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Preliminary Development of a Dynamic Risk Assessment Tool for Women Offenders: An Examination of Gender Neutral and Gender Specific Variables

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Preliminary Development of a Dynamic Risk Assessment Tool for Women Offenders: An Examination of Gender Neutral and Gender Specific Variables

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Executive Summary

Key words: *women offenders, risk assessment, dynamic risk, scale development*

To date, research on the prediction of criminal recidivism and the development of risk assessment tools have been largely male-focussed. Given that male offenders comprise the majority of correctional populations, it is not surprising that the focus has been on the more prominent population; however, there can be detrimental impacts when male-based tools are subsequently applied to women offender populations. These gender-neutral approaches do not accurately account for the risk and needs present in women offenders and have potential to inflate women's security and intervention needs. There is need for tools designed specifically for women offenders. The goal of the current study was to develop, from the ground-up, a gender-informed, dynamic risk assessment scale that could be used to predict risk of recidivism in federal women offenders.

Two cohorts of federal women offenders were identified for this study: a construction sample comprised of 309 women released between April 2002 and March 2003, and a validation sample comprised of 256 women released between April 2003 and March 2004. A number of gender-informed static (e.g., criminal history) and dynamic (e.g., education, addictions) risk factors were examined for their association with recidivism in the construction sample. Recidivism was defined as any new conviction occurring within a two year period after release. Variables significantly associated with recidivism ($\alpha = 0.05$) were entered into a stepwise selection modeling procedure to identify those variables most strongly associated with recidivism ($\alpha = 0.05$) and thus worthy of inclusion in a scale. Three different scales were developed using the identified variables. The most complex was a multivariable logistic regression. Simpler alternatives utilized the Nuffield method (i.e., a weighted summation scale) and a non-weighted simple summation. Generalizability and validity were analyzed for all scales within the validation sample.

The final model contained eight variables and explained 55% of the variation in recidivism. These variables included: 5+ previous adult convictions; previous revocation of conditional release; average number of major institutional incidents per year of current sentence; unstable employment history; previous break and enter offence; contraband charge during current sentence; previous assault offence; and, 2+ previous youth convictions. The three scales did not differ in their ability to predict recidivism in the construction sample suggesting the simple summation method is adequate (Logistic Regression Scale AUC = 0.893; Nuffield Scale AUC = 0.884; Simple Sum Scale AUC = 0.883). Analyses revealed, however, a substantial decline in the predictive accuracy of all three scales in the validation sample (Logistic Regression Scale AUC = 0.717; Nuffield Scale AUC = 0.699; Simple Sum Scale AUC = 0.707). Additional analyses, conducted to examine reasons for the decline, revealed that only three of the variables were significantly associated with recidivism in the validation sample.

Ultimately, a gender-informed dynamic risk scale for women could not be validated. Variables that contributed to the model were largely static in nature (i.e., not amenable to change) and none of the gender-informed factors (e.g., self-esteem, victimization) contributed to increasing the scale's predictive accuracy. This research suggests that, while it is important to consider gender

differences in intervention, in our study gender-informed variables did not increase our ability to predict risk of recidivism.

Limitations of the current study included: the limited nature of the data sources; ambiguous or missing data when coding files; poor inter-rater reliability resulting in dropping some of the more gender-informed variables; and, small sample. Future research initiatives should explore using the current methodology with improved data sources (e.g., standardized interviews) that more accurately and comprehensively capture the risk and needs of larger samples of women offenders. In the interim, the validity of existing gender neutral scales could be evaluated for use with women offenders.

