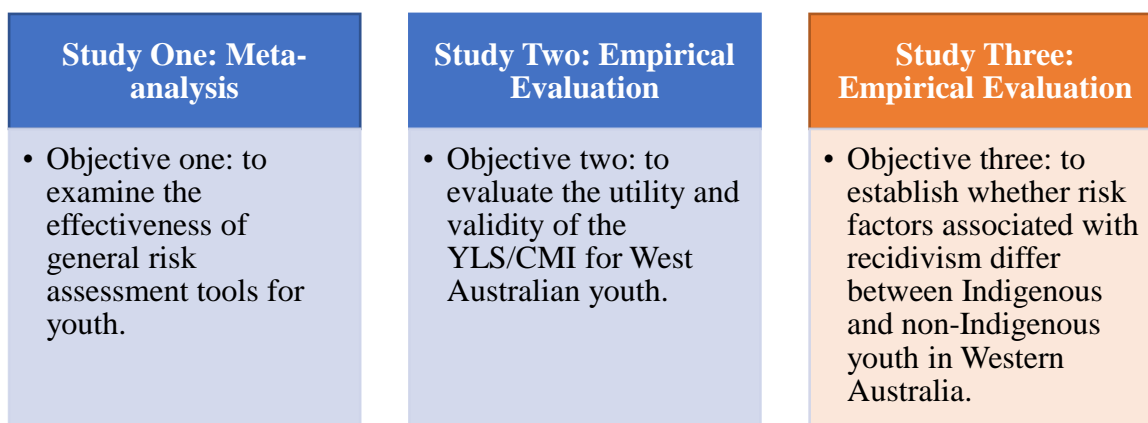| **Study One: Meta-analysis**	**Study Two: Empirical Evaluation**	**Study Three: Empirical Evaluation**
• Objective one: to examine the effectiveness of general risk assessment tools for youth.	• Objective two: to evaluate the utility and validity of the YLS/CMI for West Australian youth.	• Objective three: to establish whether risk factors associated with recidivism differ between Indigenous and non-Indigenous youth in Western Australia.

Abstract

Indigenous youth are overrepresented in the Australian criminal justice system, yet little is known about how they differ from non-Indigenous youth in terms of criminogenic risk and need profiles in relation to reoffending. The aim of the study was to examine the differences between Indigenous and non-Indigenous youth in terms of criminogenic risk and need profiles. This paper expands on findings of our previous study (Dellar et al., in press) and present the results of two analyses. The first is a comparative analysis of the differences in criminogenic risk and need factors in a sample of 4653 youth. Results raise questions about how Indigenous and non-Indigenous youth differ on type of criminogenic needs and how risk/needs are defined in an Indigenous context. The second analysis examines the predictive validity of a shortened version of the YLS/CMI in a subsample of 921 youth. Results show that a specific combination of five items for Indigenous youth corresponds to an improvement in AUC scores from $c. = .65$ for the full version to $c. = .73$. For non-Indigenous youth, the selected set of five items corresponds to an improvement in AUC scores from $c. = .66$ for the full version of the YLS/CMI to $c. = .73$. Implications of these findings for research, policy, and reducing Indigenous overrepresentation are discussed.

Keywords: YLS/CMI, predictive validity, recidivism, Indigenous youth, overrepresentation

The overrepresentation of Indigenous people in the Australian criminal justice system has been well established. Despite numerous enquiries (Royal Commission into Aboriginal Deaths in Custody [RCIADIC], 1991), targets developed to reduce overrepresentation (Australian Government & Coalition of Peaks, 2020), and research into the complex drivers of this (Hovane et al., 2014), Indigenous Australians continue to be the most incarcerated population in the world (Australian Law Reform Commission, 2018). Of particular concern, is the significant overrepresentation of Indigenous youth, who are 21-26 times more likely to be in detention on an average night compared to their non-Indigenous peers (Australian Institute of Health and Welfare [AIHW], 2020b). In Western Australia, Indigenous youth comprise around 50% of the offending population and the rate of contact with the justice system has remained relatively unchanged over the past decade despite a range of initiatives being implemented. Indigenous youth are at a higher risk of reoffending and have far higher rates of recidivism than non-Indigenous youth (Dellar et al., in press). It is plausible to assert then, that the criminal justice system in Australia does not adequately meet the criminogenic needs of Indigenous youth offenders. Understanding the criminogenic risk and needs of Indigenous youth is an essential starting point in the development and delivery of effective rehabilitative efforts to reduce the levels of overrepresentation.

The cause of Indigenous overrepresentation is complex and multifaceted. Previous research has examined additional risk factors specific to Indigenous Australians, including dislocation, exposure to traumatic events, community dysfunction, and racism (Dudgeon et al., 2014; Ferrante, 2013). These factors can be linked to the legacy of colonisation, intergenerational trauma and marginalisation, devastation of Indigenous economies and political structures, fragmentation of Indigenous families, and the systematic suppression of Indigenous views and culture (Dudgeon et al., 2014; Lockwood et al., 2018; Shepherd et al., 2015; Zubrick et al., 2014). The lack of, and limited access to, culturally appropriate service

delivery, further compounds these risk factors and prevents the criminal justice system from adequately addressing the needs of Indigenous offenders. Acknowledging the impact of colonisation, empowering elders, and incorporating Indigenous cultural norms and values into the court and justice system processes have been identified as potential strategies to transform the delivery of justice for Indigenous offenders (Marchetti, 2014).

Interventions aimed at reducing the risk of reoffending for Indigenous and non-Indigenous youth follows the Risk, Need, Responsivity (RNR) model; a well-researched evidence-based framework for effectively reducing recidivism and is based on three principles (Bonta & Andrews, 2017). The risk principle states that the intensity of intervention should parallel the level of risk (i.e., high risk = high intensity intervention). The need principle denotes that any interventions should target dynamic risk factors, also referred to as criminogenic needs. These empirically derived risk factors are strong and direct predictors of reoffending and should be the intermediate targets of treatment. There are eight criminogenic need areas that have been established as strong predictors of reoffending: criminal history, family circumstances/parenting, education/employment, peer relations, substance abuse, leisure/recreation, personality/behaviour, and attitudes/orientation. Of these eight domains, all but one (criminal history) are dynamic risk factors, meaning that they are amenable to change and should therefore be addressed through treatment (Bonta & Andrews, 2017). The final principle, responsivity, asserts that any interventions designed to reduce reoffending should be evidence-based and tailored to individual learning needs and traits.

Although there is considerable empirical support for the RNR framework, there is limited available research on the applicability of RNR-based risk assessment tools for Indigenous youth. We recently conducted the first study to examine the utility and validity of the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2003), an RNR-based risk assessment tool, on a sample of juvenile offenders in Western

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Australia (Dellar et al., in press). Commensurate with extant literature on the YLS/CMI, we found that Indigenous youth had significantly higher total risk scores, higher rates of recidivism, and differences in domain-specific risk compared to their non-Indigenous peers. Consistent with previous research, we found that although the YLS/CMI appeared to predict recidivism with a reasonable level of accuracy, predictive validity was slightly lower for Indigenous youth (McGrath & Thompson, 2012; Shepherd et al., 2014; 2015). Indeed, a consistent finding across prior studies is that the YLS/CMI is better at predicting recidivism for majority rather than minority groups (Villanueva et al., 2020). Therefore, further research is needed to improve the tool's predictive validity for minority groups, including Indigenous Australian youth.

The use of risk assessment measures that do not accurately reflect the risk and need profiles of Indigenous youth has serious implications. It has been argued that the higher risk scores for Indigenous youth are reflective of the criminal justice system's tendency to attribute systemic social problems and disadvantage onto individuals (Day, 2003; Hannah-Moffat, 2016; Lockwood et al., 2018). The argument continues that standardised risk assessment tools, which are largely developed and normed with Caucasian males, are products of systemic oppression, that continue to disregard cultural differences in how "deviance" and distress are manifested (Lockwood et al., 2018; Shepherd, 2016). For example, Indigenous people who present in situations outside of cultural context are likely to appear more agitated and distressed than normal (O'Connor et al., 2015; Westerman, 2021) and the concept "of shame" in the presence of non-Indigenous authority figures impacts the clinical presentation of Indigenous clients (Westerman, 2021). Consequently, Indigenous youth may be subjected to lengthier and more stringent sentencing conditions in comparison to their non-Indigenous peers. As such, it is necessary to understand the patterns of offending amongst Australian youth, with a particular focus on understanding the differences in

criminogenic risk and need profiles of Indigenous youth to inform the development and delivery of effective rehabilitative efforts to reduce overrepresentation.

There is some research indicating that factors outside of the RNR model are important to consider in the prediction of recidivism for Indigenous offenders. In a recent Australian sample, a strong sense of cultural identity combined with active participation in traditional activities (cultural engagement) was shown to negatively predict violent recidivism (Shepherd et al., 2018). Studies examining Indigenous Canadian youth and adults have found that history of victimisation and emotional problems, and lack of spiritual support from family or community elders were significant positive predictors of general recidivism (Gutierrez et al., 2013; Wilson, 2016). Lack of spiritual support in combination with living on a reserve and low community well-being also significantly predicted violent recidivism (Wilson, 2016). Although the factors outlined above are not unique to Indigenous youth involved in the justice system, they can be understood as uniquely related to the history of colonisation, oppression, and the pervasive role of transgenerational trauma experienced by Indigenous people (Lockwood et al., 2018). It has been well established that receiving intervention targeted at criminogenic needs predicts and reduces recidivism (Bonta & Andrews, 2017), strongly supporting the efficacy of the RNR model. However, there is also a wealth of research demonstrating the deleterious effects that can occur when the RNR principles are not effectively implemented into practice. For example, when the intensity of treatment is not matched to the level of risk or non-criminogenic needs are targeted in treatment, risk of reoffending actually increases (Armytage & Ogloff, 2017; Lipsey, 2009). More simply, if the assessment tools used to determine the criminogenic needs do not accurately capture the risk and need factors specific to Indigenous youth, then it follows that any interventions implemented to target those factors will be ineffective and could in fact, be

indirectly increasing risk and contact with the justice system (Armytage & Ogloff, 2017; Day et al., 2003).

