External validation of a novel risk prediction model for violent reoffending in young people involved in the criminal justice system

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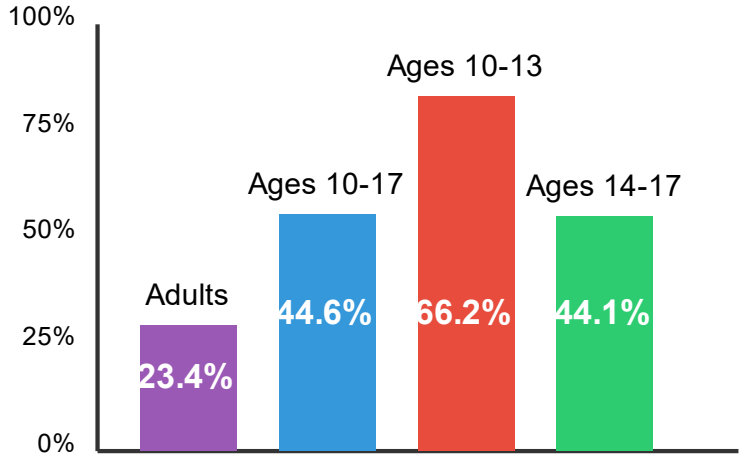
Youth Reoffending: Patterns and Risk Factors

Reoffending Rates by Age Group



The Central Eight Risk Factors

- Antisocial Behaviour History
- Antisocial Personality Pattern
- Antisocial Cognition
- Antisocial Associates
- Family/Marital Circumstances
- School/Work
- Leisure/Recreation
- Substance Abuse

