

# Predicting Intimate Partner Violence Recidivism using the Swedish Prison and Probation Service's Risk-Need-Responsivity Assessment (RNR-A)

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## Abstract

The Swedish Prison and Probation Service (SPPS) provides risk-reducing interventions tailored to clients' recidivism risk, with the intake assessment RNR-A informing sentence plans. This study tested the predictive utility of the RNR-A in a cohort of 3,145 clients ( $M_{age} = 39$  years, 2% women) convicted of intimate partner violence (IPV). During 24 months of follow-up, IPV reconvictions (10% overall) increased significantly with each increase in risk level (low, medium, high). Discrimination performance was comparable to similar instruments (AUC range = .59–.68). A high proportion of IPV recidivists were classified as medium-to-high risk (sensitivity range = 87–95%) at the cost of over-inclusion of non-recidivists in these risk levels (specificity range = 13–27%). This study contributes to broader efforts to evaluate the implementation of Bonta and Andrews' (2017) risk principle in the SPPS and supports the use of the RNR-A to screen out those clients with the least need of IPV-specific intervention. Further instrument development and calibration in combination with the use of in-depth assessments for complex medium-to-high risk cases may increase the potential of effective service delivery, providing intensive and extensive services to clients with the greatest risk and needs.

## Keywords

intimate partner violence, risk assessment, recidivism, prison, probation

## Introduction

Intimate partner violence (IPV) is a serious and extensive global health problem. According to the World Health Organization (WHO), the global lifetime prevalence of IPV is around 26% and the 12-month prevalence is around 10% (WHO, 2021). In the Nordic countries, notwithstanding engrained egalitarian values, prevalence rates are

unduly high (see Garcia & Merlo, 2016). In the Swedish Crime Survey – a nationally representative survey of victimization experiences, fear of crime, and confidence in the justice system – 6.8% reported IPV victimization in the previous year (2012) (The Swedish National Council for Crime Prevention, 2014). While victimization rates were similar for men and women (6.7% and 7%, respectively), women experienced more severe violence, as 29.1% of women and 2.4% of men reported seeking medical care due to physical violence (The Swedish National Council for Crime Prevention, 2014).

In addition to the immediate physical injury that victims suffer, IPV has short- and long-term psychosocial, economic, health and wellness-related consequences. For example, a literature review of health-related outcomes of IPV on women (Stubbs & Szoek, 2021) observed increased risk of developing diabetes, contracting sexually transmitted infections, engaging in risk-taking behaviors including alcohol and drug abuse, and developing chronic diseases and pain. IPV and related harms may carry forward through generations by the transmission of violence, likely through mediational pathways (e.g., Capaldi et al., 2012). Overall, IPV therefore places an immense burden on societies, exhausting the resources of employers and healthcare and criminal justice systems (see, for example, European Institute for Gender Equality, 2021; Holmes et al., 2018).

Recognizing the substantial impact that IPV has, multidimensional interventions are required for prevention. In addition to primary prevention directed at the general public and individuals at risk in the community, treatment and control measures that target identified perpetrators of IPV represent key intervention strategies to counteract the continued use and escalation of violence. For this purpose, the criminal justice system holds a unique opportunity and mandate to address IPV and can deliver services that target strategically those individuals who cause the most serious and costly societal harm.

Prison and probation services in Sweden and other countries provide general and specialized rehabilitation programs and interventions to reduce the risk of reoffending. In the context of treatment for perpetrators of IPV, however, there is scant evidence for treatment effectiveness (e.g., Akoensi et al., 2013; Lilly-Walker et al., 2018). Following decades of evaluations of Duluth and cognitive behavioral therapy-based programs, there are consistent calls in the literature for a shift in the rehabilitative framework (see, for example, Butters et al., 2021; Travers et al., 2021). Such calls have directed attention toward the Risk-Need-Responsivity model (RNR; Bonta & Andrews, 2017) to inform risk management and treatment case formulations to tailor interventions and apply a flexible, responsive approach.

### The Risk-Need-Responsivity (RNR) Model

The RNR model (Bonta & Andrews, 2017) provides a framework for rehabilitation within criminal justice-involved populations by offering overall principles for identifying *who* should receive rehabilitative services (the risk principle), *what* service needs should be targeted (the need principle), and *how* services should be delivered (the responsivity principle). The model has gained credence as a broad theory base through decades of research in criminal justice contexts (e.g., Andrews & Dowden, 2006; Hanson et al., 2009; Koehler et al., 2013; Polaschek, 2012) and guides practice in several countries, including Canada, England, New Zealand, and – in a Nordic context – Sweden.

The risk principle promotes a match between the intensity and extensiveness of services and clients' level of recidivism risk; intensive and extensive rehabilitative services should be directed at clients with high recidivism risk while those with low risk require minimal intervention. Dynamic risk factors (needs) are amendable to change and – to the extent that they drive the criminal behavior – represent relevant intervention targets. The need

principle, as such, defines those potential criminogenic needs suitable for service intervention. Responsive rehabilitation according to the responsivity principle entails using effective therapeutic strategies (general responsivity) and tailoring service delivery to the individual (specific responsivity). Such tailoring considers the individual's strengths, abilities, personality, mental and physical health, and relevant personal characteristics (e.g., gender and age).

### Practice Implementation

The implementation of the RNR principles in practice presumes the use of a structured assessment tool that includes a combination of static and dynamic risk factors to identify recidivism risk, criminogenic needs, and specific responsivity factors (Bonta & Andrews, 2017). Such tools have the primary purpose of informing risk management and treatment plans rather than predicting recidivism; however, to provide intensive and extensive rehabilitative services to the client group in greatest need of these services, the risk assessment needs to be a valid and reliable indicator of re-offending. As such, these tools should be evaluated in practice and calibrated to their target population.

The RNR framework is a generalist model of rehabilitation and, aligned with this purpose, RNR assessments often apply a broad scope in conceptualizing target populations (e.g., criminal justice populations) and outcomes (e.g., general/any recidivism). However, assessments of general recidivism risk may lack the needed specificity (Taxman & Smith, 2021; see also Shaffer et al., 2022) or fail to give sufficient weight to the most relevant risk indicators for certain domains of offending. There is a growing literature on the application and evaluation of RNR in sub-populations, including perpetrators of sexual offending and IPV (e.g., Pederson & Miller, 2022; Stewart et al., 2014), calling for the use of specialized risk classification systems to underlie treatment selection and delivery. Also, there may be policy- and management-related incentives for identifying clients with specific risks or needs, including legislative or policy frameworks or service selection.