Predictive validity of assessment tools may be improved by tailoring the instruments to specific jurisdictions and populations. As outlined by Hamilton et al. (2020), customisation of assessment tools to fit the needs of the jurisdiction can be done through consideration of gendered pathways to offending, any racial or ethnic differences in delinquency, and outcome specificity. Such consideration then allows for options to improve tool optimisation such as weighting of items predictive of recidivism outcomes for various youth subgroups (e.g., females and racial minorities; Hamilton et al., 2020). The tailoring of risk assessment tools improves their utility by informing practitioners which items are most relevant for their specific youth offending population (Hamilton et al., 2020). Findings from previous research (Duwe, 2019; Hamilton et al., 2016; 2020) have demonstrated the benefits of jurisdiction-specific instruments in reforming off-the-shelf risk assessment tools to reflect the population and localised context of agency needs.

In light of the research cited above, the current study sought to expand on our previous findings (Dellar et al., in press) to provide insight into the specific nature or presentation of factors associated with recidivism risk in a West Australian juvenile population. The present study aimed to examine the differences between Indigenous and non-Indigenous youth in terms of criminogenic risk and need profiles. We hypothesised that Indigenous youth would have a higher number of criminogenic needs requiring intervention. Another aim was to explore and test the most predictive combinations of the YLS/CMI risk factors to determine if a shortened version of the tool could be utilised to improve its predictive utility for both Indigenous and non-Indigenous juvenile offenders.

Research Method

Sample

The same dataset from our previous study (Dellar et al., in press) was utilised and was provided by the Western Australian Department of Justice (DoJ). The sample included all YLS/CMI assessments completed with juvenile offenders from 2016-2020 ($N = 4653$). Thirteen cases were excluded from the dataset due to the age of participants being over 18 years and 225 cases with unknown ethnicity were also excluded leaving a final sample of $N = 4428$. A summary of demographic and descriptive statistics can be seen in Table 12.

Table 12

Demographic and Descriptive Statistics for Indigenous and Non-Indigenous Subgroups

	Indigenous (n)	%	Non-Indigenous (n)	%	FET p
Gender					
Male	1901	79.2	1617	79.8	
Female	500	20.8	410	20.2	
Residence					.000**
Urban	965	40.2	1599	78.9	
Regional	1436	59.8	428	21.1	
Index Offence					.000**
General	1324	55.1	1089	53.7	
Violent	969	40.4	792	39.1	
Sexual	39	1.6	98	4.8	
Sexual Violence	69	2.9	48	2.4	
Order Tariff					.000**
Juvenile Justice Teams (diversionary)	619	25.8	769	37.9	
Statutory	1782	74.2	1258	62.1	

	Indigenous (n)	%	Non-Indigenous (n)	%	FET p
YLS/CMI Risk Rating					.000**
Very High	110	4.6	42	2.1	
High	659	27.4	384	18.9	
Moderate	1152	48	861	42.5	
Low	480	20	740	36.5	
Total	2401	54.2	2027	45.8	

Note. FET = Fisher's Exact Test

Measures

YLS/CMI

Youth Justice Services in Western Australia adopted the YLS/CMI as the predominant risk/needs assessment tool in August 2016. The tool is administered at the pre-sentence stage to inform sentencing and to assist in the development of case management plans. The YLS/CMI is administered by the young person's allocated Youth Justice Officer who is required to undergo standardised training in completion of the tool. All demographic information, including ethnicity, is collected from the young person and their responsible adult when a young person first enters the system by Youth Justice Staff who are then responsible for entering this information into the DoJ database. Completed YLS/CMI assessments are also then reviewed and endorsed by senior supervisors who may override the risk rating.

Part I of the tool provides a survey of all the risk and need factors and includes 42 items marked dichotomously (absent/present) that are subdivided into the following eight domains:

1. Prior and Current Offences/Dispositions
2. Family Circumstances/Parenting

3. Education/Employment

4. Peer Relations

5. Substance Abuse

6. Leisure/Recreation

7. Personality/Behaviour

8. Attitudes/Orientation

The total number of items marked as present are summed to provide an overall score which represents a specific risk level (low, moderate, high or very high). The higher the total score, the higher the risk of continued criminal activity. Scores and risk/need levels (low, moderate, or high) from each domain are also recorded to reflect areas of criminogenic need that should be targeted in intervention (i.e., risk/need domains rated high should be prioritised).

Recidivism

Official recidivism data was available for 921 young offenders with a minimum follow-up period of two years (*M* = 988.81 days*, SD*= 135.74*).* Recidivism was defined as any re-arrest during the follow-up period and the types of offences were also recorded: violent, sexual, sexual violence, substance related, fire, vehicle, property (stealing included), and all other offence types fell under the category 'other'.

Ethics

This study was approved by the Department of Justice Research Applications and Advisory Committee and the Curtin University Human Research Ethics Committee. Approval was granted to access the de-identified dataset that included scores for all items of all YLS/CMI assessments completed from August 2016 to March 2020. As part of the ethics process, regular consultation with Indigenous peoples was conducted to ensure the research was culturally appropriate and in line with the Ethical Conduct in Research with Aboriginal

and Torres Strait Islander Peoples and Communities (National Health and Medical Research Council, 2018). In addition, this study included both Indigenous (JB – an Wardandi Noongar man and researcher) and non-Indigenous (Wadjella) researchers with a shared interest in criminal justice and experience working with Indigenous youth and adults in a criminal justice context (KD and KD).

Data Analysis

All statistical analyses were performed using SPSS version 26. The odds ratio (OR) was used as a measure of association between risk factor and recidivism. Risk factors with an OR greater than 3.00 were included in a backward logistic regression model and the area under the receiver operating characteristic (ROC) curve was tested. The assumptions for the logistic regression model were met and the ratio between participants and variables included in the model was appropriate for effectively detecting relationships (Field, 2018).

<div align="center">

Results

</div>

The majority of Indigenous youth were residing in regional areas at the time of assessment. Commensurate with prior research, Indigenous youth were rated at a higher risk of reoffending and were more likely to receive a higher Order tariff than their non-Indigenous peers. As shown in Figure 6, Indigenous youth had higher rates of involvement with the justice system at almost every age category from 10-18 years compared to non-Indigenous youth. The only time at which the number of non-Indigenous juvenile offenders exceeded that of Indigenous juveniles was at 17 and 18 years of age. Indigenous youth between the ages of 10-12 had more than double the rates of involvement with the justice system compared to their same aged non-Indigenous peers, with an odds ratio of 2.73.

Figure 6

Bar Graph Comparison of Age of Offenders at time of YLS/CMI Assessment for Indigenous and Non-Indigenous Youth
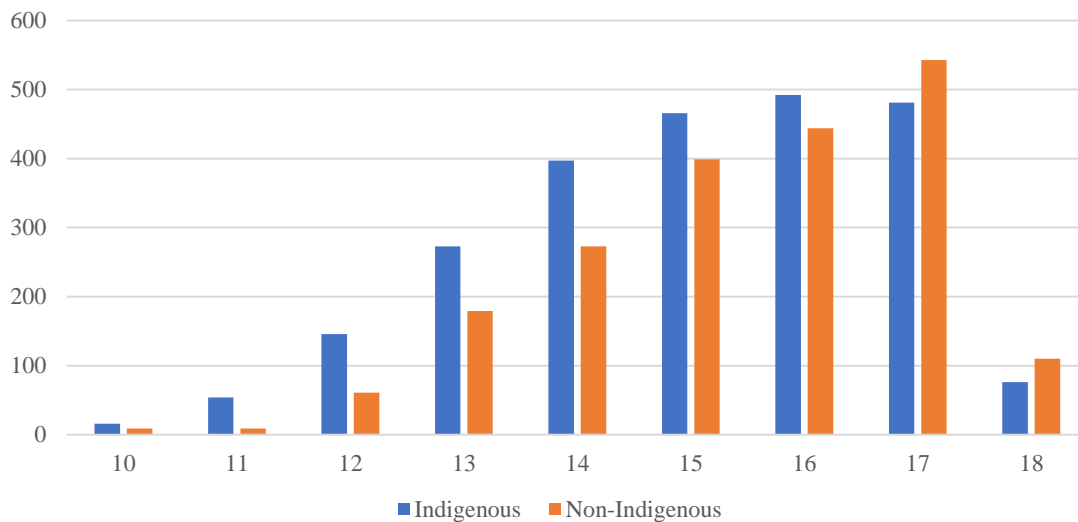
Criminogenic Risk and Need Profiles

Risk is defined as a factor that increases the likelihood of engaging in future criminal behaviour. It is considered cumulative in that the more risk factors an individual possesses, the more likely they are to offend – this is referred to as criminogenic risk. A subset of criminogenic factors, criminogenic needs, are the factors that can be changed through intervention to reduce the likelihood of future offending – also referred to as dynamic factors. For example, substance abuse is a risk factor, but it is something that we can influence, and to the extent that we succeed, we can reduce the risk level (Hoge, 2012). On the YLS/CMI instrument, there are eight risk domains captured; however, the first domain, prior/current offences, is considered a static (historical) factor that cannot be altered with intervention. The remaining seven domains are dynamic (i.e., changeable) risk factors and are therefore also considered criminogenic needs. At the conclusion of each YLS/CMI assessment, there is a list of recommendations highlighting the youth's highest rated criminogenic needs and targets

for intervention. In our data sample, the top four criminogenic needs for each youth had been recorded and was therefore coded as present if it appeared in the available dataset. Figure 7 and Figure 8 show the criminogenic risk and need profiles for Indigenous and non-Indigenous youth in our sample. In each of the figures, whenever there is a disparity between the risk and need columns, it signifies that the particular domain is being under-identified as a focus for intervention (need < risk) or over-identified (need > risk).