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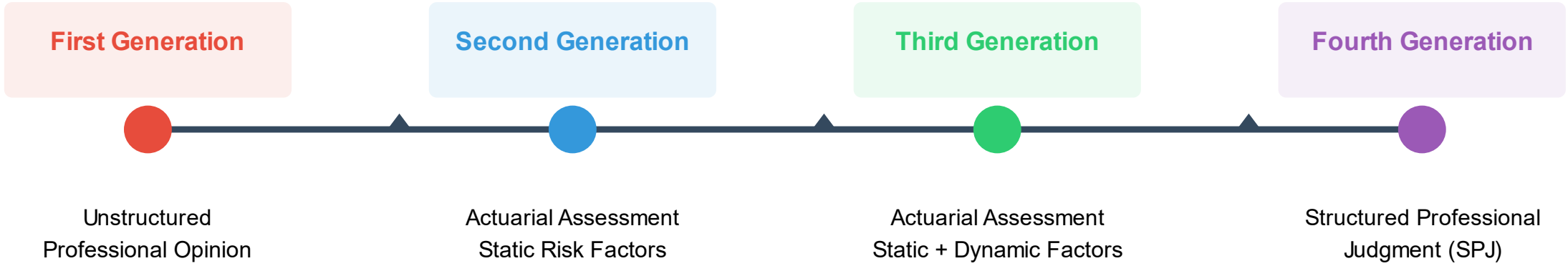
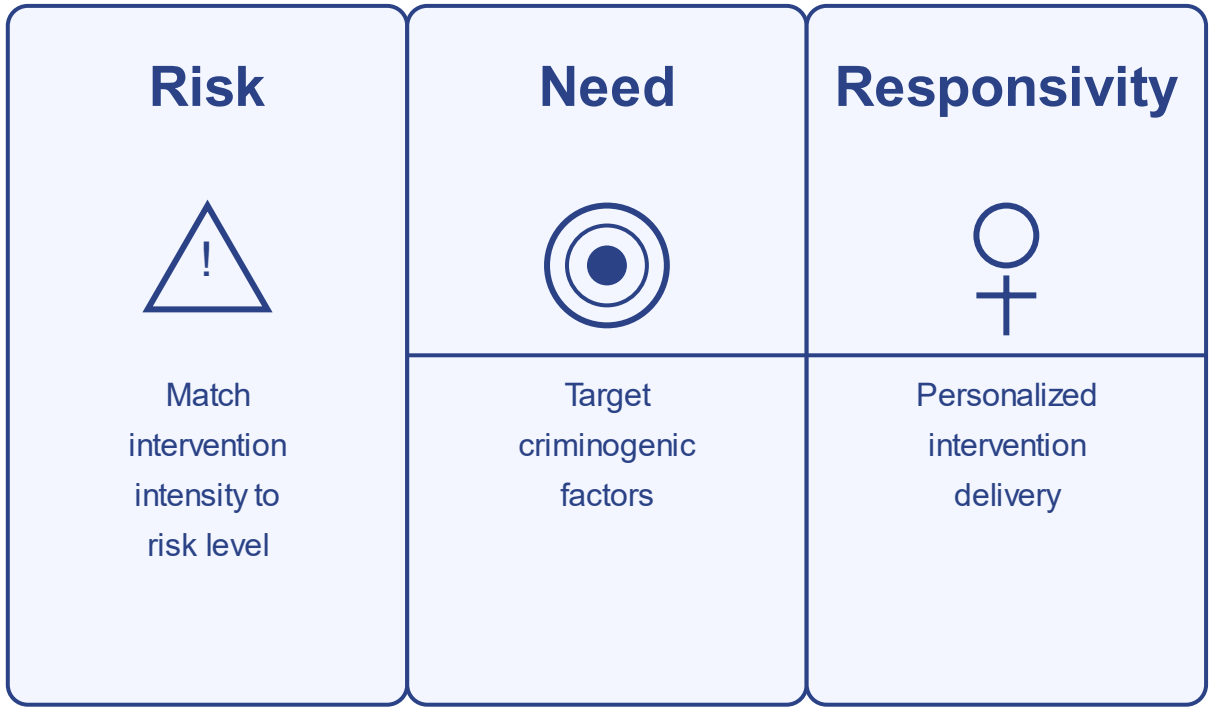
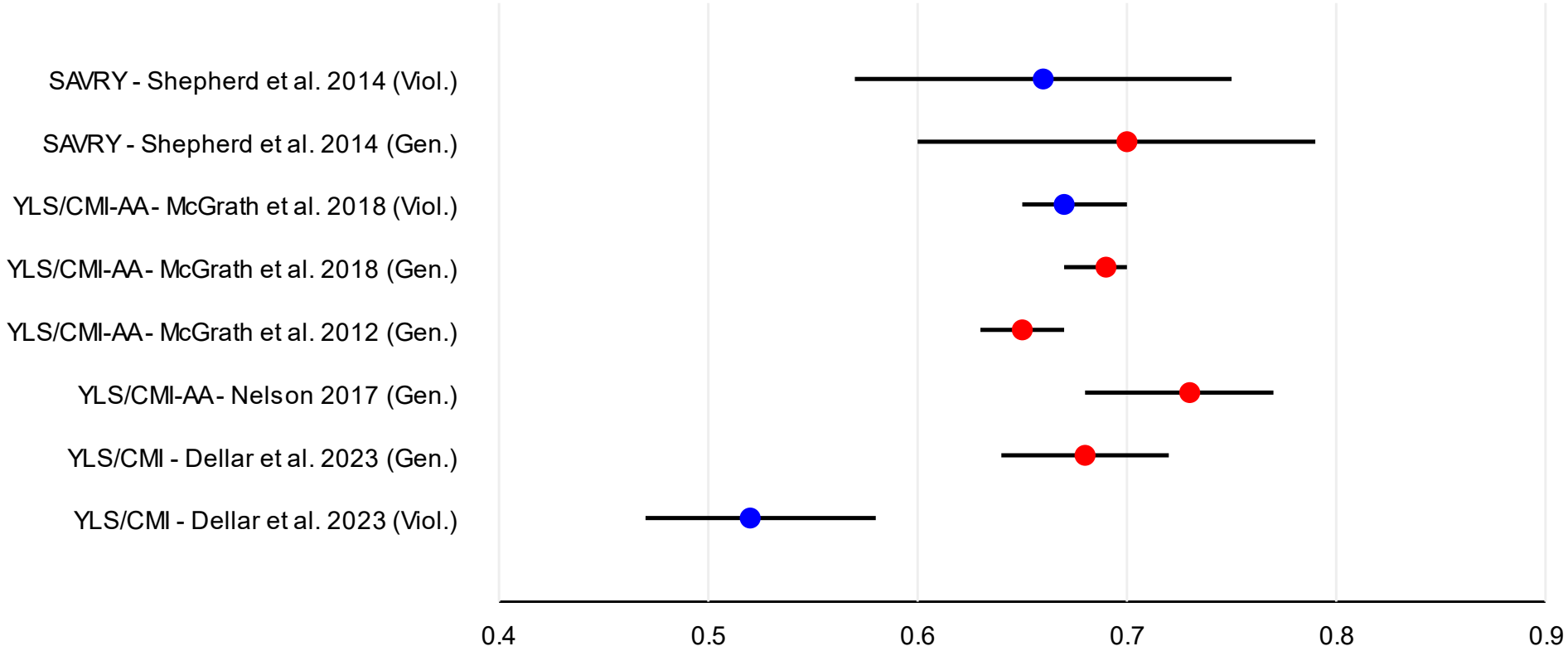
Four Generations of Risk Assessment