In Sweden, the government has presented a national strategy to prevent and combat men's violence against women (Government Offices of Sweden, 2016). The long-term action plan involves strengthening prevention of re-offending by convicted perpetrators of violence, with the Swedish Prison and Probation Service (SPPS) identified as a key stakeholder. Since the presentation of the national strategy, the SPPS has implemented an individual RNR-based treatment program intended for clients at high risk of IPV recidivism (Relationship Violence Program, RVP) and a moderate risk counterpart program (Preventing Domestic Violence, Predov) to intensify prevention efforts with this target population. These programs represent the main intervention offered to clients convicted of IPV. RVP and Predov focus on similar treatment targets (i.e., criminogenic attitudes, antisocial peers, jealousy, lack of self-control, alcohol and drug problems, lack of communication skills, and difficulties in emotion regulation), but differ in dosage, flexibility and competency criteria for program facilitators (see Supplemental Table 1). For effective treatment allocation and use of adequate control measures (e.g., supervision contact frequency), a valid and reliable IPV-specific risk assessment is needed to complement a broad RNR assessment in Swedish prison and probation practice.

### IPV Recidivism Risk Assessments

The use of IPV recidivism risk assessments in prison and probation services offers a method of identifying and prioritizing key client groups for risk management. There are a number of instruments available, such as the Spousal Assault Risk Assessment Guide

(SARA; Kropp & Hart, 2000) and the Domestic Violence Risk Appraisal Guide (Hilton et al., 2008). Common research-informed risk factors (e.g., Capaldi et al., 2012; Clare et al., 2021) include, for example, history or past violent or antisocial behavior, hostile or gender-based beliefs, and substance use. The concept of risk for this client group is, however, not clearly defined or understood (Graham et al., 2021). IPV-specific instruments vary in length, format, information sources, assessor training, and assessment approach. While some require in-depth multi-source assessment by trained and certified clinicians, others are relatively quick to administer and can be used by frontline staff. An important aspect that differentiates between instruments is the approach to assessment, with structural professional judgment (SPJ) and actuarial assessments forming the two primary approaches. SPJ relies on factors that have a demonstrated empirical association with recidivism, but a clinician assesses the weight of each factor to arrive at an overall risk level (Guy et al., 2012). Actuarial assessments generate risk based on formal, specified rules, such as a mathematical equation (Dawes et al., 1989).

Acknowledging the wide variation in the structure and use of IPV recidivism risk assessments, the psychometric performance of these instruments when evaluated varies by context, measured outcome, and length of follow-up (Graham et al., 2021). However, predictive validity is typically limited, with AUC estimates indicating moderate performance, at best (Graham et al., 2021; Messing & Thaller, 2013; van der Put et al., 2019). There is no gold standard or clearly superior IPV-specific instrument and researchers typically do not recommend the use of one instrument over another. Instead, practitioners are encouraged to consider the context of implementation and practical aspects (e.g., costs, administration, training) to choose an instrument, and plan for context-specific evaluation.

Few studies have evaluated IPV-specific risk assessments used by practitioners in real-world settings, which a relevant systematic review highlights (Svalin & Levander, 2020). In this review, only 11 such studies were identified, of which three were conducted in a prison or probation setting. The conclusion was that predictive validity was low (only three AUC values > .70), but due to the heterogeneity of assessments and outcomes, performance indicators could not be synthesized. The most relevant original study tested the predictive validity of an actuarial IPV risk assessment completed by probation officers in the context of a pilot project (Williams & Houghton, 2004). Nevertheless, the study was conducted in the USA with little relevance to the Nordic context, the sample was limited to males, and the instrument<sup>1</sup> was used as a basis for pre-trial decisions rather than sentence planning following conviction. In summary, a knowledge gap exists concerning the accuracy of practitioners' IPV risk assessments in prison and probation services (see also, Graham et al., 2021) and no such studies have been identified in a Nordic context.

### The Swedish Prison and Probation Service's RNR Assessment (RNR-A)

The RNR model of rehabilitation has become an integral part of prison and probation services in Sweden over the past decades. Organizational change was spurred by a national oversight of practice in 2009 (The Swedish National Audit Office, 2011), revealing failure to fulfill the legal and quality requirements of client sentence plans. The risk assessments were, in many cases, incomplete or inadequate and sentence plans were documented poorly and lacked follow-up. In response, the SPPS developed the RNR-A to increase transparency and structure in the sentence planning process, informed by the RNR model's conceptualization of moderate-to-strong correlates of criminal conduct, called the Central Eight (Bonta & Andrews,

1 The Domestic Violence Screening Instrument, DVSI.

2017). Following piloting and evaluation of user-friendliness and reliability, the instrument was implemented nationally in 2016.

Used as a semi-actuarial screening tool for convicted individuals sentenced to prison or probation, few requirements of user competence (basic understanding of the RNR framework) and training (five days of in-house training and a completed assessment with clinical feedback) are needed over and above qualifications for employment.<sup>2</sup> The tool is a broad-spectrum, gender-neutral assessment containing two parts: Part A focuses on static (historical) risk indicators while Part B measures mainly dynamic risk factors. Recidivism risk is assessed in three domains: general recidivism, sexual recidivism, and partner violence (IPV). For each domain, risk levels are calculated based on (A) static indicators (using items in Part A) and (B) static and dynamic indicators combined (using items in Part A and B). Given the use of RNR-A as a screening instrument at intake, high sensitivity is a primary performance criterion. Yet, for risk domains with expected low base rates, such as sexual recidivism and IPV, an unduly high number of false positives (i.e., non-recidivists assessed as medium-to-high risk) could potentially pose challenges to delivering effective and ethically justified prison and probation practice.

Systematic evaluation of the RNR-A has been initiated, with one prior study examining the predictive utility of the general recidivism risk assessment (Johansson Bäckström et al., 2022). The study provided preliminary support for the use of RNR-A to predict general recidivism within 24 months, with prediction performance (AUC ranging between .67–.76) falling within the range of similar instruments (e.g., van der Put et al., 2019). Extensive evaluation to assess the psychometric properties of the RNR-A has not yet been carried out, however.

