

CORRECTIONAL SERVICE CANADA

CHANGING LIVES. PROTECTING CANADIANS.

Validation of a Dynamic-Static Risk Index (DSRI) Scoring Algorithm

A streamlined DSRI yielded excellent predictive validity in relation to federal custody returns for men and women.

Why we are doing this study

Recently published research has found that a streamlined and combined version of 11 static risk indicators and 7 need domain ratings extracted from the Offender Intake Assessment (OIA) and Correctional Planning process demonstrated robust predictive validity in relation to returns to federal custody for both men and women¹. Moreover, this tailored algorithmic equation yielded impressive predictions for violent, drug and property-related offenders² as well as sexual offenders³.

A total of 6,946 first releases (6,548 men and 398 women) over a two-year period (2016-17 and 2017-18) was used to create an index and analyses demonstrated statistically significant AUCs (areas under the receiver operating characteristic curves) of .746 for men and .725 for women. The purpose of this study was to determine whether five-level risk groupings could be derived independently for men and women and perform well as a simplified predictor of reincarceration.

What we did

CSC administers a comprehensive, systematic, and automated OIA process to produce an individualized correctional plan for all federally sentenced offenders. The OIA has two core components: Static Factors Assessment (SFA) and Dynamic Factors Identification and Analysis-Revised (DFIA-R). One subcomponent of the SFA, the Criminal History Record, is comprised of 38 indicators covering previous youth and adult criminal justice system involvements as well as current offence(s). A restricted set of 11 static risk indicators were selected as the penological literature has established them to be strongly related to reoffending on release. These indicators included: Youth-previous - any convictions, community supervision, supervision failures, custodial terms, escapes/attempts/UAL and Adult-previous - any convictions, community supervision, supervision failures, custodial terms, escapes/attempts/ UAL, disciplinary sanctions.

Another component of OIA, the DFIA-R, is comprised of seven need domain ratings covering education/employment, marital/family relations, associates/social, substance misuse, community functioning, personal/ emotional and attitude. Summed together as a Dynamic-Static Risk Index (DSRI), the combined total score has been shown to be reflective of the likelihood of return to federal custody post release. The DSRI and 5 risk level groupings were explored separately for men and women. Details on the scoring can be found in the cited references.

What we found

The practical utility of applying differential cut-points to the DSRI combined score distribution with the rates of return to custody were statically analyzed. As the table below reveals, from lower to higher risk there were substantive increases in returns as reflected by increasing base rates. In addition, the AUCs reflected strong associations with five level risk groupings. This is, 0.732 for men and 0.727 for women.

Table. Groupings, Scores and 1 Year Return Rates

Group	Scores for Men	Return Rate	Scores for Women	Return Rate
1	4 or less	5%	5 or less	0%
2	5 to 8	10%	6 to 10	10%
3	9 to 13	24%	11 to 14	25%
4	14 to 17	37%	15 to 19	39%
5	18+	57%	20+	53%
Total		35%		33%

¹ Motiuk, L.L. & Keown, L.A. (2020). Constructing Risk Assessment Algorithms for Violent, Drug and Property-related Offenders: An Empirical Approach. *Advancing Corrections*, 10, 70-84.

² Motiuk, L.L. & Keown, L.A. (2021). Correctional Intake Assessment and Case Planning: Application Development and Validation. *Criminal Justice and Behavior*, 48 (4), 556-570.

³ Motiuk, L. L., & Anne Keown, L. (2022). Differentiating Sexual from Other Violent Offence Types for Case Assessment, Planning, and Management. *International Journal of Offender Therapy and Comparative Criminology*, Online First. <https://doi.org/10.1177/0306624X221086549>.

What it means

Psychometric analyses of the DSRI have revealed excellent predictive validity estimates for men and women. A streamlined and auto-populated risk/need assessment instrument such as the DSRI can serve as the foundation for efficient algorithmic-assisted case management practice.

For more information

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