For both groups, there were numerous disparities between criminogenic risk and needs however, Indigenous youth had more needs that were being over-targeted as a focus of intervention which may reflect the higher rates of recidivism for this group of juvenile offenders. The leisure/recreation domain was being over-targeted as a focus of intervention for both Indigenous and non-Indigenous groups. The family circumstances, education/employment and personality/behaviour domains were under-targeted as a focus of intervention for both groups. Peer relations and substance abuse were over-targeted as a focus of intervention for Indigenous youth and was under-targeted for non-Indigenous youth.

Figure 7

Criminogenic Risk and Need Profiles for Indigenous Youth
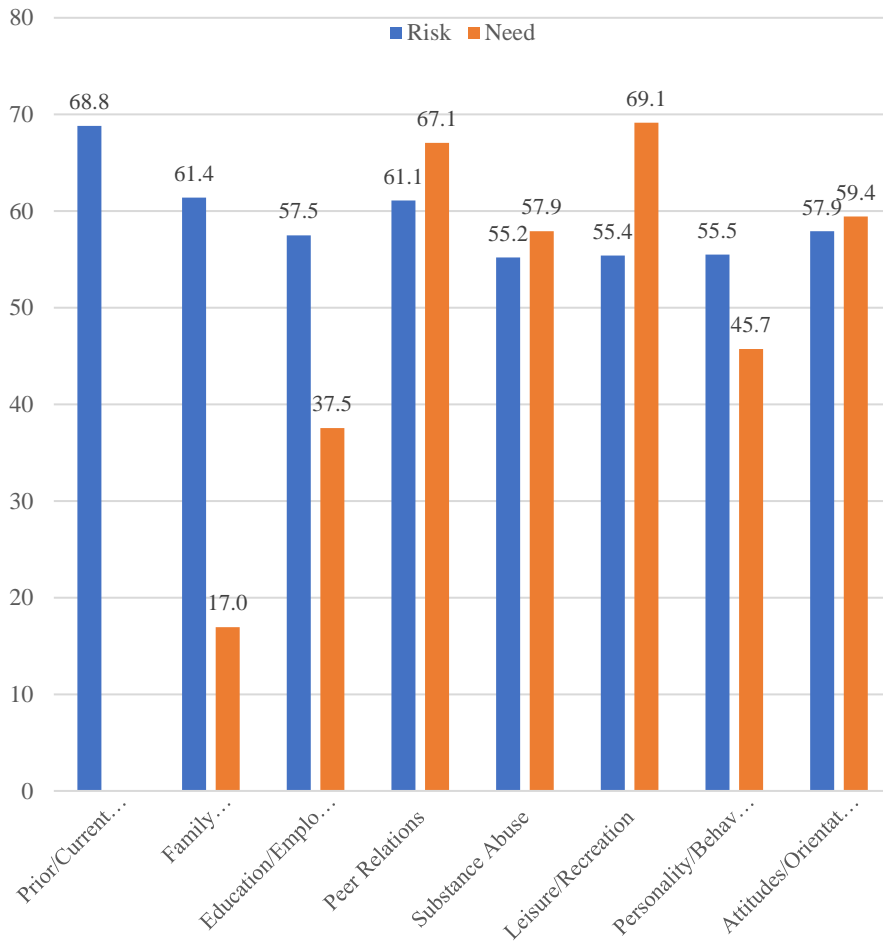
Figure 8

Criminogenic Risk and Need Profiles for Non-Indigenous Youth
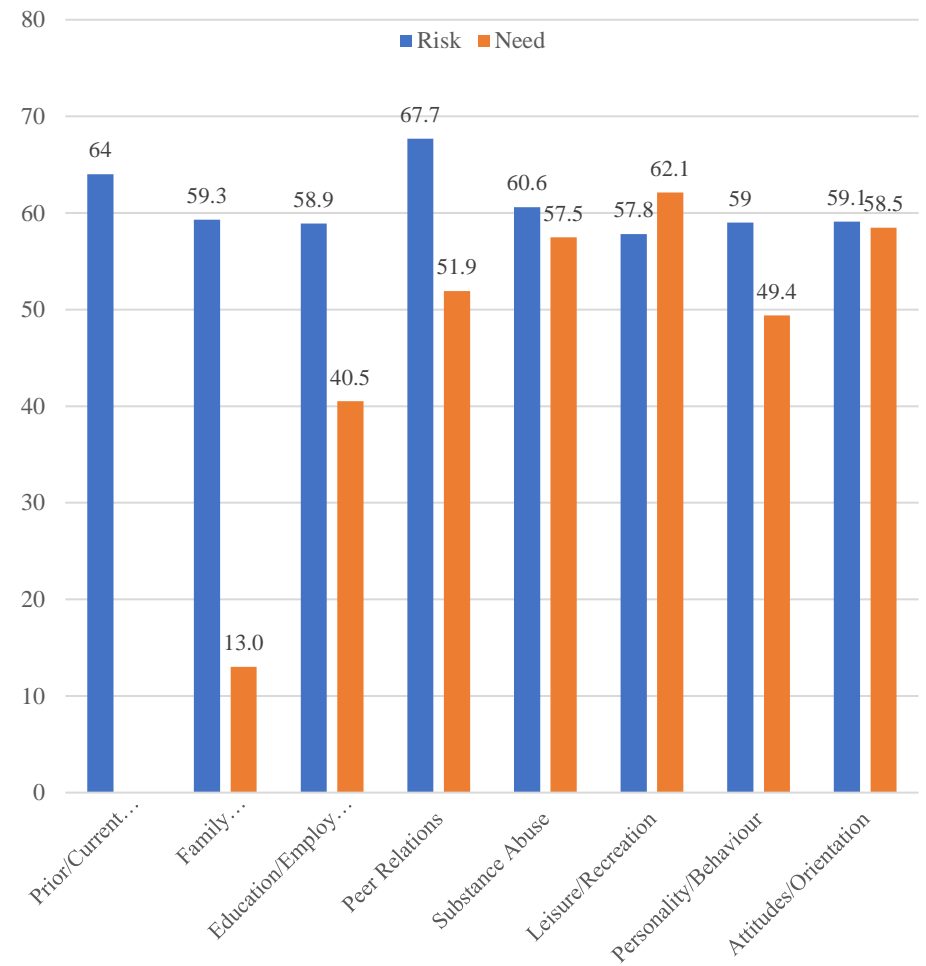
Logistic Regression

A backward binomial logistic regression model was tested for recidivism versus non-recidivism over a two-year follow-up period. One-tailed tests were used because of directional predictions. The overall recidivism rate for our sample was 74.8%. Indigenous youth reoffended at a higher rate than non-Indigenous youth, with 84.8% of Indigenous youth reoffending during the follow-up period compared to 63.3% of non-Indigenous youth. Table 13 shows the prevalence of all 42 risk factors (items) for Indigenous and non-Indigenous youth along with the odds ratio (OR) and confidence intervals. For Indigenous youth, the most important risk factor was actively rejecting help (item 8c) on the attitudes/orientation domain (OR = 5.65, CI = [1.35, 23.66]). The YLS/CMI user manual defines this item as a *youth actively resisting the interventions of helping persons or agencies.* An Indigenous youth with this factor has five times the odds to recidivate within two years. For non-Indigenous youth, the most important risk factor was two or more failures to comply (item 1b) on the prior/current offences domain (OR = 25.44, CI = [3.46, 187.23]). The user manual defines this item as including *failures to appear in court, probation/parole violation, escape from custody, failure to comply with alternative measures, or being unlawfully at large.* A non-Indigenous youth with this factor has 25 times the odds to recidivate within two years.