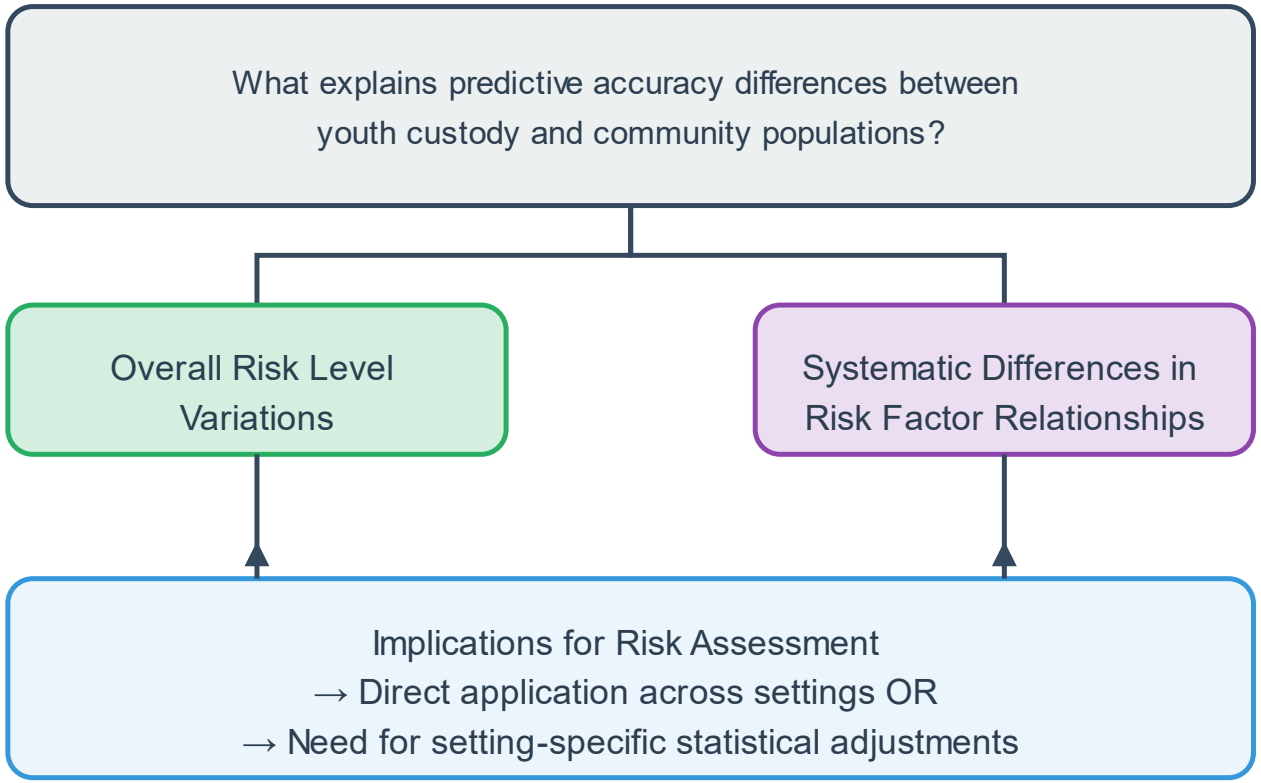
RNR Model


Risk
Need
Responsivity
Match intervention intensity to risk level
Target criminogenic factors
Personalized intervention delivery

AUC Values for Youth Reoffending Risk in Australia



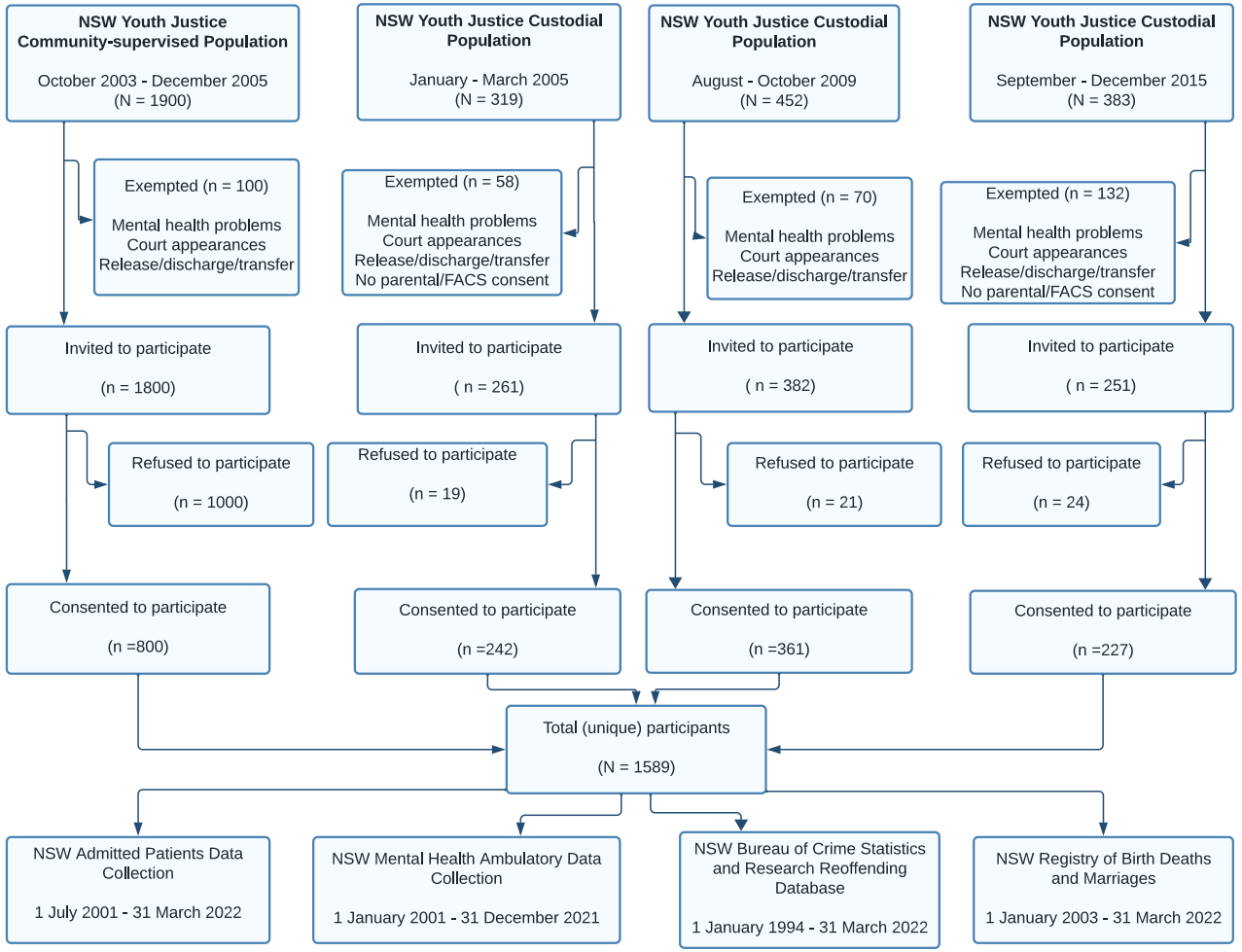
Investigation of Risk Prediction Differences Across Settings