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Introduction

As males comprise 80% of the correctional population in Canada and over 90% of individuals housed in federal institutions (Statistics Canada, 2008), much of the theoretical and empirical literature on offending behaviour to date has been male-based (Akers & Jensen, 2003; Andrews, 1980; Blanchette & Brown, 2006; Gendreau, Smith, & French, 2006; Pratt & Cullen, 2000). Although developed with male offenders as a reference, this literature has since been applied to women offenders, and, given its use with both men and women, has hence received a label of being "gender-neutral" (Blanchette & Brown, 2006; Blanchette & Taylor, 2007; Farr, 2000; Salisbury, Van Voorhis & Spiropoulos, 2009). A growing debate among forensic scholars and policy-makers has developed concerning the effectiveness and appropriateness of using gender-neutral theories and approaches with women offenders (e.g., Brennan 2007; Dowden & Andrews, 1999; Rettinger & Andrews, 2010; Taylor & Blanchette, 2009; Van Voorhis, Wright, Salisbury & Bauman, 2010).

With the increasing population of women offenders, and more precisely, women charged for violent crimes[1], many have claimed that there is need for policies and practices that take into account the specific experiences and trajectories of women. This concern is particularly noteworthy when considering correctional classification, risk assessment and the ability to predict recidivism (Blanchette & Brown, 2006; Covington & Bloom, 2006; Farr, 2000; Koons-Witt & Schram, 2003; Taylor & Blanchette, 2009; Van Voorhis, Wright, Salisbury & Bauman, 2010; Wright, Salisbury, & Van Voorhis, 2007). More specifically, arguments surrounding this issue have been grounded in whether the current, gender-neutral risk assessment protocols are in fact suitable for use with female populations. In other words, can instruments that were developed largely on male samples generalize to accurately predict recidivism and appropriately inform treatment strategies for women offenders?

Given that the development of a scale that accurately predicts an offender's likelihood of re-offending upon release to the community has several important implications, it is imperative that such a scale accurately reflects the levels of risk and need of the offender. By identifying

[1] According to Canadian statistics, charges for serious violent crime have more than doubled among young females in recent years, rising from 60 per 100,000 in 1986 to 132 per 100,000 in 2005 (Kong & AuCoin, 2008). Similar trends are evident in the United States, with the number of incarcerated females increasing at a rate double to that of males over the last three decades (Calverly, 2007).

criminogenic factors which are amenable to change (dynamic risk-factors) and those which are not (static risk-factors), this scale can assist rehabilitation professionals in identifying potential successful interventions and in identifying those offenders in need of these interventions. Additionally, it can provide parole board members additional information to consider during their decision making processes around granting parole and conditions of release. Finally, it can provide parole officers a method of identifying the needs of high-risk parolees under their supervision.

Scales developed to predict the risk of re-offending cannot definitively distinguish recidivists from non-recidivists but they will, in the long run, outperform a cross-section of decision makers (Meehl, 1954). Further, such scales increase objectivity, consistency, transparency, and fairness (Nuffield, 1989). As the following review of literature will demonstrate, given the lack of gender-informed risk assessment protocols and the necessity for scales to accurately reflect offenders' (i.e., women offenders) risk and needs, the primary purpose of this research was to develop and validate a gender-responsive scale for predicting the risk of re-offending among women offenders released from Canadian federal penitentiaries.

The Static versus Dynamic Debate

The development of current day criminal risk assessment tools can be described as having gone through a number of "generational" changes (Bonta, 1996, as cited in Gendreau, Little & Goggin, 1996; Bonta & Andrews, 2007). First generation risk assessments relied on clinical and professional judgment to assess risk, and have since been discredited in comparison to the benefits of actuarial prediction (Meehl, 1954). It has been well-established that second generation risk assessment measures, which rely on statistically-grounded methods, tend to outperform those measures based on clinical judgment (e.g., Dawes, Faust, & Meehl, 1989; Egisdottir et al., 2006; Grove & Meehl, 1996; Harris, Rice, & Cormier, 2002; Sawyer, 1966; Swets, Dawes, & Monahan, 2000). The development of statistical or empirically grounded tools for the purpose of establishing an offender's risk to re-offend are pivotal both to the maintenance of public safety and to the welfare of the offender. Specifically, risk assessment tools contribute to the appropriate classification, management and supervision of offenders in institutions and communities. In addition, these tools can be used in the decision-making process concerning parole eligibility (Andrews & Bonta, 2006).