Table 13

Prevalence of YLS/CMI Risk Factors for Indigenous and Non-Indigenous Youth from Recidivist Sample

Risk factor	Indigenous (*n* = 493)				Non-Indigenous (*n* = 428)			
	% Recidivists (*n* = 418)	% non-recidivists (*n* = 75)	OR	95% CI	% Recidivists (*n* = 271)	% non-recidivists (*n* = 157)	OR	95% CI
Prior/Current Offences								
1a. Three or more prior convictions	**48.1**	**18.7**	**4.04***	**2.19 – 7.44**	25.8	5.7	5.73*	2.77 – 11.83
1b. Two or more failures to comply	**34.9**	**13.3**	**3.49***	**1.74 – 6.99**	14.0	0.6	25.44*	3.46 – 187.23
1c. Prior probation	35.4	18.7	2.39*	1.29 – 4.42	20.7	5.1	4.85*	2.25 – 10.47
1d. Prior custody	13.2	5.3	2.69	0.95 – 7.66	4.4	0	0.62*	0.58 – 0.67
1e. Three or more current convictions	**37.1**	**12.0**	**4.32***	**2.10 – 8.92**	18.8	5.1	4.32*	1.99 – 9.36
Family Circumstances/Parenting								
2a. Inadequate supervision	59.8	44.0	1.89*	1.15 – 3.11	28.0	19.7	1.58	0.99 – 2.55
2b. Difficulty in controlling behaviour	62.7	50.7	1.64	1.00 – 2.68	50.2	29.9	2.36*	1.56 – 3.58
2c. Inappropriate discipline	32.3	20.0	1.91*	1.05 – 3.48	13.3	14.0	0.94	0.53 – 1.66
2d. Inconsistent parenting	52.4	36.0	1.96*	1.18 – 3.26	24.4	19.1	1.36	0.84 – 2.21
2e. Poor relations (father-youth)	39.7	37.3	1.11	0.67 – 1.84	34.3	29.3	1.26	0.82 – 1.93
2f. Poor relations (mother-youth)	32.8	20.0	1.95*	1.07 – 3.56	26.2	22.9	1.19	0.75 – 1.89
Education/Employment								
3a. Disruptive classroom behaviour	26.6	21.3	1.33	0.74 – 2.41	34.7	24.2	1.66*	1.07 – 2.59
3b. Disruptive behaviour on school property	23.4	20.0	1.23	0.67 – 2.25	26.6	24.2	1.13	0.72 – 1.78
3c. Low achievement	44.5	30.7	1.81*	1.07 – 3.07	28.0	23.6	1.26	0.80 – 1.99
3d. Problems with peers	25.8	25.3	1.03	0.58 – 1.81	25.5	27.4	0.91	0.58 – 1.41
3e. Problems with teachers	20.1	12.0	1.84	0.88 – 3.85	29.9	22.9	1.43	0.91 – 2.26
3f. Truancy	71.1	61.3	1.55	0.93 – 2.58	56.5	33.8	2.54*	1.69 – 3.83
3g. Unemployed/not seeking employment	15.1	10.7	1.49	0.68 – 3.24	12.5	8.30	1.59	0.81 – 3.11
Peer Relations								
4a. Some delinquent acquaintances	**91.9**	**77.3**	**3.31***	**1.74 – 6.31**	79.0	60.5	2.45*	1.59 – 3.78
4b. Some delinquent friends	85.9	69.3	2.69*	1.53 – 4.73	**69.4**	**39.5**	**3.47***	**2.30 – 5.24**
4c. No/few positive acquaintances	49.3	36.0	1.73*	1.04 – 2.87	36.2	15.9	2.99*	1.83 – 4.90
4d. No/few positive friends	52.9	36.0	1.99*	1.20 – 3.32	**39.1**	**16.6**	**3.24***	**1.99 – 5.27**

Risk factor	Indigenous (*n* = 493)				Non-Indigenous (*n* = 428)			
	% Recidivists (*n* = 418)	% non-recidivists (*n* = 75)	OR	95% CI	% Recidivists (*n* = 271)	% non-recidivists (*n* = 157)	OR	95% CI
Substance Abuse								
5a. Occasional drug use	60.8	53.3	1.36	0.83 – 2.22	63.8	44.6	2.19*	1.47 – 3.28
5b. Chronic drug use	36.1	37.3	0.95	0.57 – 1.58	37.3	27.4	1.58*	1.03 – 2.42
5c. Chronic alcohol use	13.4	8.0	1.78	0.74 – 4.29	9.60	7.60	1.28	0.63 – 2.62
5d. Substance abuse interferes with life	33.7	22.7	1.74	0.98 – 3.09	27.3	17.2	1.81*	1.10 – 2.96
5e. Substance abuse linked to offences	40.2	30.7	1.52	0.90 – 2.58	34.7	22.3	1.85*	1.18 – 2.91
Leisure/Recreation								
6a. Limited organised activities	64.8	54.7	1.53	0.93 – 2.51	59.8	51.6	1.39	0.94 – 2.07
6b. Could make better use of time	69.9	57.3	1.73*	1.04 – 2.85	55.4	38.9	1.95*	1.31 – 2.91
6c. No personal interests	20.1	20.0	1.01	0.54 – 1.86	18.5	13.4	1.47	0.84 – 2.55
Personality/Behaviour								
7a. Inflated self-esteem	3.1	1.3	2.38	0.31 – 18.43	2.20	1.90	1.16	0.29 – 4.71
7b. Physically aggressive	33.3	32.0	1.06	0.63 – 1.79	35.8	26.1	1.58*	1.02 – 2.44
7c. Tantrums	23.9	18.7	1.37	0.74 – 2.55	23.2	15.9	1.60	0.96 – 2.67
7d. Short attention span	30.9	16.0	2.34*	1.22 – 4.50	22.5	17.8	1.34	0.81 – 2.20
7e. Poor frustration tolerance	41.4	38.7	1.12	0.68 – 1.85	39.1	28.0	1.65*	1.08 – 2.52
7f. Inadequate guilt feelings	20.6	8.0	2.98*	1.25 – 7.09	21.8	13.4	1.80*	1.05 – 3.10
7g. Verbally aggressive, impudent	24.9	28.0	0.85	0.49 – 1.48	30.6	19.1	1.87*	1.16 – 3.00
Antisocial Attitudes/Orientation								
8a. Antisocial/Procriminal attitudes	70.1	68.0	1.10	0.65 – 1.87	56.8	53.5	1.14	0.77 – 1.70
8b. Not seeking help	36.8	29.3	1.41	0.82 – 2.40	27.3	17.8	1.73*	1.06 – 2.82
8c. Actively rejecting help	**13.4**	**2.70**	**5.65***	**1.35 – 23.66**	10.7	5.10	2.23*	0.99 – 5.01
8d. Defies authority	28.2	16.0	2.07*	1.08 – 3.97	**30.3**	**11.5**	**3.35***	**1.92 – 5.84**
8e. Callous, little concern for others	5.3	2.7	2.03	0.47 – 8.81	3.70	2.50	1.47	0.45 – 4.75

The final model predicting recidivists for both Indigenous and non-Indigenous youth showed that risk factors related to criminal history, peer relations, and antisocial attitudes were the strongest predictors of recidivism. Table 14 presents the logistic model that was tested for recidivism. The full model for Indigenous youth was statistically significant, χ^2 (5) = 50.15, p <.001, and correctly classified in 84.8% of the cases (p = .5). Although seven items were initially identified as the strongest risk factors associated with recidivism for non-Indigenous youth (OR > 3), the final model only includes five items, two of which are dynamic risk factors. The logistic regression showed a significant improvement in predicting recidivism and correctly classifying cases when these two items were removed. The full model for non-Indigenous youth was statistically significant, χ^2 (5) = 73.32, p <.001, and correctly classified in 70.3% of the cases (p = .5). The final model for non-Indigenous youth includes three dynamic risk factors.

Table 14

The Final Logistic Regression Model Predicting Recidivism Among Indigenous Juvenile Offenders

Predictor	β	SE	Exp (B)	Significance (p)
Indigenous Youth				
Constant	1.72	0.13	5.57	.000
1a. Three or more prior convictions	1.08	0.40	2.95	.007
1b. Two or more failures to comply	0.02	0.47	1.02	.961
1e. Three or more current convictions	1.10	0.39	3.00	.005
4a. Some delinquent acquaintances	0.95	0.35	2.59	.006
8c. Actively rejecting help	1.44	0.75	4.23	.054
R2 Nagelkerke			0.17	
Correctly Classified (p = .05)			84.8%	

Predictor	β	SE	Exp (B)	Significance (p)
Non-Indigenous Youth				
Constant	0.55	0.10	1.73	.000
1a. Three or more prior convictions	0.90	0.41	2.53	.024
1b. Two or more failures to comply	1.89	1.07	6.62	.077
4b. Some delinquent friends	0.80	0.23	2.22	.000
4d. No/few positive friends	0.42	0.28	1.52	.132
8d. Defies authority	0.78	0.31	2.18	.011
R2 Nagelkerke			0.22	
Correctly Classified ($p = .05$)			70.3%	

According to the area under the ROC curve, the selected set of five items for Indigenous youth corresponds to an improvement from AUC of .646 for the full version of the YLS/CMI to .729. For non-Indigenous youth, the selected set of five items corresponds to an improvement from AUC of .660 for the full version of the YLS/CMI to .726 (see Table 15).

Table 15

Relationship Between YLS/CMI Full Version, Shortened Version, and General Recidivism

YLS/CMI Tool/Items	AUC	SE	Significance (p)
Indigenous Youth			
YLS/CMI Full version	.646	.03	.000
YLS/CMI Five items	.729	.03	.000
Non-Indigenous Youth			
YLS/CMI Full version	.660	.03	.000
YLS/CMI Five items	.726	.03	.000

Discussion

The main goal of this study was to examine the differences in criminogenic risk and need profiles for Indigenous and non-Indigenous juvenile offenders to provide insight into the specific nature or presentation of factors associated with future offending. The second aim of this study was to explore and test the most predictive combinations of the YLS/CMI risk factors to identify a shortened version of the tool could that be utilised to improve its predictive utility for both Indigenous and non-Indigenous juvenile offenders. Our research objectives addressed several gaps in the literature, most notably the absence of any empirical research examining differences in risk and need factors for reoffending between Indigenous and non-Indigenous youth in an Australian context. Results raise questions about how Indigenous and non-Indigenous youth differ on type of criminogenic needs, how risk is defined, and how criminogenic needs are manifested in an Indigenous context. In addition, certain criminogenic needs were less likely to be identified as targets for intervention for Indigenous youth, which we link to how the YLS/CMI is scored and criminogenic needs are identified and prioritised. Finally, we discuss the predictive validity and utility of a shortened version of the YLS/CMI for Indigenous youth, along with the implications of these findings for research and policy.