Study population

Surveys	Timeline	Location	Sampling method	Sample count
2003-2006 Young People on Community Orders Health Survey [YPoCOHS]	October 2003 – December 2005	Community	Total population sampling	800
2003 Young People in Custody Health Survey [YPiCHS]	January – March 2003	9 NSW Youth Justice Centres	Total population sampling	242
2009 YPiCHS	August – October 2009	9 NSW Youth Justice Centres 1 Maximum Security Centre	Total population sampling	361
2015 YPiCHS	September – December 2015	7 NSW Youth Justice Centres	Total population sampling	227

Data Linkage



Custodial and Community Characteristics

Variable	Custodial N = 790	Community N = 766
Demographics		
Female	78 (9.9)	114 (14.9)
Male	712 (90.1)	652 (85.1)
Age at conviction, median (IQR)	17 (16, 18)	17 (16, 18)
Indigenous	291 (36.8)	115 (15.0)
Non-Indigenous	499 (63.2)	651 (85.0)
IRSD quartile, median (IQR)	1 (1, 2)	2 (1, 3)
Education		
Primary	18 (2.3)	14 (1.8)
Secondary	480 (60.8)	637 (83.2)
Senior secondary	292 (36.9)	115 (15.0)
Criminographic		
Out of home care placement	177 (22.4)	156 (20.4)
Prior incarceration	521 (65.9)	301 (39.3)
Prior violent offense‡	566 (71.7)	471 (61.5)
Violent index offense†	338 (42.8)	320 (41.8)
Mental Health		
Alcohol/substance use disorder	134 (16.9)	74 (9.7)
Psychosis	58 (7.3)	26 (3.4)