Contemporary risk assessment protocols habitually achieve moderate to high rates of

accuracy in the range of 70 to 80% (e.g., Brown, St. Amand, & Zamble, 2009; Brown & Zamble, 2007; Gendreau, Goggin, & Smith, 2002; Harris, Rice, & Quinsey, 1993). Notably, such impressive levels of predictive validity have been yielded by actuarial tools that are predominantly if not entirely comprised of static items (i.e., factors that are predictive of recidivism, are grounded in an offender's background and are impermeable to change) (e.g., Hanson & Thorton, 2000; Hoffman, 1994; Quinsey, Harris, Rice, & Cormier, 2006). For example, the revised Statistical Information on Recidivism Scale (SIR-R1; Nuffield, 1982)[2] is a static tool routinely administered by both the Correctional Service of Canada (CSC) to non-Aboriginal male offenders upon admission to the federal correctional system and by the National Parole Board to assist in pre-release decisions (Motiuk, 2006). The 15-item instrument, gauging demographic and criminal history variables, yields excellent inter-rater reliability (r = .96; Wormith & Goldstone, 1984), moderate internal consistency (Cronbach's alpha = .75; Nafekh & Motiuk, 2002), and a respectable level of predictive validity (*AUC* = .74; Bonta et al., 1996).

Although strong predictors of recidivism, using static items in the context of risk assessment can be deterministic as it assumes the permanence of an offender's risk status and does not reflect any changes in behaviour that have been made. From a practical perspective, while useful in determining risk level and classification at intake, a sole reliance on static factors is of limited practical benefit in establishing treatment goals, monitoring progress in correctional intervention, or predicting an impending failure within community settings (Brown, St. Amand, & Zamble, 2009; Douglas & Skeem, 2005; Skeem & Mulvey, 2002).

Third generation risk assessment measures support the inclusion of dynamic risk factors (i.e., criminogenic needs that are subject to change) to identify appropriate treatment targets and reduce recidivism. Indeed, evidence has amassed to demonstrate the capacity of dynamic risk factors (e.g., criminal attitudes, criminal associates, employment, substance abuse) to predict adult criminal recidivism with moderate to high levels of accuracy (e.g., Andrews & Bonta, 2006; Bonta, 1996; Brown et al., 2009; Douglas & Skeem, 2005; Gendreau et al., 1996; Hanson, Harris, Scott, & Helmus, 2007; Quinsey, Book, & Skilling, 2004; Quinsey, Jones, Book, & Barr, 2006). Perhaps more importantly, recent research suggests that dynamic factors contribute incremental predictive validity to models comprised of static items exclusively (Brown et al., 2009; Jones, Brown, & Zamble, 2010). For example, in a sample of 136 male offenders released

[2] This revised version of the SIR encompasses the modifications that the Correctional Service of Canada brought to the scale in 1996 in order to reflect changes in the offender population (Motiuk, 2006).

from federal institutions, Brown and colleagues (Brown et al., 2009; Jones, Brown, & Zamble, 2010) demonstrated that a model comprised of both static and prospectively re-assesssed dynamic items significantly outperformed a pure static model in the prediction of general recidivism over a two-year follow-up period (*AUC* = .89 and .81, respectively).

The Canadian Model of Criminal Risk Assessment

Currently, the Canadian model for correctional assessment and treatment of offenders is largely based on a gender-neutral perspective that uses actuarial methods to identify *risk* and *need* factors and determine the correctional treatment objectives and service intensity (low or high risk) in a way to attain optimal *responsivity* with offenders and ultimately reduce recidivism (Blanchette & Brown, 2006; Dowden & Andrews, 1999; Rettinger & Andrews, 2010). The RNR (Risk-Need-Responsivity) model, developed in the 1980s by Andrews, Bonta & Hodges (1990), has since provided significant empirical grounds to counter-argue the "nothing works" movement (Martison, 1974) which had discredited, in the 1970s, the efforts undertaken thus far, mostly based on clinical judgment, to rehabilitate and treat offenders (Bonta & Andrews, 2007). This empirical approach to effective correctional treatment, oriented toward a "what works" perspective, proposes a rehabilitation strategy that is centered around the notions of assessment and classification (Andrews & Bonta, 2006, Blanchette & Brown, 2006).