### The Current Study

RNR-A assesses IPV recidivism risk to inform risk management through individualized sentence planning and allocation to IPV treatment programs. The effective use of such a tool presupposes predictive validity. As part of ongoing efforts to evaluate the validity of the RNR-A to identify perpetrators of IPV in need of intensive and extensive rehabilitative services and control measures, this study aims to examine the predictive utility of the IPV recidivism risk assessment. The study is guided by three research questions:

- (1) To what extent and how quickly do clients assessed by the RNR-A as low, medium and high IPV risk recidivate?
- (2) How well do IPV risk measures discriminate between IPV recidivists and non-recidivists?
- (3) How does the predictive utility compare between the risk measure based on static risk indicators (Part A) and the risk measure based on static and dynamic risk indicators (Part A + Part B)?

A priori research questions were not formulated to evaluate subgroup differences given the expectation of small subsamples; however, potential sex and age differences were examined in an exploratory manner.

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2 Assessors are prison and probation officers. Qualification requirements for employment in the SPPS as a prison officer include a two-year introductory in-house training program combining theoretical modules with supervised work. Employment as a probation officer requires an academic degree in a relevant field (e.g., psychology, social work) and a three-week introductory in-house theoretical module.



## Method

### RNR-A

The RNR-A is a broad-spectrum prison and probation intake assessment used to inform sentence planning in the SPPS. The instrument consists of two parts (A and B). Part A assesses the history of criminal and antisocial behavior based on clients' case files. Part B collates information from a semi-structured client interview to assess antisociality, criminogenic needs (e.g., alcohol and drug use, procriminal attitudes), and responsivity factors (e.g., physical and psychological health).

The full RNR-A consists of 87 items (15 items in Part A, 72 items in Part B), of which 14 items (six from Part A, eight from Part B) are used to generate two automated partner violence recidivism risk measures, each with three risk levels (low, medium, high<sup>3</sup>). The primary risk measure is based on all of these items (from Part A and Part B; possible score range = 0–27; 0–3 = low; 4–9 = medium; 10–27 = high), but to allow for risk-informed sentence planning in instances where a client interview is not possible (due to, for example, client refusal), a secondary risk measure is calculated based on historical risk indicators only (Part A; possible score range = 0–11; 0 = low; 1–4 = medium; 5–11 = high).

The 14 items that generate IPV recidivism risks assess the risk/need domains of previously recorded IPV and violence (e.g., prior convictions), alcohol and drug use, and attitudes pertaining to relationships and gender roles. The Alcohol Use Disorders Identification Test (WHO, 2001) and Drug Use Disorder Identification Test (Berman et al., 2002) are included, with a summarized and categorized score from each instrument representing one respective item in Part B (score range = 0–3). With the further exception of items scored dichotomously as the presence (1) or absence (0) of a protective order (one item) or substance abuse (one item), items are scored on a three-point ordinal scale (0, 1, 2) with each incremental point representing an increase of the seriousness or extent of a specified risk/need indicator. Assessors are prison and probation staff with specialized, in-house training that includes clinical feedback.

### Design and Data Collection

The study used a registry-based retrospective cohort design and the regional ethics board in Linköping provided ethical approval (ref. 2019/06359).<sup>4</sup> Data were extracted from the SPPS's internal client registry on August 31, 2020. Data included clients' RNR-A results pertaining to IPV-specific risk (raw risk scores, automated risk levels, professional overrides), demographics and criminal history (sex, age, prior convictions) and information about any reconviction occurring within the specified timeframe.

### Sample

The sample consisted of SPSS clients with an RNR-A completed between October 16, 2014 and December 29, 2017, meeting at least one of three inclusion criteria: (a) a current conviction of Gross Violation of a Woman's Integrity *or* other information about a violent crime directed toward a current or former intimate partner; (b) a prior conviction for Gross Violation of a Woman's Integrity; or (c) prior convictions corroborating IPV. Based on these criteria and

3 The automated risk levels of low, medium, or high may be altered through a professional override.

4 The requirement of participant consent was waived by the ethics board.

following the exclusion of 76 clients who were deceased (non-recidivists) during follow-up, 3,145 clients were included in the study.

The sample size was sufficiently large as to allocate clients into two age groups to assess the predictive utility of the RNR-A across groups. Young adults were clients up to 24 years of age ( $n = 313$ ) and adults were 25 years of age or older ( $n = 2,832$ ). The mean age of the full sample was 39 years ( $Mdn = 37$ ,  $SD = 12$ ), ranging from 18 to 87 years. Two percent of the clients were women ( $n = 69$ ). As such, sex differences could not be explored.

With the exception of the IPV conviction which led to study inclusion, prior (within five years) and current convictions for other crimes were common in this sample. Recorded convictions included property offences (40%), traffic offences (30%), drug offences (38%), and other offences (42%). The proportion of clients convicted for a sexual offence was 8%. In total, just over two thirds of the sample (68%) had been convicted of crimes other than crimes against persons within the previous five years.

### Recidivism and Follow-up Time-Period

Recidivism was defined as the first registered violent crime directed at a current or former partner during the follow-up time-period, which led to a reconviction and a sentence of prison, probation, or community service. Given the absence of a system to identify IPV offences through the Swedish Penal Code, each sentencing document for a violent offence was reviewed and coded separately by two authors. Unclear cases and coding disagreements were discussed to consensus with a researcher and clinical psychologist with expertise in the field.

The follow-up time-period was 24 months after release from prison or, for clients serving a probation sentence, completion of the RNR-A during community supervision. The latest possible date for commencement of follow-up was December 31, 2017 and, as such, follow-up of recidivism events ceased on December 31, 2019. An additional buffer time-period to allow for prolonged verdict and sentencing processes extended study follow-up until August 31, 2020 (buffer range = 246–1,416 days).

### Analyses

Analyses were conducted for the full sample and, in an exploratory manner (decided ex-post facto), separately for subgroups based clients' age. Both the primary (Part A + Part B) and secondary (Part A) risk measures were included to compare the predictive utility across risk measures used in practice. Risk based on professional overrides was excluded from analysis given its reliance on clinical judgment and expected rare occurrence. Preliminary analyses confirmed that overrides were uncommon (6%) and agreement with the primary risk measure was high (Cohen's Kappa = .90, 95% CI = .88–.91), warranting exclusion of risk based on overrides.

Performance indicators calculated include sensitivity (i.e., the proportion of recidivists who were assessed to be at risk of IPV), specificity (i.e., the proportion of non-recidivists who were assessed not to be at risk of IPV), positive predictive values (*PPV*; i.e., the proportion of those who were assessed to be at risk of IPV who recidivated), and negative predictive values (*NPV*; i.e., the proportion of those who were assessed not to be at risk of IPV who did not recidivate) at 24 months follow-up. Given that these calculations require a  $2 \times 2$  contingency table, medium- and high-risk levels were merged into one risk bin and referenced against the low-risk group (see Singh et al., 2011). The merging of the medium- and high-risk groups is justified by current practice, with the

medium risk level used as a lower-bound threshold for planning rehabilitative services (e.g., treatment programs).