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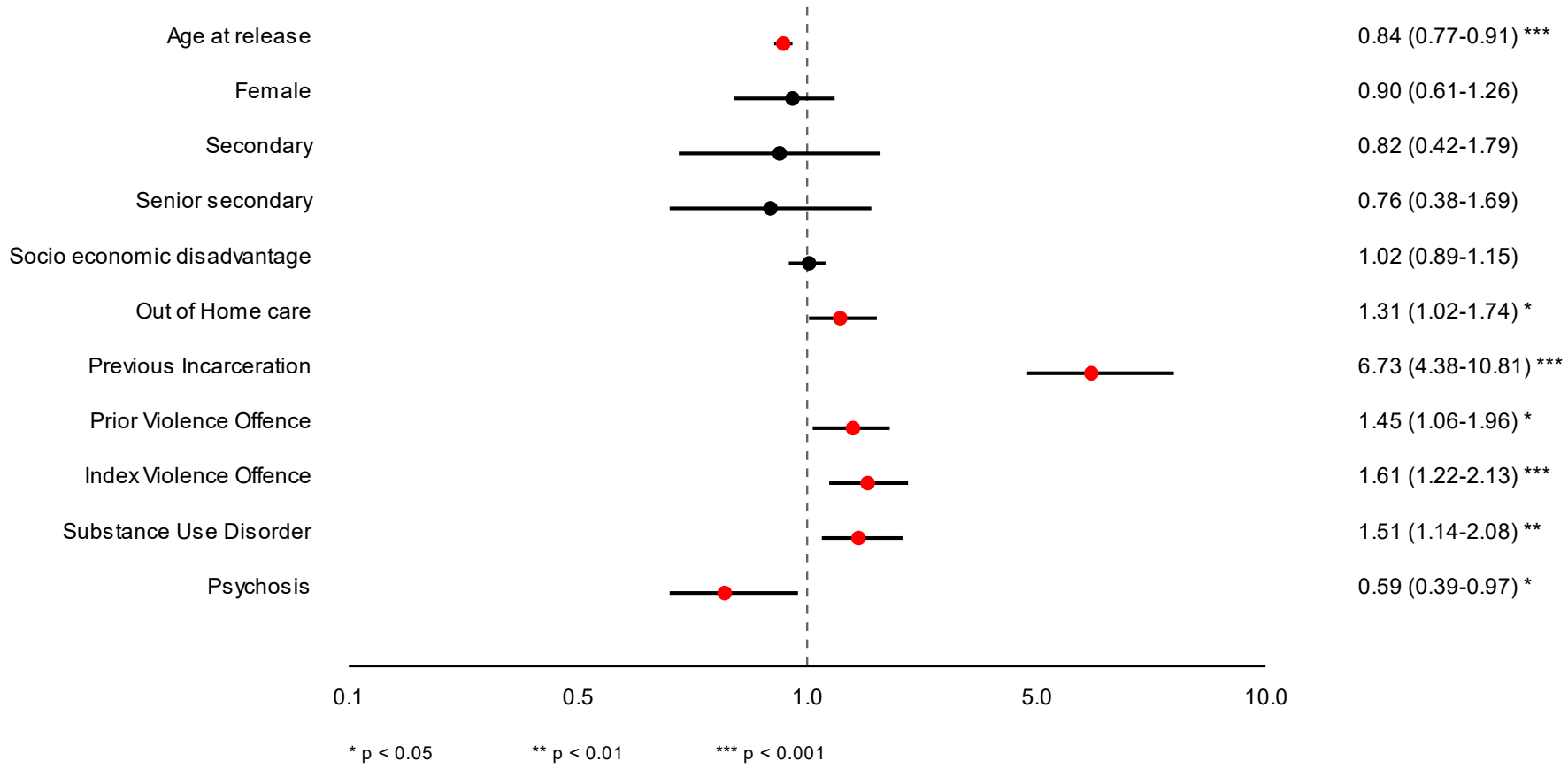