Comparing Criminogenic Risk and Need Profiles

The results identified numerous disparities between criminogenic risk and needs for both Indigenous and non-Indigenous youth, although non-Indigenous youth had more needs that were being under-identified as a focus of intervention. It is plausible to assume that the disparities between criminogenic risk and the criminogenic needs identified as requiring intervention contribute, at least in part, to the higher rates of recidivism for Indigenous youth in our sample. The leisure/recreation domain was being over-identified as a focus of intervention for both Indigenous and non-Indigenous groups, whereas the family

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circumstances, education/employment and personality/behaviour domains were under-identified as a focus of intervention for both groups. Peer relations and substance abuse were both over-identified as a focus of intervention for Indigenous youth and were under-identified for non-Indigenous youth. According to the YLS/CMI training slides provided by the test distributor (Multi-Health Systems, 2016) when identifying the criminogenic needs that should be a focus in intervention, priority should be given to the more intrinsic (internally motivated) factors, which include antisocial attitudes, personality/behaviour, leisure/recreation and substance abuse. For example, should all seven dynamic risk domains be scored and rated as high, priority would be given to the above intrinsic factors first. Consequently, the protocol in which the YLS/CMI is scored and interpreted as defined in the user manual, is likely contributing to the disparities between criminogenic risk and needs identified and thereby indirectly contributing to the higher rates of recidivism and overrepresentation of Indigenous youth. It can also be argued that the definition of the YLS/CMI items, particularly in the education, peer relations, and recreation domains, disregard important cultural and social differences for Indigenous youth. For example, given the significantly higher proportion of Indigenous youth residing in regional areas in our sample, opportunities for forming positive peer relationships are conceivably more limited compared to their non-Indigenous counterparts. Moreover, there are numerous barriers to participating in education and organised leisure activities for Indigenous youth, particularly those residing in regional areas, including lack of infrastructure and programming, pervasive underfunding, and limited access to transportation (Butcher et al., 2019).

Practice and Policy Implications

Understanding the domains of criminogenic risk and need and how they operate differently for Indigenous youth is imperative and may inform the development and delivery of policies and programs to better meet youth's needs and reduce overrepresentation

(Lockwood et al., 2018). Previous research has suggested that experiences of colonisation, oppression, and transgenerational trauma have created a distinctive set of circumstances for Indigenous youth that are not adequately captured in existing risk assessment tools such as the YLS/CMI (Lockwood et al., 2018). A range of factors such as marginalisation, systemic racism, social disadvantage and feelings of powerlessness are all thought to contribute to Indigenous justice system involvement (Dudgeon et al., 2014; Shepherd et al., 2015). As outlined by Lockwood et al. (2018), careful consideration must be given to whether and how any such Indigenous specific factors are incorporated into risk assessment and intervention efforts for Indigenous youth. Including Indigenous specific factors into established RNR-based assessment tools and identifying them as "risk factors" may in fact 'responsibilise' or attribute systemic social problems and disadvantage onto individuals and communities (Day, 2003; Hannah-Moffat, 2016; Lockwood et al., 2018). Lockwood et al. (2018) suggest that it may be more appropriate to conceptualise and address Indigenous specific factors such as intergenerational trauma and socioeconomic disadvantage at the treatment stage rather than the assessment stage.

Recent research (Allan et al., 2020) has recommended access to cultural consultants and the inclusion of cultural guidelines to give practitioners using risk assessment tools a better understanding of the Indigenous people they assess and to help gain entrance into those people's communities. The researchers examined the views of practitioners using various risk assessment tools with Indigenous Australian sexual offenders and found that most practitioners believed that current risk assessment tools do not allow for enough consideration of individual and contextual factors. These individual and contextual factors are reflective of the Indigenous specific factors outlined above and include variables such as connection to culture, trauma histories, level of proper law enforcement and availability of work, recreational activities and support services in the communities of origin (Allan et al., 2020).

This becomes particularly important when considering the socio-historical background of Indigenous peoples in Australia and the likely influence of these experiences on the dynamic risk factors identified as most predictive for Indigenous youth. Specifically, in our sample the most predictive dynamic risk factor for Indigenous youth was item 8c defined as a *youth actively resisting the interventions of helping persons or agencies.* Within a cultural context, it is plausible to assume that for Indigenous youth, particularly those residing in remote and rural areas, this item reflects a level of mistrust and perceived discrimination resulting from historical injustices and intergenerational trauma. Without the cultural context and consideration of Indigenous people's socio-historical background, there is an increased risk of pejorative labels being ascribed to Indigenous youth with this item such as defiant, antisocial, and/or unwilling to change. Access to cultural consultants and the inclusion of cultural guidelines with the YLS/CMI manual is therefore one approach that would likely assist in more appropriate interpretation and understanding of the risk factors for Indigenous youth. This approach would also encourage practitioners to develop a more thorough understanding of the circumstances in the communities that many young Indigenous offenders come from as opposed to merely considering whether they fall in a specific risk category (Allan et al., 2020).

The results from our study confirm that a shortened version of the YLS/CMI using five risk items was able to predict general recidivism in an Australian sample, with higher values than those for the full version, which is 8.4 times longer. These specific combinations of items may contribute to creating a better shortened version of the YLS/CMI, which substantially reduces time required to complete the measure, and even improves the predictive validity and classification rates for both Indigenous and non-Indigenous youth. In addition, the specific combination of items includes dynamic (changeable) risk factors that are useful in determining urgent lines of intervention. Commensurate with results from

previous studies examining shortened forms of the YLS/CMI (Chu, et al., 2014; Cuervo & Villanueva, 2018), this study has demonstrated that specific, dynamic items are particularly important. Some of the preeminent theories of Indigenous overrepresentation include, as important mechanisms of recidivism and overrepresentation, similar factors found in this study – namely, systemic factors that influence the nature and extent of relationships between Indigenous people and the criminal justice system.

Overall, our results suggest that tailoring the YLS/CMI tool to the specific characteristics of West Australia's justice-involved youth population may be a more effective approach in the prediction of recidivism. This would require population norms to be developed, items to be reweighted, and risk category cut points developed that are jurisdiction specific. This approach would assist practitioners in identifying which items on the YLS/CMI are most relevant for the West Australian youth offender population. Another advantage of this approach could be developing a locally weighted pre-screen tool, with a reduced set of items most predictive of recidivism. This would allow low-risk youth to be identified for diversion and those not diverted would be administered the full YLS/CMI, reducing assessment labour and assisting in the allocation of resources to target higher risk cases. Utilising this approach is also relevant for early intervention and prevention efforts as increasing the accuracy of assessments could ensure lower risk youth are diverted away from the justice system and any rehabilitative intervention is focused on targeting relevant criminogenic needs to reduce recidivism.

Limitations and Future Directions

Although our study included a large dataset and is the first to analyse the differences in criminogenic risk and needs of Indigenous and non-Indigenous youth in Western Australia, it has some limitations. As outlined earlier, there is some research indicating that factors outside of the RNR model are important to consider in the prediction of recidivism for

Indigenous offenders. Although these factors are not unique to Indigenous youth involved in the justice system, they can be understood as uniquely related to the history of colonisation and associated impacts (Lockwood et al., 2018). Given the issues raised about how best to conceptualise and incorporate Indigenous specific factors such as intergenerational trauma and socioeconomic disadvantage, examining these factors is imperative for future research. In addition, more research is needed about why certain risk areas, such as leisure and peers, are such high areas of need for Indigenous youth and what can realistically be done to reduce risk. It could be that the definitions of the YLS/CMI items are disregarding important cultural and social differences for Indigenous youth. As previously mentioned, access to cultural consultants and the inclusion of cultural guidelines with the risk assessment tool may be a useful approach. The Australian focus of our study limits the direct application of the findings outside Australia, but the future directions are likely to have broader international relevance particularly in other countries with Indigenous populations that have been affected by colonisation. It is imperative that future research is done in partnership with Indigenous peoples and local communities to ensure that these risk assessments and subsequent intervention services do not become additional tools of oppression for Indigenous youth. As Marchetti (2014) outlined in her research, the historical context of colonisation makes the involvement of Indigenous elders and community representatives even more imperative for the transformation of the delivery of justice for Indigenous offenders. Incorporating the findings from our research into local policy and practice decisions could potentially assist in the reduction of overrepresentation of Indigenous youth in the criminal justice system by ensuring a more culturally inclusive framework in the assessment of their risk and needs.

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Conclusion of this Chapter

In this chapter, I have provided a manuscript of findings from an empirical evaluation of the differences in criminogenic risk and need factors between Indigenous and non-Indigenous youth in Western Australia and the predictive validity of a shortened version of the YLS/CMI. This chapter presented the final study included in this body of research, designed to meet the third objective of the research project. The next chapter will provide a summary of the research findings and general discussion.

Chapter 7: Research Summary and General Discussion

Although youth crime has been trending downward over the past few decades, considerable attention continues to be given to the issue of how to manage young offenders. Practitioners and policymakers are particularly interested in identifying young people who are most likely to reoffend. Given the economic costs associated with assessing and managing offending in youth and the potentially deleterious effects that can occur when risk is inappropriately assessed and managed, it is unsurprising that practitioners and policymakers want to feel confident that the risk assessment tools being used are valid and reliable.