The general principles behind the RNR model are that: 1) the risk of re-offending can be predicted through assessment and, in order for intervention to be effective, the level of services provided to offenders should reflect the level of risk identified (e.g., high risk offenders receive high intensity interventions); 2) the treatment of offenders should be based on the assessment of criminogenic needs, otherwise known as dynamic risk factors (e.g., attitudes to crime, moral values, drug use, family relationships, (Hollin & Palmer, 2006)), and finally; 3) the services and treatment provided should be adapted to the personal learning style and cognitive abilities of the offender to maximize responsivity, as stipulated in the 'general personality and cognitive social learning' (GPCSL) theory of criminal conduct (Andrews & Bonta, 2006, Blanchette & Brown, 2006, Dowden & Andrews, 1999; Hollin & Palmer, 2006; Rettinger & Andrews, 2010). Therefore, in essence, the effective risk assessment for re-offending is considered to rely on adequate identification of criminogenic needs (Dowden & Andrews, 1999; Hollin & Palmer, 2006).

In a series of rigorous meta-analyses, Andrews, Zinger, Hodges, Bonta, Gendreau and

Cullen (1990) identified the Big Four risk and need factors that proved to be supportive of the above mentioned principles and consequently, valid in predicting the risk of re-offending. These factors include antisocial attitudes, antisocial associates, criminal history, and antisocial personality factors (Dowden & Andrews, 1999; Salisbury, Van Voorhiss & Spiropoulos, 2009). To these were added four other factors (substance abuse, family factors, education/vocation, and leisure/recreation), which, together, are considered the Central Eight risk and need factors (Andrews & Bonta, 2006; Rettinger & Andrews, 2010; Salisbury, Van Voorhis & Spiropoulos, 2009). These Central Eight are currently used in the Canadian correctional context within the classification instruments used for both men and women offenders (i.e. Level of Supervision Inventory (LSI), Level of Supervision Inventory Revised (LSI-R)).

As the following will demonstrate, both gender-neutral and gender-responsive camps emphasize dynamic risk factors over those of a static nature. In accordance with Andrews and Bonta's (2006) Personal, Interpersonal, and Community – Reinforcement (PIC-R) model of criminal conduct, seven of the Central Eight most empirically aligned predictors of recidivism have various potentials of malleability [e.g., antisocial attitudes, antisocial associates, antisocial personality or personal/emotional factors (e.g., impulsivity), substance abuse, family factors, employment/school, and leisure/recreation[3]]. In turn, feminist scholars also underscore the importance of targeting dynamic factors in the treatment of women offenders. Despite the inherently static nature of certain factors underscored in gender-responsive theory (e.g., childhood victimization), feminist scholars encourage correctional interventions to target dynamic factors such as relational empowerment coupled with appropriate focus on mental health needs (Blanchette & Brown, 2006; Blanchette & Taylor, 2009; Covington & Bloom, 2003; Salisbury & Van Voorhis, 2009).

The Gender-Neutral versus Gender-Responsive Debate

While the predictive validity of the Central Eight inspired assessment instruments has been supported by numerous studies, for males, and more recently, for females (e.g., Andrews, Bonta, & Wormith, 2008; Andrews, Dowden, & Rettinger, 2001; Coulson, Ilacqua, Nutbrown, Giulekas, & Cudjoe, 1996; Dowden & Andrew, 1999; Folsom & Atkinson, 2007; Gendreau, Goggin, & Smith, 2002; Gendreau et al., 1996; Holsinger, Lowenkamp, & Latessa, 2003; Lovins, Lowenkamp, Latessa, & Smith, 2007; Lowenkamp, Latessa, & Smith, 2007; Simourd &

[3] As a static variable concerning an offender's past, criminal history is not a predictor amenable to change.