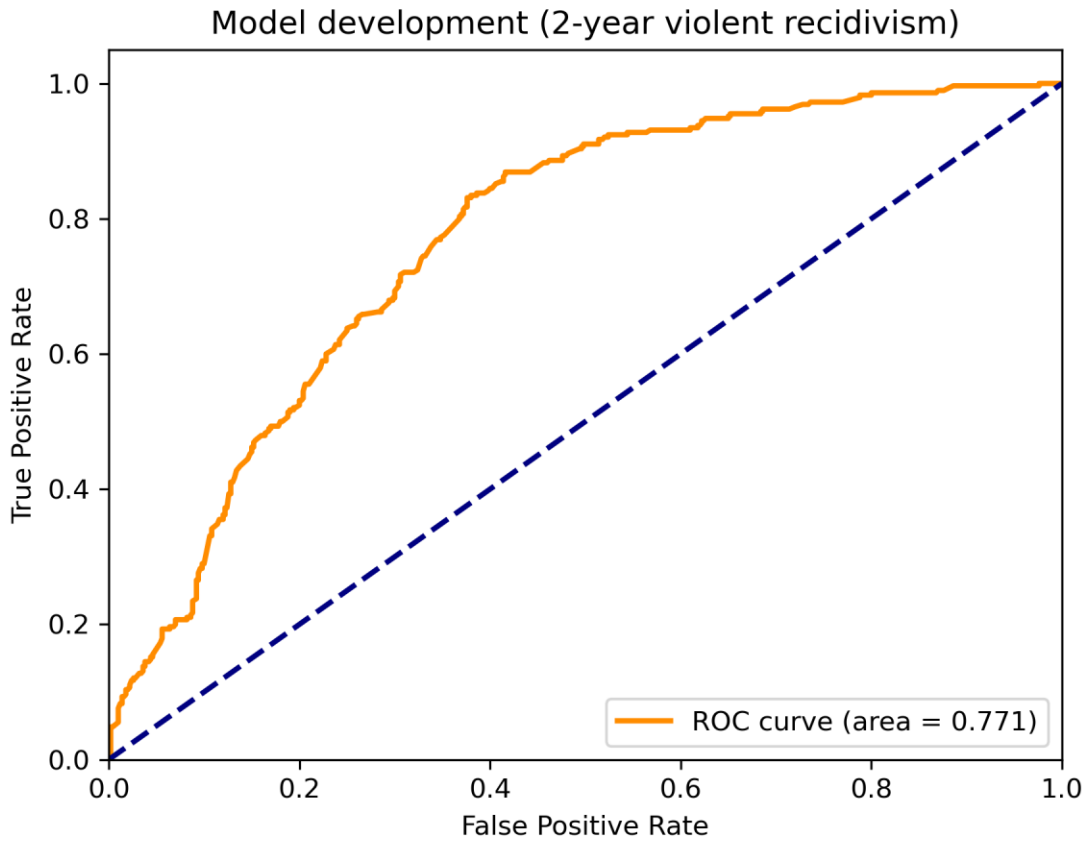
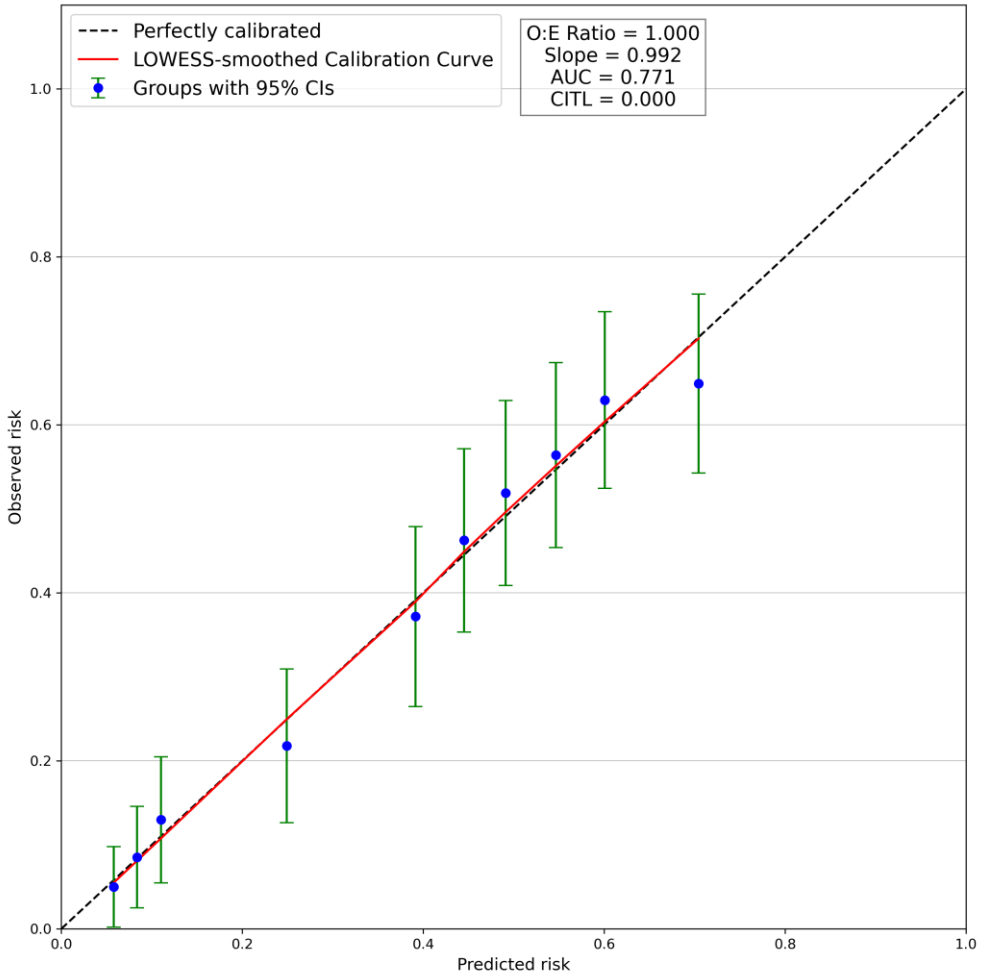
Predictors of violent reoffending