To test discrimination performance while taking into account the time to the IPV recidivism events, Cox regressions were undertaken. The low- and medium-risk groups were used as reference categories in separate analyses. Hazard ratios (HR) are reported with 95% confidence intervals (CI). Discrimination was examined further through Receiver Operating Characteristic (ROC) curve analysis to produce Area under the Curve (AUC) values and associated 95% confidence intervals. The AUC value is a measure of the association between a continuous variable (i.e., raw risk scores) and a dichotomous outcome (IPV recidivism: yes/no). To analyze discrimination performance, time to the first IPV recidivism event was recorded in number of days. For statistical comparisons between AUC values, a formula suited for large independent ROC-curves was used (Gönen, 2007):  $\chi^2 = (AUC_1 - AUC_2)^2 / (s_1^2 + s_2^2)$ .

## Results

### Descriptive Analyses

Within 24 months of follow-up, about one third (32%) of the sample had been reconvicted of a crime (general recidivism) which led to a sentence of prison, probation or community service, and 1 in 10 (10%) had been reconvicted of an IPV offence (IPV recidivism). Table 1 shows IPV recidivism rates according to risk measure and clients' risk level. The table shows an increase in the recidivism rate for each incremental increase in risk after 12 and 24 months, for both the primary (Part A + B) and secondary (Part A) risk measure. Recidivism rates are similar for each risk level across risk measures. Of the identified IPV recidivist events, 71% occurred during the initial 12 months.

**Table 1.** IPV Recidivism Rates after 12 and 24 Months Follow-Up, According to Risk Measure and Risk Level.

Risk measure/ risk level	Recidivism					
			12 months		24 months	
	<i>N</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Part A + B						
Low risk	568	(19)	20	(4)	30	(5)
Medium risk	1,665	(57)	110	(7)	156	(9)
High risk	691	(24)	82	(12)	114	(16)
Total	2,924	(100)	212	(7)	300	(10)
Part A						
Low risk	394	(13)	13	(3)	17	(4)
Medium risk	1,702	(54)	98	(6)	141	(8)
High risk	1,049	(33)	122	(12)	169	(16)
Total	3,145	(100)	233	(7)	327	(10)

Table 2 tabulates recidivism rates across age groups. As shown in the table, recidivism rates increase with each level of risk for young adult and adult clients. IPV recidivism rates after 24 months were between 12% and 13% among young adults and 10% among adults even though the low-risk group was proportionately larger in the younger cohort. About 1 in 4 (24%) of the younger high-risk clients recidivated, although it is noted that the sample size of the younger cohort is relatively small overall.



**Table 2.** IPV Recidivism Rates after 12 and 24 Months Follow-Up for Young Adults and Adults, According to Risk Measure and Risk Level.

Risk measure/risk level	Young adults (≤ 24 years)						Adults (≥ 25 years)					
			Recidivism						Recidivism			
			12 months		24 months				12 months		24 months	
	<i>N</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>N</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Part A + B												
Low risk	75	(25)	3	(4)	5	(7)	493	(19)	17	(3)	25	(5)
Medium risk	173	(57)	15	(9)	23	(13)	1,493	(57)	95	(6)	133	(9)
High risk	56	(18)	7	(13)	10	(18)	635	(24)	75	(12)	104	(16)
Total	304	(100)	25	(8)	38	(13)	2,620	(100)	186	(7)	263	(10)
Part A												
Low risk	59	(19)	2	(3)	3	(5)	335	(12)	11	(3)	14	(4)
Medium risk	212	(68)	16	(8)	25	(12)	1,490	(53)	82	(6)	116	(8)
High risk	42	(13)	7	(17)	10	(24)	1,007	(36)	115	(12)	159	(16)
Total	313	(100)	25	(8)	38	(12)	2,832	(100)	208	(7)	290	(10)

### Sensitivity, Specificity, *PPV*, and *NPV*

Table 3 displays sensitivity, specificity, *PPV*, and *NPV* at 24 months follow-up for the full sample and subgroups based on clients' age. Sensitivity for the primary risk measure (Part A + B) indicated that IPV recidivists had been assessed as medium or high risk in 9 out of 10 cases. Sensitivity was equally high for adults and only slightly lower for young adults. The secondary risk measure (Part A) performed somewhat better, with sensitivity exceeding 90% for the full sample, as well as young adults and adults.

Specificity was consistently low, but varied across risk measures and client age groups. Using the primary risk measure (Part A + B), for the full sample and adult subgroup, about 1 in 5 non-recidivists had been assessed as low risk. For young adults, the proportion was about 1 in 4. The secondary risk measure (Part A) performed worse, with specificity ranging between 13% (full sample, adults) and 20% (young adults).

**Table 3.** Sensitivity, Specificity, Positive Predictive Value (*PPV*), and Negative Predictive Value (*NPV*) at 24 Months Follow-Up for the Full Sample and Subgroups Based on Age.