Andrews, 1994; McShane, Williams III, & Dolny, 2002), a significant issue with this perspective remains: most empirical work on risk and need assessment instruments was carried out using male samples and then applied to women, thus not taking into account any gender-specific considerations (Blanchette & Brown, 2006; Blanchette & Taylor, 2007; Brennan, 2007; Farr, 2000; Hollin & Palmer, 2006; Rettinger & Andrews, 2010). Essentially, these gender-neutral theories of crime maintain that instruments based on individually-oriented factors encompassed under the Central Eight are most appropriate to the prediction of criminal behaviour regardless of gender (Andrews & Bonta, 2006), and therefore assume that criminogenic needs and risk factors for men and women offenders are similar (Hollin & Palmer, 2006). Gender simply becomes an aspect considered under the responsivity principle (Hannah-Moffat, 2009).

In contrast, gender-responsive grounded paradigms, namely the Feminist Pathways (Chesney-Lind & Shelden, 2003; Daly, 1992, 1994; Reisig, Holtfreter and Morash, 2006) and Relational-Cultural Theories (Miller, 1986; Spencer, Jordan, & Sazama, 2004), maintain that although some females follow a more traditional route to crime, many others are criminalized as a result of a unique constellation of factors ultimately linked to patriarchal oppression (e.g., physical and sexual abuse, substance abuse, poverty). As such, the main argument against the RNR model and GPCLS theory is their inherent failure to incorporate a host of factors that may be specific to women and to recognize that there are factors that may be more or less salient to recidivism in women offender populations (Hannah-Moffat, 2009; Hannah-Moffat & Shaw, 2001; Hollin & Palmer, 2006; Reisig, Holtfreter and Morash, 2006; Rettinger & Andrews, 2010). Among the proposed gender-responsive factors are notably, mental health issues, self-concept, childhood and adult victimization, and poverty (Blanchette, & Brown, 2006; Salisbury & Van Voorhis, 2009).

The concern with omitting gender-specific factors in the risk assessment of women offenders is that women typically present with a lower level of risk than men, and invalid assessment based on gender-neutral factors may lead to the overclassification of women and therefore subject them to unnecessarily high security measures (Farr, 2000; Rettinger & Andrews, 2010; Salisbury, Van Voorhis & Presser, 2001; Van Voorhis & Spiropoulos, 2009). Additionally, utilizing gender-neutral measures may incorrectly identify women offender's needs, and can thereby negatively impact the appropriate referral to correctional programs and the effectiveness of reintegration efforts (Blanchette & Taylor, 2007; Rettinger & Andrews, 2010; Van Voorhis, Wright, Salisbury & Bauman, 2010). For these reasons, advocates for a gender-responsive approach claim that

rather than merely validating or adapting male-driven assessment measures, there is need for instruments that are designed specifically for the women offender population (e.g., Belknap, 2001; Chesney-Lind & Shelden, 2003; Farr, 2000; Hannah-Moffat, 2009; Taylor & Blanchette, 2009).

Women Offenders, Gender-Informed Risk Factors and Risk Assessment

While much of the research in this area has focussed on attempting to validate already existing gender-neutral risk assessment tools with women offenders (Bonta, Pang & Wallace-Capretta, 1995; Lowenkamps, Holsinger, & Latessa, 2001; Reisig, Holtfreter & Morash, 2006), research exploring gender-specific factors involved in female re-offending has gained ground in recent years. Women represent a distinct and diverse population of offenders who differ from men in terms of their levels of risk and need, lifestyles, offending patterns and response to treatment (e.g., Blanchette & Brown, 2006; Bloom, Owen & Covington, 2003). As such, it is imperative to consider how gender impacts women's involvement in criminal behaviour, as well as how this will impact them within the criminal justice system, particularly with regard to treatment and their risk to re-offend.