In 2016, the DoJ in Western Australia adopted the YLS/CMI as the standard risk assessment tool for evaluating criminogenic risk and needs of young people entering the justice system. While there is a large empirical base supporting the predictive validity of the YLS/CMI with North American, Canadian, and other international youth offender populations, there has been little research demonstrating its effectiveness in Australian populations and no such research with the West Australian youth population. There has also been limited research investigating the utility of the YLS/CMI with young Indigenous offenders, which is particularly concerning given that Indigenous peoples are significantly overrepresented in the Australian criminal justice system.

The overarching aim of this thesis was to examine the validity and utility of the YLS/CMI general risk assessment tool for young offenders in Western Australia. The specific aims of this thesis were:

- To explore the effectiveness of general risk assessment measures for youth

- To examine the utility and validity of the YLS/CMI for West Australian youth

- To establish whether criminogenic risk factors differ between Indigenous and non-Indigenous youth in Western Australia

These aims were achieved through three key pieces of work: a meta-analysis of three standardised risk assessment tools used to predict the risk of general reoffending in youth, and two empirical studies evaluating the psychometric properties of the YLS/CMI and an examination of criminogenic risk and need profiles comparing Indigenous and non-Indigenous youth using a large West Australian sample. A summary of each of the studies is included with a discussion outlining the contributions of this thesis to the existing literature in the field of youth risk assessment and risk management.

Summary of Findings

The introductory chapter of this thesis provided the background and context for the subsequent chapters by outlining the issue of youth crime, with a focus on trends in Australian youth offending. Chapter three provided a review of the empirically supported criminogenic risk factors that are most predictive of reoffending in adolescence, with consideration given to culturally specific risk and protective factors for Indigenous youth. This chapter included a summary of the most empirically studied and supported model of offender assessment and management: the RNR model (Bonta & Andrews, 2017). The RNR model provided the theoretical and empirical foundation for the studies included in this thesis and is the framework on which the YLS/CMI risk assessment tool was developed. Whilst the RNR model has a strong empirical base and broad scope of application, concerns have been raised about the practical utility of the model and its lack of specificity. In response to criticisms, Bonta and Andrews (2017) have continued to expand the RNR model incorporating strength/protective factors and research has strongly supported the assertion that risk assessment and management approaches consistent with the principles of RNR, tend to produce larger reductions in recidivism (Brogan et al., 2015; Cuervo & Villaneuva, 2015; Hoge, 2016).

Meta-Analysis of Three General Risk Assessment Tools

Best practice approaches to assessment of reoffending risk in youth recommend practitioners incorporate the use of standardised risk assessment tools. While there are several risk assessment tools that have demonstrated validity with youth offending populations, no single tool has been identified as most effective in the prediction of general reoffending. I conducted a meta-analysis to examine the accuracy with which three standardised risk assessment tools can predict general recidivism in young offenders: the YLS/CMI (Hoge & Andrews, 2003), the YASI (Orbis Partners, 2000), and the Y-ARAT (van der Put, 2014). The aim was to identify the risk assessment tool that is best at predicting general recidivism for youth offenders. An additional aim was to provide a current and comprehensive review of empirical research on criminogenic risk factors for youth and the predictive validity of the three risk assessment tools for this population.

This study provided an update to existing research on three standardised risk assessment tools, the YLS/CMI, YASI, and Y-ARAT, used to assess general reoffending risk in youth. Overall, the three risk instruments included in the review performed similarly in terms of predictive validity. Differences were observed in the operational definitions of recidivism and between countries of origin, with studies originating from Scotland yielding the highest average effect sizes and studies from the United States yielding the lowest. The implication for clinical practice is that these tools may be appropriate for use with youth offenders when predicting general risk but should be interpreted and applied with caution. Although the YLS/CMI is the most widely used and most empirically researched tool, the results showed its ability to predict general reoffending in youth as being in the moderate range. The YASI is a newer tool that has shown promise, but currently lacks sufficient validation across different countries and populations for the results to be meaningfully generalised. The Y-ARAT, whilst yielding a moderate-to-large effect size, also lacks

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sufficient validation and is further limited in that the tool does not guide intervention planning as it only captures static/historical risk factors. The YLS/CMI and the YASI may be more useful for treatment and case management because they include dynamic risk factors that can be targeted in order to reduce recidivism risk.

Validity and Utility of the YLS/CMI with West Australian Youth Offenders

This study sought to examine the reliability and validity of the YLS/CMI with West Australian youth offenders to determine questions regarding generalisability and classification accuracy. This study also sought to provide insight into the specific nature or presentation of factors associated with future offending risk in West Australian youth for the purposes of understanding how well the tool meets the needs of this population as well as guiding future research efforts.

Results showed that the YLS/CMI had excellent internal consistency and the tool was able to differentiate between recidivists and non-recidivists with reasonable accuracy. Commensurate with extant literature on juvenile offending, there were significant group differences across YLS/CMI total scores and subcomponent scores. Although the findings showed statistically significant differences between Indigenous and non-Indigenous total scores, it should be noted that the mean scores for both groups in our sample fell within the same risk rating (i.e., moderate). A similar pattern has been identified in previous Australian studies (McGrath & Thompson, 2012; Shepherd et al., 2015). The higher total scores for Indigenous youth in the sample are likely a reflection of the additional complex risk factors experienced by Indigenous Australian's involved in the criminal justice system that have been linked to the impacts of colonisation, intergenerational trauma, marginalisation, social disadvantage, and racism (Dudgeon et al., 2014; Ferrante, 2013a; Shepherd et al., 2015; Zubrick et al., 2014). These factors potentially increase the risk of engaging in crime and thereby contribute to the significant overrepresentation of Indigenous youth in the justice

system. As such, the YLS/CMI seems to accurately account for the increased exposure to risk factors for Indigenous youth, despite the additional complex risk factors not actually being included in the tool itself (i.e., dislocation, racism, community dysfunction, and exposure to traumatic events).

Overrepresentation of Young Indigenous Offenders

Study three study sought to expand on the findings from study two, to provide insight into the specific nature or presentation of criminogenic risk factors in the West Australian youth offender population. I aimed to examine the differences between Indigenous and non-Indigenous youth in terms of criminogenic risk and need profiles and hypothesised that Indigenous youth would have a higher number of criminogenic needs requiring intervention. Another aim was to explore and test the most predictive combinations of the YLS/CMI risk factors to determine if a shortened version of the tool could be utilised to improve its predictive utility for youth offenders in Western Australia.

Indigenous youth in the sample reoffened at higher rates and had more involvement with the justice system at almost every age category from 10-18 years compared to non-Indigenous youth. The only time at which the number of non-Indigenous juvenile offenders exceeded that of Indigenous juveniles was at 17 and 18 years of age. Indigenous youth between the ages of 10-12 had more than double the rates of involvement with the justice system compared to their same aged non-Indigenous peers, with an odds ratio of 2.73. This is consistent with previous research (Broidy et a., 2015; Ferrante, 2013b; Fitzgerald et al., 2012) demonstrating a higher likelihood of Indigenous youth falling into the *life-course persistent* offending trajectory, with early onset and more chronic offending patterns compared to non-Indigenous youth.

The findings raised questions about how Indigenous and non-Indigenous youth differ on type of criminogenic needs, how risk is defined, and how criminogenic needs are

expressed in an Indigenous context. The results identified numerous disparities between criminogenic risk and needs for both Indigenous and non-Indigenous youth, although non-Indigenous youth had more needs that were being under-identified as a focus of intervention. I suggest that the disparities between criminogenic risk and the criminogenic needs identified as requiring intervention contribute, at least in part, to the higher rates of recidivism for Indigenous youth in our sample. I also suggest that the protocol in which the YLS/CMI is scored and interpreted as defined in the user manual, is likely contributing to the disparities between criminogenic risk and needs identified and thereby indirectly contributing to the higher rates of recidivism and overrepresentation of Indigenous youth. I further argue that the definition of the YLS/CMI items, particularly in the education, peer relations, and recreation domains, disregard important cultural and social differences for Indigenous youth.

The results from the study confirm that a shortened version of the YLS/CMI using five risk items was better able to predict general recidivism in our sample compared to the full-length tool, which is 8.4 times longer. These specific combinations of items could be used to create a shortened version of the YLS/CMI, which substantially reduces time required to complete the measure, and improves the classification rates and predictive validity for both Indigenous and non-Indigenous youth in Western Australia.

Applied Implications and Future Directions

This research furthers understanding about the utility of and validity of the YLS/CMI general risk assessment tool for young offenders in Australia. The findings also contribute to the knowledge base of criminogenic risk and need profiles for Indigenous and non-Indigenous West Australian youth and highlight the need for empirical research to avoid a 'one size fits all' approach to youth risk assessment. It is anticipated that the findings will have utility for researchers, practitioners, local government, and correctional agencies in the youth justice field in terms of improving risk assessment and risk management practices.

Theoretical Implications

Commensurate with existing international and Australian research, the findings from this thesis lend support to the developmental trajectory pathway of offending for youth. Specifically, Indigenous youth in Western Australia demonstrated *life-course persistent* trajectories at higher rates that non-Indigenous youth as evidenced by the overrepresentation of Indigenous youth at every age group, particularly the younger cohort (10-12 years). Indigenous youth in Western Australia also demonstrated higher levels of cognitive impairments, including FASD, which is consistent with research showing *life-course persistent* offenders tend to have higher rates of neurodevelopmental and psychosocial risk factors (Kerridge et al., 2020; Miller, 2014; Russell & Odgers, 2016). From a sociological perspective, the findings also provide support for the important influence of peers and family on antisocial and offending behaviour, as evidenced by the strength of these risk domains, particularly for Indigenous youth. This is unsurprising given Ferrante's (2013a) earlier work providing empirical evidence for the importance of social networks within Indigenous communities. As recommended by prominent Indigenous researchers, the findings from this thesis support the need for criminogenic risk factors for Indigenous youth to be understood within a context of social disadvantage, historical injustices, and intergenerational marginalisation (Cunneen, 2014; Milroy et al., 2021). In line with Allard and colleagues (2020), the findings suggest that early prevention programs will likely be a more useful approach to reducing Indigenous overrepresentation in the justice system by disrupting the *life-course persistent* trajectory of offending.