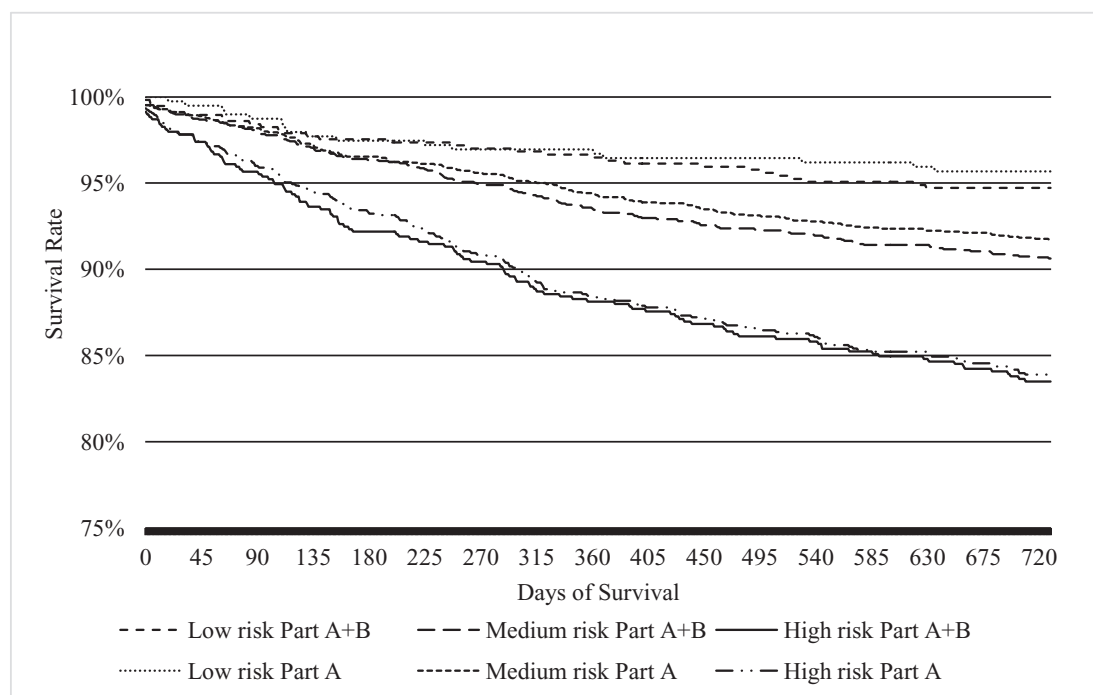
Risk measure	Performance indicator	Full sample	Young adults (≤ 24 years)	Adults (≥ 25 years)
Part A + B				
	Sensitivity	90%	87%	90%
	Specificity	21%	26%	20%
	<i>PPV</i>	11%	14%	11%
	<i>NPV</i>	95%	93%	95%
Part A				
	Sensitivity	95%	92%	95%
	Specificity	13%	20%	13%
	<i>PPV</i>	11%	14%	11%
	<i>NPV</i>	96%	96%	96%

*Note.* Medium- and high-risk levels are merged into one risk bin and referenced against low risk.

The *PPV* and *NPV* showed less variation between risk measures. For the full sample and the subgroup of adults, about 1 in 10 medium-to-high risk clients recidivated within 24 months (*PPV*). The *PPV* was somewhat higher for young adults. The *NPV* was consistently high in the full sample and subgroups based on age, exceeding 90%. As such, a very high proportion of low-risk clients did not recidivate within 24 months of follow-up.

### Discrimination Performance Analyses

Figure 1 shows the survival curves of low-, medium-, and high-risk clients, based on the primary (Part A + B) and secondary (Part A) risk measures. High-risk clients recidivated to a greater extent, and also more quickly, than clients assessed as low- or medium-risk. As seen in the figure, the survival curves of the high-risk group are discernable from the start of follow-up. The difference in survival rates between the medium- and low-risk group is not as clear at the start of follow-up, although the survival rate remains higher in the low-risk group consistently across time.



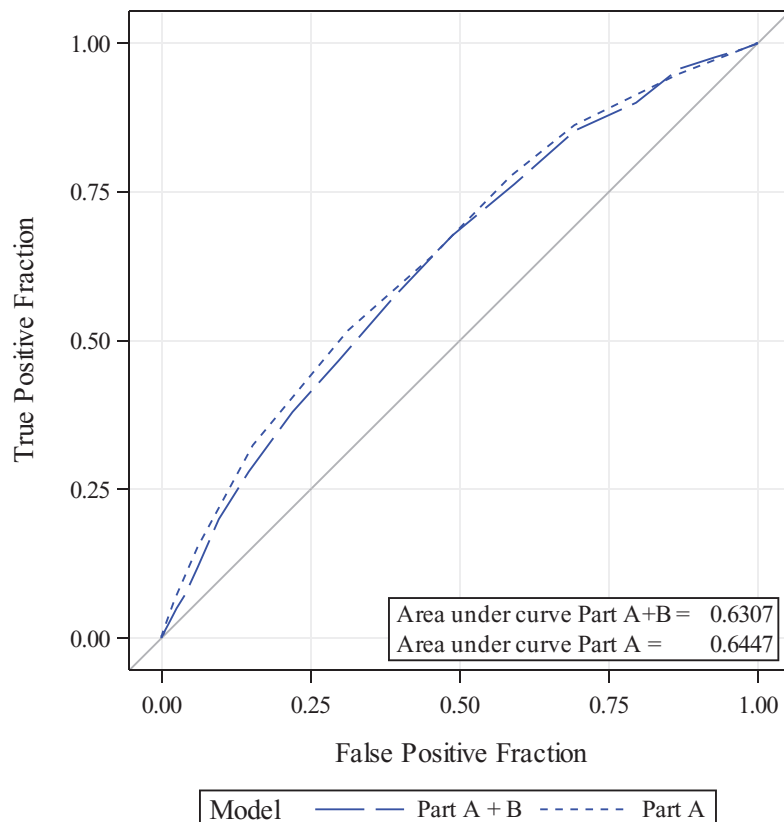
**Figure 1.** Survival Curves of Low-, Medium-, and High-Risk Clients based on the Primary (Part A + B) and Secondary (Part A) Risk Measures

The relative difference between risk levels, taking into account the time-to-event, was analyzed through Cox regressions to produce hazard ratios (HR) and associated confidence intervals (see Table 4). For the primary risk measure (Part A + B), using the low-risk group as a reference category, IPV recidivism hazard increases significantly with 81% (HR = 1.81) in the medium-risk group and 232% (HR = 3.32) in the high-risk group. Relative to the medium-risk group, IPV recidivism hazard increases significantly with 84% (HR = 1.84) in the high-risk group. For the secondary risk measure (Part A), hazard ratios are larger overall, indicating greater relative risk across risk levels; however, wider confidence intervals suggest less precision. All differences are statistically significant (see Table 4).

**Table 4.** Hazard Ratio (HR) for Comparing IPV Recidivism Risk Levels after 24 Months Follow-Up, According to RNR-A Risk Measure (Part A + B, Part A).

Risk measure	Risk level	Reference category			
		Low risk		Medium risk	
		HR (95% CI)	<i>p</i>	HR (95% CI)	<i>p</i>
Part A + B					
	Medium risk	1.81 (1.22–2.67)	.003		
	High risk	3.32 (2.22–4.97)	< .001		
	Low risk			0.55 (0.37–0.82)	.003
	High risk			1.84 (1.44–2.34)	< .001
Part A					
	Medium risk	1.95 (1.18–3.23)	.009		
	High risk	3.97 (2.41–6.54)	< .001		
	Low risk			0.51 (0.31–0.85)	.009
	High risk			2.03 (1.63–2.54)	< .001

ROC analyses were performed across 12 and 24 months follow-up for both risk measures (see Figure 2). For the full sample and the subgroup of adult clients, AUC values are very similar across time points and risk measures, ranging between .63 and .64 (see Table 5). As such, no significant differences between risk measures were found. Among young adults, however, AUC values show greater variation and are indicative of weaker

**Figure 2.** ROC-curves after 24 months for the Primary (Part A + B) and Secondary (Part A) Risk Measures

**Table 5.** Area under the Curve (AUC) Values after 12 and 24 Months Follow-Up with Comparisons by Risk Measure for the Full Sample and Subgroups based on Age.