Feminist Pathways literature (e.g., Daly 1992; 1994; Reisig et al., 2006) provides evidence that women become involved in criminal activity for different reasons than men. These theories postulate that, for most women, crime is a method of survival or a way to support substance abuse habits. Daly (1992) presents five pathways that often lead women to criminal lifestyles: street women, harmed and harming women, battered women, drug-connected women, and economically motivated women. While differences are noted between these women's involvement in, and connection to crime, a number of common factors and lifestyle conditions were identified. Such factors include neglect and abuse in childhood, victimization in adult relationships, substance abuse, mental health concerns and economic marginalization. In addition to Daly's work, other research has supported that women often become involved in crime and the criminal justice system as a result of life situations and conditions. Additional factors associated with women's criminal behaviour, prison adjustment and recidivism include: histories of physical and sexual abuse (Benda, 2005; Bloom, Owen & Covington, 2003; Bonta, Pang & Wallace-Capretta, 1995; Holtfreter & Morash, 2003), co-occurring mental health and substance abuse issues, social marginalization (including educational and employment disadvantages; Schram, Koons-Witt, Williams III & McShane, 2006; Van Voorhis, Wright, Salisbury &

Bauman, 2010), parenting responsibilities (Benda, 2005; Van Voorhis et al., 2010), harmful interpersonal relationships (Benda, 2005; Bloom et al., 2003; Holtfreter & Morash, 2003) and self-esteem/self-efficacy (Van Voorhis et al., 2010).

In sum, research which has been conducted in attempts to validate such existing risk/need scales as the LSI-R has been largely inconclusive. Some studies have supported the use of such gender-neutral scales (e.g., Lowenkamps et al., 2001), while others have found marginal support for the use of these scales with women (e.g,. Reisig et al., 2006; Holtfreter, Reisig & Morash, 2004). Recent studies have looked at outcomes of supplementing such gender-neutral measures with indices inclusive of gender-responsive items and factors. Results of these research initiatives have shown support for including gender-responsive measures in order to enhance the predictive ability of gender-neutral assessments with women (Van Voorhis, 2009; Van Voorhis et al., 2010). What may be concluded from these studies is that there is need to conduct further research in the area of risk assessment for women offenders in order to better gauge the relevance of gender-responsive tools, and the potential for development of a tool designed specifically with women in mind. It has been argued that despite the time and effort that would be required to develop a gender-informed measure from the ground up, there would be benefit in doing so, as these tools may outperform gender-neutral techniques that are merely adjusted for use with women (Taylor & Blanchette, 2009).

Current Study

Given the absence of empirically based tools designed specifically for women, the goal of the current study is to develop an assessment measure that can be used to predict risk of re-offending in federal women offenders. Development of such a tool will involve the analysis of hypothesized factors predictive of recidivism from both gender-neutral and gender-responsive camps, with the ultimate goal of developing an empirically driven, gender-informed risk assessment protocol. As has been demonstrated, the literature is largely supportive of the use of dynamic need factors in the assessment of risk; as such, another goal of the current study is to develop not only an assessment measure specific to women, but one that is gender-responsive and dynamic in nature. For this purpose, variables to be examined will include both those that are static (e.g., criminal history variables) and dynamic (e.g., education, addictions).

While the ultimate goal of this study is to develop an assessment tool that could be implemented with women offender populations, given the dearth of research examining women

and risk assessment, research in this area is largely exploratory in nature. Regardless of outcome, it is imperative to conduct research on this topic as findings will contribute to advancing the current knowledge base surrounding women, predictive risk factors and gender-informed assessment practices.

Method

Study Sample

Construction sample

All federally sentenced adult women in Canada released through day parole, full parole, statutory release[4], or sentence expiration between April 1, 2002 and March 31, 2003 were eligible for inclusion in the construction sample (n = 336). For those offenders released more than once during the fiscal year, the last release was used as the commencement of the offender's follow-up period. Exclusion criteria included: conviction for a crime that actually occurred prior to release (n = 1) (e.g., committed while incarcerated); death prior to the end of the two year follow-up period unless convicted of a crime prior to death (n = 2); and, unavailability of electronic case files for manual review (n = 24). Women who died prior to the end of the two year period were removed, unless convicted of a crime prior to death, because it is impossible to determine if these women would have recidivated during the two year period. Thus, the development sample consisted of 309 women released during fiscal year 2002/03.