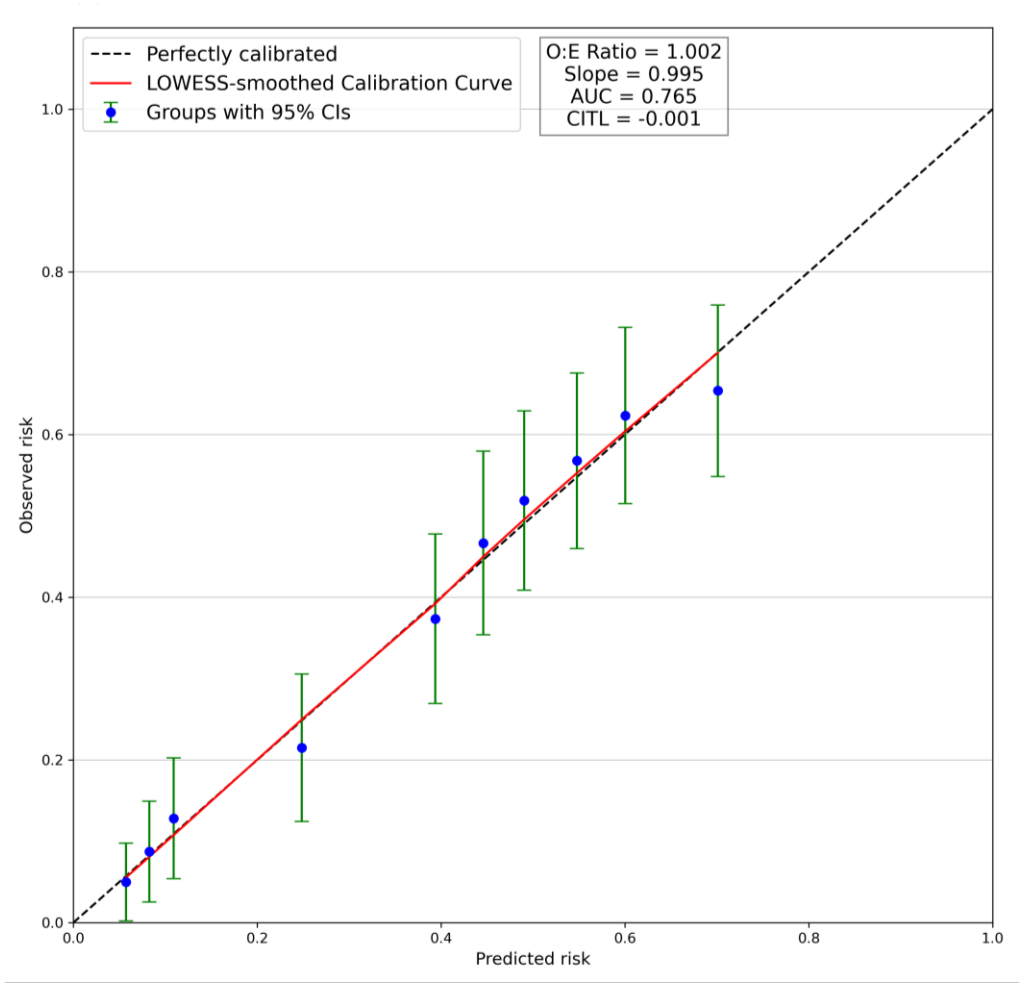
Discrimination – Model development



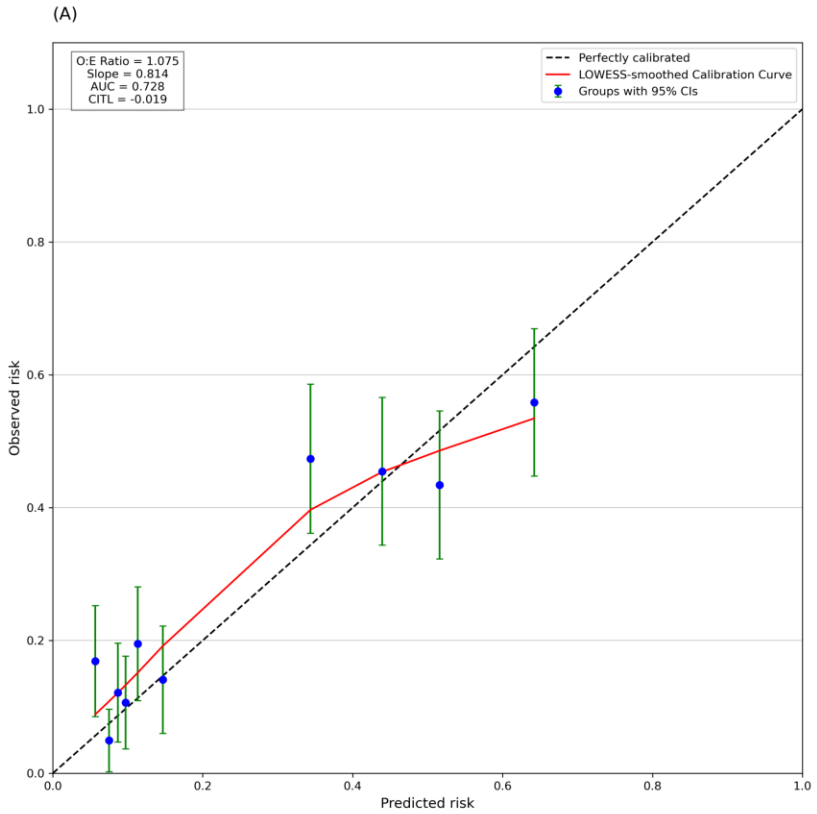
Calibration – Model development

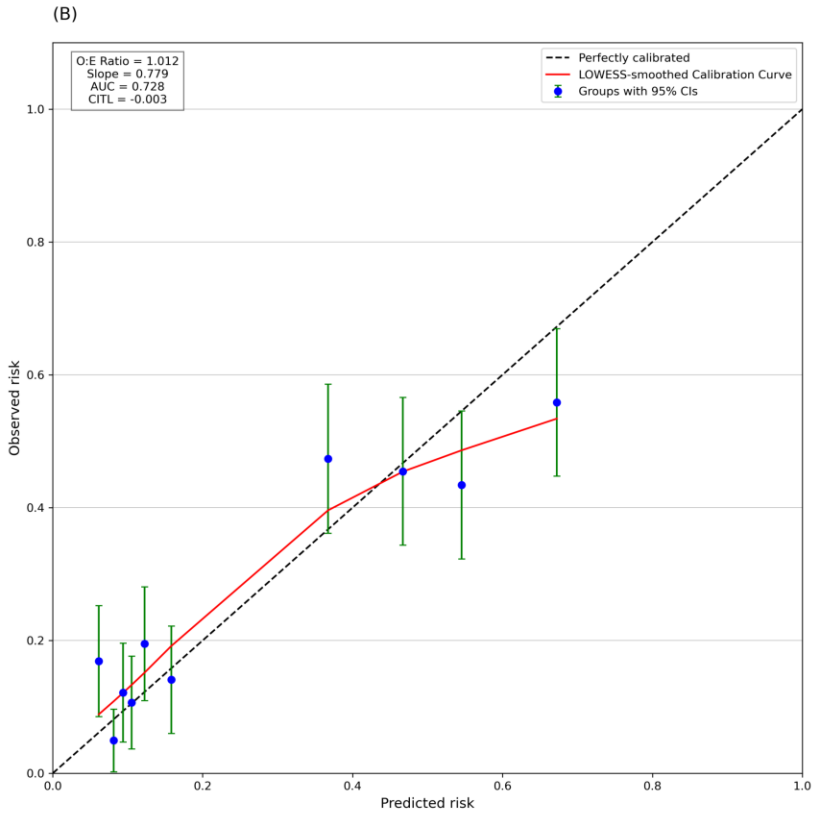


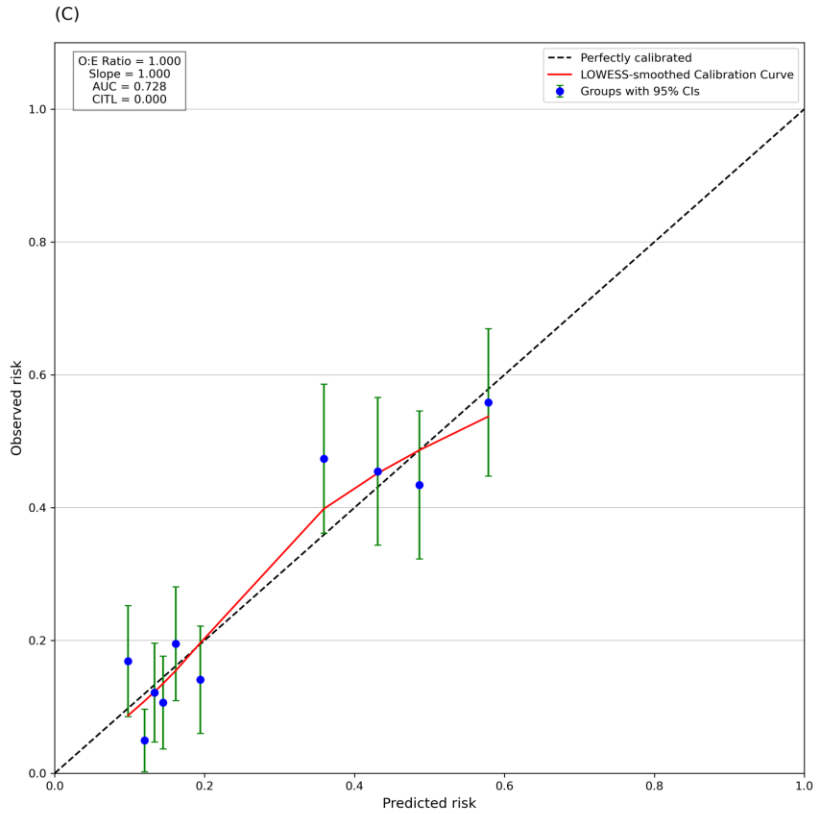
Calibration – Bootstrap validation



Calibration – External validation







Violent recidivism (Custody)

Event proportion: 37%

AUC/C-index: 0.771 (0.735 – 0.807)

Risk threshold	Sensitivity	Specificity	PPV	NPV
35%	87% (83 – 90)	56% (52 – 60)	54% (49 – 58)	88% (84 – 91)
40%	83% (78 – 87)	62% (58 – 66)	56% (51 – 61)	86% (82 – 90)

Violent recidivism (Community)

Event proportion: 27%

AUC/C-index: 0.728 (0.685 – 0.770)

Risk threshold	Sensitivity	Specificity	PPV	NPV
25%	71% (68 – 74)	72% (69 – 76)	48% (45 – 52)	87% (85 – 89)
30%	70% (66 – 73)	73% (70 – 76)	49% (45 – 52)	87% (84 – 89)

Age at Release

15

Sex

(•) Male ( ) Female

Index of Relative Socio-economic Disadvantage (IRSD)

1

Highest Education Level

( ) Primary (•) Secondary ( ) Senior Secondary

Out-of-Home Care Placement

( ) No placement (•) At least one placement

Previous Custody

( ) No (•) Yes

Previous Violent Offence

( ) No previous violence (•) Violent Offence prior to index offence

Violent Index Offence

( ) Not Violent Index (•) Violent Index

Substance Use Disorder

( ) Not Present (•) Present

Psychosis

(•) Not Present ( ) Present

output

Probability of Violent Reoffending: 92.25%
Risk Level: High Risk

Conclusion

- The strength and pattern of relationships between risk factors and recidivism may vary across settings, suggesting the need to examine these differences when developing risk assessment protocols.
- Risk assessment tools require evaluation of their predictive accuracy and appropriate statistical adjustment before application across different supervision settings.
- The practical application of risk assessment tools across settings involves consideration of classification trade-offs, as maintaining consistent sensitivity affects false positive rates. The acceptability of these trade-offs may vary depending on the nature and intensity of resulting interventions.
- In situations where the primary concern is identifying as many high-risk individuals as possible, even at the cost of a higher false positive rate, decision-makers can choose a lower risk threshold.
- Conversely, when the priority is to minimize false positives and the potential harms of unnecessary interventions, a higher risk threshold can be selected

THANK YOU