Sample	Risk measure	N	12 months			24 months		
			AUC	95% CI	$\chi^2$ -test	AUC	95% CI	$\chi^2$ -test
Full sample								
	Part A + B	2,924	.64	.60–.67	$\chi^2 = 0.34, p = .56$	.63	.60–.66	$\chi^2 = 2.16, p = .14$
	Part A	3,145	.64	.60–.68		.64	.61–.68	
Adults								
	Part A + B	2,620	.64	.60–.68	$\chi^2 = 0.21, p = .65$	.64	.60–.67	$\chi^2 = 1.45, p = .23$
	Part A	2,832	.64	.60–.68		.65	.62–.68	
Young adults								
	Part A + B	304	.61	.51–.72	$\chi^2 = 1.71, p = .19$	.59	.50–.68	$\chi^2 = 3.02, p = .08$
	Part A	313	.68	.58–.78		.67	.58–.76	

discrimination performance after 24 months (compared to 12 months). The primary risk measure (Part A + B) performs somewhat worse than the secondary measure (Part A) at both time points in the young adult client group. However, no significant differences between risk measures were found for young adults.

## Discussion

The current study's purpose was to examine the predictive utility of the Swedish Prison and Probation Service's (SPPS) assessment of risk for intimate partner violence, the RNR-A, to enable sentence plans that comprise risk-reducing interventions tailored to clients' recidivism risk. The findings are indicative of three overall conclusions. First, the results indicate that the RNR-A performs similarly to comparable instruments (Messing & Thaller, 2013; van der Put et al., 2019), with moderate discrimination performance at best (AUC range = .59–.68) and risk levels that can be differentiated based on recidivism outcomes. Second, the RNR-A serves its purpose as an intake assessment to screen out clients with the *least* need of intensive or extensive services to reduce the risk of IPV recidivism, given that low-risk clients rarely recidivated within two years. The instrument could be used more effectively to screen out a larger group of clients, given that the IPV recidivism rate was low overall. Screening out low-risk clients is one, but not the only central function of the RNR-A. Third, the low base rate and the small absolute differences in recidivism rates between risk levels call for a discussion about risk tolerance and current policy and practice that uses the medium risk level as a lower-bound threshold for rehabilitative services. Further specialized IPV risk assessment could be pertinent for complex medium-to-high-risk cases to identify clients with a true potential to impose continued serious harm to their current or former intimate partners. The higher end of the risk continuum should be the continued priority for policy and practice as well as further research and development, in line with the evidence-based risk principle (Bonta & Andrews, 2017). Accordingly, identifying IPV recidivists with increased precision should be a focus of such future efforts.

This study makes a significant contribution through its focus on IPV-specific risk assessments conducted by practitioners in a real-world setting and addresses an identified knowledge gap (Svalin & Levander, 2020). The benefit of strong ecological validity, however, presents an inherent problem. Given that the RNR-A was developed and is used as a basis for risk-reducing intervention, *intake* risk assessments should, if subsequent interventions

are effective, have little predictive utility in practice. Ideally, effective prison and probation services should reduce the recidivism risk of clients with high risk and need profiles, whereas low-risk clients should remain at low risk. The underlying assumption that validates the findings is that prison and probation services' ambitious preventive efforts, at least to some extent, are unrealistic – partly because a small proportion of clients actually follow through with treatment. Further, the large amount of hidden crime means that recidivism risk cannot be conceptualized accurately. It is acknowledged, therefore, that this real-world evaluation likely undervalues the utility of the RNR-A due to a presumably small preventive effect of the risk management system in place, and understates actual intimate partner violence.

### Summary and Interpretation of Findings

In this study, one in 10 clients convicted of an IPV offence recidivated for the same type of crime within two years of follow-up, with the majority of re-offenses occurring within the initial year. As expected, and in support of the RNR-A's practical utility in differentiating client groups based on risk, recidivism rates increased with each incremental level of assessed IPV risk. Recidivism rates in the low- and medium- risk groups varied between 4% and 5%, and 8% and 9%, respectively, while 16% of high-risk clients recidivated within the follow-up time-period. High-risk clients were the quickest to recidivate, with a discernably different survival curve from the start of follow-up.

Analyses that took time to recidivism into account further supported the utility of the RNR-A in risk group differentiation. Cox regressions showed that the secondary risk measure (assessing antisociality), compared to the primary risk measure (assessing antisociality, substance use, and relationship/gender role attitudes), more clearly differentiated between risk levels: Recidivism rates were about twice as high in the medium- compared to the low-risk group and the high- compared to the medium-risk group, respectively. However, wide confidence intervals indicate low precision in the effect size estimates. The primary risk measure, showing somewhat weaker differentiation but better precision in these analyses, assesses dynamic risk factors amenable to change and, as such, serves to inform risk management. This function is central to RNR-based practice (Bonta & Andrews, 2017).

Given that medium- and high-risk clients are targeted specifically for IPV treatment in the SPPS, comparisons between these client groups and low-risk clients hold practical utility. The RNR-A managed to identify between 90% and 95% of IPV recidivists through a medium-to-high-risk classification. The development of the RNR-A used a population frequency distribution to identify risk level cut-offs, with 25% of the population forming the low- and high-risk groups, respectively. Since medium-to-high risk clients comprise about 75% of the population, it is not surprising that the instrument identifies a large proportion of IPV recidivists.

The ability of the RNR-A to identify IPV recidivists comes at a cost, especially given the low overall base rate. Limited *PPVs* (range = 11–14%) in combination with poor specificities (range = 13–26%) indicate low precision through the over-inclusion of non-recidivists in medium- and high-risk levels. As such, the number of false positives is high. The low-risk level showed a much greater precision. As revealed by high *NPVs* (range = 93–100%), most low-risk clients did not recidivate.