Validation sample

All federally sentenced adult women in Canada released through day parole, full parole, statutory release, or sentence expiration between April 1, 2003 and March 31, 2004 were eligible for inclusion in the validation sample (n = 328). Exclusions included: one woman convicted of a crime that actually occurred prior to her release; one woman who died prior to the end of the two year follow-up period without being convicted of a crime; and, 70 women who were included in the construction sample. These 70 women were excluded to ensure that the findings from the validation sample were not biased by including women who had contributed to development of the prediction model. Hence, the validation sample consisted of 256 women released during fiscal year 2003/04.

Sample characteristics

The construction and validation samples did not significantly differ with respect to basic sociodemographic and criminal characteristics (see Table 1). On average, these women were about 33 years old and the majority were not in committed relationships (62%), had not

[4] For a detailed definition of release types refer to the *Corrections and Conditional Release Act*, section 99 (1) (CCRA, 1992).

completed highschool (68%), and self-reported as non-Aboriginal (75%). Almost all were serving determinate sentences (98%) of an average length of 3.3 years. For about half of the women (56%), the most serious offence for the current sentence was a drug (39%) or robbery offence (18%). Approximately 26% recidivated within two years of release, after spending an average of 359 days in the community.

Table 1
Characteristics of Canadian Federal Women Offenders Included in the Construction and Validation Samples

	Construction Sample n = 309	Validation Sample n = 256	T (df) or χ^2 (df)	All Women n = 565
Average age at admission, years (sd)	32.1 (9.0)	33.3 (9.7)	1.46 (563)	32.7 (9.3)
% married	37.5	39.4	0.22 (1)	38.4
% completed highschool[a]	33.1	31.2	0.21 (1)	32.3
% self-identifying as Aboriginal	24.3	26.6	0.39 (1)	25.3
% with determinate sentence[b]	97.4	98.4	0.71 (1)	97.9
Average sentence length[c], years (sd)	3.3 (1.8)	3.4 (2.3)	0.65 (551)	3.3 (2.1)
Most serious offence of current sentence (%)			5.04 (7)	
homicide-related	10.7	9.4		10.1
robbery	17.2	18.0		17.5
sex-related	0.6	2.3		1.4
other violent offence	14.9	14.8		14.9
drug-related	40.8	36.3		38.8
break and enter	2.9	3.5		3.2
other property	10.0	12.9		11.3
other non-violent offence	2.9	2.7		2.8
Security level at release (%)			4.39 (2)	
minimum	56.5	62.6		59.2
medium	36.4	33.9		35.2
maximum	7.1	3.5		5.5
% recidivating within two years	27.8	23.8	1.17 (1)	26.0
Average time to recidivate[d] in days (sd)	361.5 (221.7)	355.5 (219.9)	0.16 (145)	359.0 (220.2)

[a]For the construction sample, education level was quantified at time of manual file review; for the validation sample, education was extracted from the offender management system database. [b]Determinate sentences are of a specified length, as opposed to indeterminate sentences. [c]Calculated for women with determinate sentences (construction sample, n=301; validation sample, n=252). [d]Calculated for women who recidivated within two years of release (construction sample, n=86 ; validation sample, n=61).
*p<0.05. **p<0.01. ***p<0.001.

Procedure and Data Sources

Defining recidivism and the follow-up period

Previous research has established that the manner in which recidivism is defined can substantially impact the estimated rates of recidivism (Gobeil & Barrett, 2007). In this study, recidivism is defined as any conviction for a new offence occurring within two years of release. Since previous research involving women offenders has found that the majority who recidivate do so within the first two years (80%) (Putkonen, Komulainen, Virkkunen, Eronen & Lönnqvist, 2003), our follow-up period was considered appropriate for capturing the majority of temporally relevant new convictions.