Additional research could further our understanding of the causal factors of Indigenous youth offending by examining the influence of culturally specific risk and protective factors. Prospective research could further assist in identifying and understanding systemic factors that contribute to the significant overrepresentation of Indigenous young

people in the youth justice system. Any future research should include an evaluation of the impact and influence of neurodevelopmental impairments such as FASD on rates of reoffending, particularly for Indigenous youth, as this could identify potential pathways to reduce reoffending. For example, if empirical research supports the higher rates of neurogenetic factors (e.g., FASD) in the development of youth offending, then primary prevention efforts targeting education and awareness of the impacts of maternal alcohol consumption may assist in reducing risk of youth offending.

Best Practice in Youth Risk Assessment

Risk assessment is a clinical task that is often integral in legal decision-making processes, including those pertaining to youth offenders. Using standardised tools to evaluate the recidivism risk is fundamental in aiding clinical judgement and decision-making and forms a core component of best practice in the field of youth risk assessment and risk management. Conducting risk assessments with youth offenders requires careful consideration of multiple factors. At a minimum, practitioners conducting youth risk assessments should be knowledgeable about developmental factors that contribute to antisocial and offending behaviour. Furthermore, risk assessments should be evidence-based; practitioners and policymakers working in the field of youth justice field should select appropriate risk assessment tools that are standardised and empirically supported (DeMatteo et al., 2016).

Consistent with extant literature, the findings from the meta-analysis add empirical support for the use of both actuarial (Y-ARAT) and SPJ youth risk assessment tools (YLS/CMI and YASI) in the prediction of general recidivism. Whilst actuarial approaches are effective when considering predictive power, SPJ approaches are more useful in formulating antisocial behaviour and identifying interventions to reduce recidivism risk (DeMatteo et al., 2016; Hoge, 2012; Olver et al., 2009). In terms of practical utility, SPJ risk

instruments, such as the YLS/CMI and YASI may be more useful for practitioners in terms of identifying changeable (dynamic) risk targets for intervention with the aim of reducing reoffending. SPJ approaches are also less likely to introduce racial bias into decision-making as they don't focus solely on static (unchangeable) risk factors that tend to artificially inflate risk scores for minority populations.

The results from study two (chapter five) support the generalisability of the YLS/CMI, a SPJ assessment measure, across racial and ethnic groups as the tool performed similarly in predicting general reoffending with Indigenous and non-Indigenous youth. In line with prior research, the results from study two also found that Indigenous youth score higher on SPJ risk assessment measures compared to non-Indigenous youth which is likely a reflection of factors associated with minority disadvantage (Frize et al., 2008; Shepherd et al., 2014; Thompson & McGrath, 2012). Consequently, the findings from this thesis lend support to the argument for the focus of risk assessments to move away from risk level and towards targeting individual risk factors in order to avoid further marginalising Indigenous youth for historical and social injustices that are outside of their control.

A comprehensive understanding of criminogenic risk factors is necessary to identify appropriate interventions and resources with the aim of reducing reoffending. There is a dearth of research exploring the role of protective factors in youth offending, particularly for Indigenous youth. A better understanding would allow for the identification of ways to maintain protective factors. There is an ongoing need to evaluate the effectiveness of youth risk assessment tools and procedures, particularly with Indigenous youth, to ensure continued evidence-based policy change. With increased confidence in the use of risk assessment tools, youth justice systems could be more effective in early prevention and diversion programs to address the early onset *life-course persistent* trajectory of offending, particularly for Indigenous youth.

YLS/CMI Utility and Validity

The results from study two (chapter five) provide empirical support for the use of the YLS/CMI as a reliable and valid measure in predicting general recidivism with young offenders in Western Australia. Taken together, the findings of this thesis suggest that tailoring the YLS/CMI tool to the specific characteristics of West Australia's justice-involved youth population may be a more effective approach in the prediction of recidivism. This would require population norms to be developed, items to be reweighted, and jurisdiction-specific risk categories to be developed. This approach would assist practitioners in identifying which items on the YLS/CMI are most relevant for the West Australian youth offender population. Another advantage of this approach could be developing a locally weighted pre-screen tool, with a reduced set of items most predictive of recidivism. This would allow youth who are lower risk to be identified and triaged for diversion, reducing assessment labour and assisting in the allocation of resources to target higher risk cases.

Overrepresentation of Indigenous Youth

Study two (chapter five) and study three (chapter six) add empirical support for the use of the YLS/CMI risk assessment tool with Indigenous youth, with some caveats applied. Having awareness of the influence or importance of particular risk factors/domains, especially for minority groups including Indigenous youth, will likely improve risk assessment and management approaches with this population. For example, leisure/recreation was found not to be significantly predictive for Indigenous youth in Western Australia but was over-targeted as a focus of intervention. In line with the RNR model, focusing on the wrong criminogenic needs for intervention can, in fact, increase recidivism, and may offer some explanation as to the higher rates of recidivism for Indigenous youth. That is, current intervention approaches are not focusing on the right areas of need and it is therefore unsurprising that rates of reoffending are so high. Additionally, the definitions of risk items

included in the user manual appear to disregard important cultural and social context. It is plausible to assume that this further contributes to the high rates of reoffending for Indigenous youth as there appears to be a fundamental misunderstanding of the underlying need and subsequent behavioural manifestations. For example, *actively rejecting help* was identified as the most important risk factor for Indigenous youth but the definition of the item in the user manual fails to consider the underlying causes of this attitude/behaviour and may encourage a pejorative view of the young person as non-compliant/antisocial. However, with consideration of cultural and social factors, this item could be interpreted and understood in the context of historical trauma, systemic marginalisation and racism that has resulted in a deep mistrust of so called 'helping agencies', particularly those associated with the Government. It may be then, that a young Indigenous person who is 'actively rejecting help' is not in fact, antisocial or non-compliant, but is fearful and mistrusting of the agencies responsible for intervening to address offending behaviour. With this understanding, the risk management approach would likely alter and include more efforts to develop trust and rapport with the young person, their family and wider community, as opposed to enforcing punitive sanctions for non-compliance and likely entrenching the young person further into the justice system.

Commensurate with recent research by Allan and colleagues (2020), access to cultural consultants and the inclusion of cultural guidelines with the YLS/CMI user manual is recommended to give practitioners a better social and cultural understanding of Indigenous youth that are assessed. This approach would likely assist in more appropriate interpretation and understanding of criminogenic risk factors and encourage practitioners to develop a more thorough understanding of the communities that Indigenous youth come from as opposed to merely considering whether they fall into a specific risk category.

There is a need for effective culturally safe and trauma-informed prevention and early intervention approaches to transform the delivery of justice and to reduce Indigenous overrepresentation in the criminal justice system (Milroy et al., 2021). To better understand the causes of Indigenous overrepresentation, consideration must be given to a broad range of contributing factors as well as pathways for prevention and healing. Acknowledging the impact of colonisation, empowering elders, and incorporating Indigenous cultural norms and values into the court and justice system processes have been identified as potential strategies to transform the delivery of justice for Indigenous offenders (Marchetti, 2014). More research is needed about why certain risk areas, such as leisure and peers, are such high areas of need for Indigenous youth and what can realistically be done to reduce risk.

Real World Applications

This research has already contributed to real-world applications within the West Australian DoJ. After submitting two research papers (study two and three) to the DoJ, I was asked to complete a state-wide audit of YLS/CMI assessments in 2021. The purpose of the audit was to evaluate the reliability of YLS/CMI risk ratings by establishing the inter-rater reliability index across 10 Youth Justice sites in both metropolitan and regional Western Australia. The state-wide audit was initiated by the DoJ and represented an important step in quality assurance practices for risk assessments conducted with young people in Western Australia. The audit took 10 months to complete and involved a review of 118 YLS/CMI assessments, culminating in a final audit report with recommendations for improving current practices. Positively, the DoJ has already actioned several of these recommendations and has made active efforts to improve the accuracy of YLS/CMI assessments through the delivery of staff training. I have also been delivering specialised workshops for staff across the state since November 2021, focusing on issues identified through the audit, and utilising real-life case scenarios to upskill staff who conduct YLS/CMI assessments, and management staff

who are responsible for endorsing final assessments and overseeing quality assurance practices. The findings from our research have been integral to the YLS/CMI workshops and ensuring DoJ staff feel confident in the reliability and validity of their assessments, particularly with Indigenous youth.

I presented the findings from our research (study two and three) at the Australasian Youth Justice Association (AYJA) Conference on 15-17 November 2021. I also presented the findings from study three of our research through a lightning oral presentation at the Australian and New Zealand Association of Psychology, Psychiatry, and Law (ANZAPPL) conference held online in November 2021. Following the conferences, I have been contacted by Youth Justice staff across multiple Australian states (New South Wales, Queensland, and South Australia) who expressed interest in our research findings and to establish connections for the purpose of information-sharing, training and professional development.