These counterbalances between sensitivity, specificity, *PPV*, and *NPV* are common for screening instruments similar to the RNR-A (Graham et al., 2021; van der Put et al., 2019; see also Fanshawe & Fazel, 2022). Low precision may in such contexts be viewed as an acceptable cost for identifying individuals who require support and control measures to,



ultimately, manage the serious risk of harm to intimate partners, families, and society at large. Nevertheless, the poor performance of the indicators of specificity and *PPV* observed in this study raises issues from both ethical and economic perspectives.

The ethical aspect entails a risk of the SPPS using heightened measures of control and supervision with a large proportion of clients who may not require these measures to desist from further crime. In the longer term and from a human rights perspective, this risk translates to potential stigmatization and unnecessary infringements on convicted people's personal integrity and freedom. The economic aspect concerns the risk of the SPPS spending resources that could be allocated more effectively to those clients who are most likely to re-offend, especially given the cost of treatments offered to clients convicted of IPV (RVP and Predov). With the medium-and-high risk group comprising about 75% of the target population, an unduly large proportion of clients is eligible for these resource-intensive, individual treatments (although it is acknowledged that many do not follow through with treatment). The ethical and economic implications discussed here could perhaps be viewed as unlikely given that the true prevalence of IPV among medium-to-high risk groups – if known – would reveal much greater treatment and control needs. Implications for individuals are, however, serious. Formulating risk tolerances, evaluating adjusted cut-offs for risk levels, and calibrating the RNR-A are therefore prioritized areas for future development and research. Such future endeavors should include oversight of the utility of using the medium-risk level as a lower-bound threshold for IPV treatment, given the small absolute differences in recidivism rates between low- and medium-risk clients observed in this study.

Analyses focused on risk levels are called for, given their practical use in sentence planning. However, analyses using the raw risk scores are valuable to understand instrument performance and inform efforts to optimize the balance between sensitivity and specificity. ROC analyses and associated AUC values showed that the likelihood of a randomly selected recidivist having a higher risk score than a randomly selected non-recidivist varied between 63% and 64%. There was, as such, little difference in discrimination performance between risk measures (primary and secondary) and time points (12 and 24 months). A meta-analysis of domestic violence risk assessments found an overall AUC of .657 for actuarial assessments (van der Put et al., 2019), indicating that the RNR-A performs equivalently to similar instruments. Discrimination accuracy varies across the low-to-moderate continuum (e.g., Graham et al., 2021; van der Put et al., 2019), however, suggesting that development of the RNR-A could yield improved prediction.

Potential subgroup differences were explored and showed that performance indicators of adult clients were very similar to the full sample. This finding is unsurprising, given the large overlap between the full sample and subsample of adults. Of note is the somewhat weaker discrimination performance of the primary, compared to the secondary risk measure among young adults. Although the difference did not reach statistical significance, the AUC of the primary risk measure after 24 months of follow up indicated weak predictive utility for young adults. Research conducted in the Dutch jurisdiction has shown that the relevance and impact of dynamic risk factors can vary across age groups of criminal justice populations (Spruit et al., 2017; Wilpert et al., 2018), which could be a relevant hypothesis to examine for an IPV client population in Sweden. Relatedly, the RNR-A may fail to capture relevant dynamic risk factors of IPV (e.g., relationship dynamics) for emerging adults or operationalize dynamic risk factors poorly (see Shaffer et al., 2022). There are some claims in the literature that risk assessments of youthful populations have a short shelf-life (see Grey et al., 2019), signaling that follow-up times of 24 months may be too long to assess the predictive utility of risk that entails dynamic risk indicators for clients of

a relatively young age. Nonetheless, wide confidence intervals show low precision in effect size estimates, and assumptions regarding potential age differences should be a matter for further research.

Although acceptable discrimination performance was observed across the subgroups based on age overall, no analyses were possible according to sex since women were few. The scant research focusing on female clients is a serious problem in assuring gender equality in policy and practice. There remains an urgent need to build an evidence base regarding the utility of recidivism risk assessments for women, with calls for high quality research across contexts, with women of different offending profiles (see, for example, Geraghty & Woodhams, 2015; Henning et al., 2009). In the SPPS, testing the predictive and practical utility of the RNR-A for women should be prioritized in forthcoming evaluations to test the assumption of gender neutrality.

### Practical Implications

This study focused mainly on evaluating risk measures of the RNR-A as they are used in practice. The results support the practice of planning minimal or no IPV-specific intervention for clients assessed as low risk of IPV recidivism to reserve resources for medium-to-high risk clients. Further specialized assessment may assist in tailoring sentence plans in complex medium-to-high risk cases involving, for example, multiple responsivity issues. Women and young adults could also benefit from further assessment and individual tailoring of sentence plans given that the performance of the RNR-A is more tentative in these client groups (see also Johansson Bäckström et al., 2022). Although a small difference in the absolute rates of recidivism among clients assessed as low-, medium-, and high-risk was observed, recidivists in the high-risk group in particular re-offended quickly. In line with the risk principle (Bonta & Andrews, 2017), the implementation of sentence plans should therefore be swift for high-risk clients on conditional release or probation. The secondary risk measure – which does not encompass dynamic risk factors – can remain a reserve in cases where a client interview is not possible. Dynamic risk factors are crucial as an underpinning of assessed risk, when risk assessments are used to inform risk management and represent a practice supported by a broad evidence base (see Bonta & Andrews, 2017, for a comprehensive review). The performance of any one risk measure was not, overall, clearly superior to the other.

The SPPS has initiated an internal policy and practice review regarding the function and purpose of risk assessments to inform sentence planning, placements, and security measures. Also, a plan for the continued quality assurance of the RNR-A has been implemented as of 2022 and includes future research directions. These two parallel undertakings will likely address questions regarding, for example, appropriate risk tolerances and a target balance between sensitivity and specificity, and result in revised policy documents, guidelines, and in-house training. This study's findings represent a contribution to this work.

A prioritized research direction involves optimizing the predictive utility of the RNR-A. Although there is room for improvement of the instrument's ability to predict recidivism, marginal improvements could be expected, at best. Such efforts could be directed at evaluating item performance to adjust risk-score calculations or clarify item wording or assessment instructions, exploring the utility of adding items or risk domains aligned with advancements in research, and continuing the evaluation of the instrument's performance in future client populations and subpopulations, especially women and young adults.