I have recently taken steps to become an accredited master trainer in the YLS/CMI. Currently, there is only one accredited master trainer for the YLS/CMI in Australia and 36 worldwide. I have received personal correspondence from Multi-Health Systems and Dr Robert Hoge, one of the developers of the tool, to advise that I have been approved to become an accredited master trainer and am waiting to receive the written contract.

Strengths of the Research

This research was the first to examine the reliability and predictive validity of the YLS/CMI on a large sample of youth offenders in Western Australia. The research objectives addressed several gaps in the literature, most notably the absence of any research supporting the use of the YLS/CMI in a West Australian youth population. This research also addressed the absence of any empirical research examining differences in criminogenic risk factors between Indigenous and non-Indigenous youth in an Australian context. The empirical studies in this research included a large dataset and were the first to examine differences in

criminogenic risk and needs of Indigenous and non-Indigenous youth in Western Australia. The findings from this thesis are important for identifying the unique influence of particular risk factors on recidivism and potential contributing factors to the overrepresentation of Indigenous youth in the Australian criminal justice system. Incorporating the findings from this research into local policy and practice decisions could potentially assist in reducing the overrepresentation of Indigenous youth in the justice system by ensuring a more culturally inclusive framework in the assessment and management of their criminogenic risk/needs.

Limitations of the Research

Although this research was the first to examine the predictive validity of the YLS/CMI among West Australian youth and included a large dataset, there are limitations. First, recidivism was measured through official records using charges/arrests as opposed to convictions, as charges are considered to be a more sensitive measure. However, many offences are not detected through official records and may reflect ethnic and cultural biases (Farrington et al., 2008). Second, the custodial subgroup ($n = 238$) included in the sample and the female subgroup used in the reoffending analysis ($n = 184$) were both small and any specific findings should therefore be interpreted with caution. Third, the results may not generalise to other jurisdictions due to the unique West Australian population (i.e., high number of young people from rural and remote areas). I did not examine the predictive validity of the YLS/CMI for other minority groups (e.g., African youth) due to small sample sizes; however, this remains an important area for further research. Finally, I was not able to investigate the direct contributions of young people and their families and any future research should aim to incorporate the voices of young people involved in the justice system, along with their family and support systems, to allow for a greater understanding of criminogenic risk/needs.

Concluding Remarks

The practical implications of my research findings for juvenile justice are many. Firstly, the results provide empirical support for the use of the YLS/CMI as a reliable method for conducting general risk assessments with young West Australian offenders. The YLS/CMI was able to identify with reasonable accuracy which youth will reoffend, although predictive validity was slightly lower for Indigenous youth. Secondly, the results highlight the significance of particular risk factors and domains for specific subgroups of youth offenders, therefore indicating where resources and interventions should be allocated to target those risk factors in order to reduce recidivism. A final important implication is the identification of the unique influence of particular risk factors for minority groups, such as the female and Indigenous youth subgroups in our sample. Practitioners must be acutely aware of the prejudicial impact of risk assessment tools if they are misused, particularly given the decreased predictive validity for these minority populations. In line with Shepherd's (2016) recommendations, non-Indigenous clinician's assessing risk with Indigenous clients should be engaged in an ongoing program of cultural competence training and where possible, consult with Indigenous liaison officers at all stages of the assessment process. To adequately address the needs of Indigenous youth involved in the justice system, a more culturally inclusive risk assessment and management framework is imperative.

There is a growing recognition of the need for Indigenous cultural consultants to work with youth and staff in the justice system. Researchers, practitioners, and stakeholders must seek out the knowledge and expertise of Indigenous peoples and work together if we are to truly make any change in reducing the overrepresentation of Indigenous youth in the criminal justice system. It is imperative that future research is done in partnership with Indigenous peoples and local communities to ensure that risk assessment measures, such as the

YLS/CMI, and subsequent intervention services, do not become additional tools of

oppression for Indigenous youth.

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Appendix A

Thesis Attribution Tables

<table>
<tr><td colspan="2">Co-Author Attribution: Associate Professor Lynne Roberts</td></tr>
<tr><td></td><td>Study One (Submitted), Two (Submitted and accepted for publication) and Three (Submitted)</td></tr>
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<tr><td>Analysis & Statistical Method</td><td align="center">X</td></tr>
<tr><td>Interpretation & Discussion</td><td align="center">X</td></tr>
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<tr><td>Final Approval</td><td></td></tr>
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Appendix B

Quality Assessment Tool - Adapted from Critical Appraisal Skills Program (CASP) & Geraghty & Woodhams (2015)

Assessment of quality (only score for relevant items)	Guidance for scoring	Overall rating of quality
A. Selection Bias		**Out of total possible 6 points**
Q1) Were the study objectives clear?		Yes = 2 No = 0 U = Unsure/insufficient information
Q2) Were the participants recruited in an acceptable way?	Fully met = participants were appropriately selected (i.e., using random, systematic, or interval sampling), recruitment process described	Condition fully met = 2 Condition partially met = 1 Condition not met = 0 U = Unsure/insufficient information
Q3) Are the participants in the study likely to be representative of the defined population?	Fully met = randomly selected from juvenile offending population Partially = participants referred from a source list in a systematic manner (e.g., clinic, prison, mental health facility) Not met = Self-referred	Condition fully met = 2 Condition partially met = 1 Condition not met = 0 U = Unsure/insufficient information
B. Measurement Bias		**Out of total possible 16 points**
Q1) Was the operational definition of outcome clearly stated?	Fully met = clear definition of recidivism (reconviction/re-arrest) and any subcategories (e.g., violent, non-violent, sexual etc) underpinned by clear rationale/theory. Partially = recidivism used as outcome but not clearly defined Not met = no clear definition or rationale for recidivism or subcategories	Condition fully met = 2 Condition partially met = 1 Condition not met = 0 U = Unsure/insufficient information

Assessment of quality (only score for relevant items)	Guidance for scoring	Overall rating of quality
Q2) Were the methods for obtaining the outcome clearly described?	*Fully met = reliable system for sourcing data described (e.g., recidivism using reconviction data, police records)* *Partially = sources mentioned but methods on how they were obtained not adequately described or methods but no sources identified* *Not met = no system to measure outcome established*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*
Q3) Was the outcome measured in the same way across all participants?	*Yes = recidivism measured in the same way for all participants* *No = recidivism not measured in the same way for all participants*	*Yes = 2* *No = 0* *U = Unsure/insufficient information*
Q4) Was the risk assessment tool administered by trained professionals?	*Fully met = trained to administer the tool* *Partially = research assistants or trainees with no experience or supervision* *Not met = professional was not used to administer the tool*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*
Q5) Was the risk assessment tool completed with relevant information from a variety of sources?	*Fully met = file info and clinical interviews* *Partially = more than one source used but not all potential sources used* *Not met = only one source of information used*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*
Q6) Was the follow-up period sufficiently described and reported?	*Fully met = follow-up period fully described and clearly reported* *Partially = follow-up period described or follow-up period reported* *Not met = no follow-up period described or reported*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*
Q7) Was follow-up time acceptable (follow-up period of 2 years typically deemed sufficient for recidivism studies)?	*Fully met = follow-up period was at least 2 years* *Partially = follow-up period was <2 years but at least 3 months* *Not met = follow-up period was less than 3 months*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*

Assessment of quality (only score for relevant items)	Guidance for scoring	Overall rating of quality
Q8) Was missing data dealt with appropriately?	*Fully met = missing data were reported and taken into account for risk assessment tool (i.e., not included in analyses or adjustments made)* *Partially met = missing data was reported but not taken into consideration when measuring risk* *Not met = missing data was not dealt with at all* *NA = study did not have any missing data and reported this*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information* *NA = not applicable*
C. Attrition Bias		***Out of total possible 2 points***
Q1) Was the attrition rate reported?	*Fully met = attrition rate recorded and explanation provided for those not included in the follow-up* *Partially = attrition rate reported but no explanation provided for those not included in follow-up* *Not met = attrition rate not reported*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information* *NA = not applicable*
D. Reporting Bias		***Out of total possible 8 points***
Q1) Was the quantitative analysis appropriate for the research?	*Yes = ROC/AUC statistics, correlations, multivariate statistics such as regressions, NPV or PPV*	*Yes = 2* *No = 0* *U = Unsure/insufficient information*
Q2) Was the predictive validity of the tests reported?	*Fully met = ROC/AUC analyses or correlations reported for recidivism and range reported (i.e., CIs, SE)* *Partially = other statistics used to report recidivism or correlations only reported or AUC estimates but no range reported*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*

Assessment of quality (only score for relevant items)	Guidance for scoring	Overall rating of quality
Q3) Can the results be generalised to other juvenile offending populations?	*Consider age, ethnicity, offender type, correctional (prison/community) vs. psychiatric sample* *Very likely = recidivism can be predicted in other juvenile populations taking into account all of the above factors* *Somewhat likely = recidivism can be predicted in other juvenile populations but may be limited by some of the above factors* *Unlikely = the above factors limit the generalisability of the results to other juvenile populations*	*Very likely = 2* *Somewhat likely = 1* *Unlikely = 0* *U = Unsure/insufficient information*
Q4) Were potential confounders taken into account?	*Fully met = any or most of potential confounders were taken into consideration* *Partially = some efforts made to control for confounders* *Not met = no effort made to control for confounders*	*Condition fully met = 2* *Condition partially met = 1* *Condition not met = 0* *U = Unsure/insufficient information*
		Total Maximum Points = 32

Scores are summed in order to obtain an overall quality rating, with higher scores indicating better quality studies