An example of a research need specific to the IPV risk assessment of the RNR-A is the evaluation of supplemental structural professional judgement (SPJ) assessment through the

SARA (Kropp & Hart, 2000). The SARA is used currently in the SPPS as a specialist instrument and is administered by trained regional assessment teams that provide consultation in complex cases. The SPJ approach applied has the advantage of considering individual relevance and manifestation of research-informed risk factors (Guy et al., 2012). It may be relevant to explore if the SARA can help inform more effective sentence planning and IPV treatment allocation in the SPPS.

### Limitations

Although the study provides some support for the utility of the RNR-A, the study has important limitations. The main limitations include a failure to adjust for interview response omissions (missing data at item level) and to account for clients' participation in risk-reducing interventions during follow-up, as well as relying on a stringent definition of recidivism.

First, the automated risk score calculation that underpins the allocation into risk levels allows for response omission (relevant in Part B only). If a client, for example, refuses to respond to questions in the interview, the risk calculation may fail to capture the client's "true" risk score, resulting in inappropriate risk level allocation. RNR-A assessors are trained and instructed to, in every individual case, appraise the face validity and reliability of the information obtained through the client interview and use available, trustworthy information from other sources to complete missing items. The assessor has the opportunity to adjust the risk level through a professional override or rely solely on the secondary risk measure for sentence planning if information is missing in Part B, which could be justified in such instances. There remains a need, however, to evaluate systematically the influence of omissions on the validity of the risk (need/responsivity) measures of the RNR-A. Such evaluation could be used as a basis for modifying the automated risk score calculation to take into account missing items (e.g., criteria regarding what proportion of items and/or which items need to be completed to generate a risk score/level).

The issue of response omissions was observed in 371 (13%) cases (primary risk measure only). Post-hoc sensitivity analyses were conducted, entailing the exclusion of cases with omitted item responses to re-run ROC analyses. Marginal differences in AUC values after 24 months were found, with no impact on the conclusions drawn based on the overall findings.

Second, if the RNR-A is implemented in practice as intended and risk-reducing interventions are effective, recidivism rates would be underestimated in particular in the medium- and high-risk groups, since clients in these risk levels are allocated to more intensive and extensive rehabilitative services. The impact of this disproportional participation in treatment could mean that the predictive utility of the RNR-A is undervalued by the findings of this study. Nonetheless, the risk level differentiation observed was clear and in the expected direction and discrimination was comparable with similar instruments. This limitation may be construed as a cost of evaluating "real-world" practice, with low measurement control offset by external validity.

Post-hoc sensitivity analyses were conducted on a subsample of clients ( $n = 1,045$ ) who had served a prison sentence to test if treatment program participation (both IPV specific and general treatment programs) affected the study results. Participation in treatment programs overall (29%) was relatively uncommon, with only about one in 10 (11%) initiating IPV-specific treatment during imprisonment. Cox regressions were re-run, controlling for 1) participation in and 2) completion of a) IPV-specific and b) any treatment. The association between risk level and recidivism remained robust.

Finally, the operationalization of recidivism was restricted to reconvictions that led to a sentence of prison, probation, or community service, using the SPPS's internal client registry. There are many alternatives to defining recidivism including re-offences that lead to re-arrest or a new charge. The use of a stringent definition means that actual re-offending is underestimated in this study. IPV represents a largely underreported form of violence (e.g., The Swedish National Council for Crime Prevention, 2014). As such, no conclusions can be drawn regarding low-, medium- and high-risk clients' actual continued use of violence towards an intimate partner. Acknowledging the fast-growing prison and probation population in Sweden in combination with the SPPS's limited resources, however, the key objective of this study is evaluating the differentiation between client groups to allow for effective resource allocation. The most serious risk of bias of a restricted definition of recidivism concerns the potential systematic group differences in the type of unreported or unregistered IPV that low-, medium- and high-risk clients commit. For example, should low-risk clients be more likely than medium- and high-risk clients to commit IPV that does not lead to reconviction, results of this study may be subject to bias. Continuous and more serious IPV is arguably more likely to be reported to the police and lead to a reconviction, lending credence to the findings. Further research should explore alternative outcome operationalizations to examine the robustness of the findings.

IPV is to some extent unique in that these crimes require a relationship to or contact with a current or former intimate partner. A client who desists from IPV may yet be capable of committing IPV and therefore be at risk, but criminal opportunities may have been absent without a potential victim. In summary, there are multiple issues surrounding the operationalization and measurement of IPV, pointing to a challenge for researchers to assess this type of crime validly and with precision.

## Conclusion

As a contribution to broader efforts of evaluating the implementation of Bonta and Andrews' (2017) risk principle in practice, this study provides initial support for the use of the RNR-A as an intake assessment to screen out clients with the least need of IPV-specific intervention. In-depth, SPJ-based risk assessment of medium-to-high risk clients may be warranted to improve the chances of identifying clients who have a true potential to impose continued serious violence towards intimate partners. Instrument development and calibration of the RNR-A can increase the potential of effective service delivery that reserves intensive and extensive rehabilitation for clients with the greatest risk and needs. Such efforts also have the potential to make minor but important contributions to Sweden's national strategy to prevent and combat men's violence against women.

## Data Availability Statement

Legal restrictions apply to the public availability of the data that support the findings of this study. Freedom of information requests to access pseudonymized data can be made to the Swedish Prison and Probation Service through the Research and Evaluation Unit: HK.FoU@kriminalvarden.se

## Author Contributions

Authors L.S.S. and M.D. conceptualized the study. M.D. and B.N.P. conducted the analyses. All authors contributed to interpreting the findings. L.S.S. wrote the first draft of the manuscript, and M.D. and B.N.P. critically edited it. All three authors approved the final submitted version.

## Disclosure Statement

The authors are employed by the organization (the Swedish Prison and Probation Service) responsible for the development and administration of the instrument (RNR-A) that is evaluated in this research. The authors have not been involved in instrument development and are not involved in the management or administration of the RNR-A. Further, instrument developers have not been involved in study conceptualization, data analysis, or write-up of this article. A representative of an external scientific review board has reviewed the study protocol and findings as presented in a government report written in Swedish and published by the Swedish Prison and Probation Service: Kriminalvården. (2022). *Risk för återfall i partnervåld: Hur träffsäker är Kriminalvårdens RBM-bedömning?* [Risk of partner violence recidivism: How accurate is the Swedish Prison and Probation Service's RNR-assessment?] <https://www.kriminalvarden.se/globalassets/publikationer/forskningsrapporter/risk-for-aterfall-i-partnervald--hur-traffsaker-ar-kriminalvarden-rbm-bedomning.pdf>. The authors have no other competing interests or commercial interests to declare.

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