Identifying potential predictors of recidivism

To develop a candidate pool of predictor variables, relevant bibliographic databases (SocINDEX, PsycArticles, Psychology and Behavioral Sciences Collection, and Medline) were searched for recently published reviews and original research focusing on predicting criminal recidivism in adult incarcerated women. This was augmented with grey literature web searches and consultations with CSC departments specializing in women and Aboriginal offenders, and community reintegration.

Data sources

Three data sources were utilized to gather relevant predictor information on the women offenders: CSC's Offender Management System, standardized manual file review, and the Canadian Police Information Centre System. Appendix A provides a summary of the information obtained from each data source.

Standardized manual file review

To ensure the reliability of data captured through manual file review, a random sub-sample of 10% of offenders in the construction sample had their files independently reviewed by a second reviewer. Inter-rater agreement was quantified using the kappa statistic (Maclure & Willet, 1987) for categorical data and the intra-class correlation coefficient (ICC(2,1)) (Shrout & Fleiss, 1979) for continuous data. If a kappa or ICC was less than 0.65, the information was considered unreliable and the variable was dropped from further consideration. A Kappa of 0.65 is considered substantial agreement (Landis & Koch, 1977) while an ICC of 0.65 is considered

good agreement (Fleiss, 1981).

Data quality evaluation

The distribution of each candidate variable was reviewed to identify and correct invalid values and to identify potential missing data issues. For the construction sample, cross-tabulations between the categorical variables and recidivism were also examined to identify zero cell counts. Variables with zero cells were collapsed in a meaningful way to eliminate the zero cell and avoid compromising the modeling process (Hosmer & Lemeshow, 2000, p. 93).

Identifying candidate predictors while minimizing the impact of missing data in the construction sample

The statistical relationship between each of the predictor variables and recidivism was examined using univariate logistic regression. Those predictors significantly associated with recidivism at an alpha level of 0.05 (119 variables in total) and containing information for at least 90% of the sample (109 variables in total) were retained as candidate predictors of recidivism. Seven of the 10 variables dropped from the data set due to missing data were moderately to strongly ($0.51 \leq | r_{spearman} | \leq 0.86$) correlated with more complete variables capturing similar information.

To further minimize the impact of missing data, for variables with 5% or less missing data (12 in total), the mean of the distribution was imputed for missing values (Tabachnick & Fidell, 2007, p.71). For all 12 of these variables, women missing the data were no more likely to recidivate than women with complete data ($p > 0.05$).

After the above steps were taken, one final missing data pattern was identified which excluded 16 women (about 5% of the sample) from potentially contributing to scale development. All sixteen of these women were missing data on two variables: family violence program completion and substance abuse program completion. Since missing data in these variables was not associated with recidivism and these two variables were correlated with other more complete variables capturing similar information ($0.51 \leq | r_{spearman} | \leq 0.77$), the two variables were not further considered.

After addressing missing data issues, 264 (85%) of the 309 women had complete data for the 107 remaining predictor variables. Table 2 indicates that women excluded from the scale development process did not significantly differ from those included with respect to

sociodemographic and offence characteristics, and the tendency to recidivate. They were, however, less likely to be serving determinate sentences [87% vs. 99%, χ^2 (n = 309, df = 1) = 24.11, $p < 0.001$], more likely to be classified at higher security levels [16% vs. 6% in maximum security, χ^2 (n = 308, df = 2) = 13.38, $p < 0.01$], and serving longer sentences, on average [4.0 vs. 3.1 years, t(df = 299) = 2.82, $p < 0.01$], than women included in the scale development process.

Table 2
A Comparison of Canadian Federal Women Offenders Included and Excluded from Model Development

	Included in Model n = 264	Excluded from Model n = 45	T (df) or χ^2 (df)
Average age at admission, years (sd)	32.4 (9.1)	30.5 (8.1)	1.35 (307)
% married	37.5	37.8	0.00 (1)
% completed highschool	33.2	32.6	0.01 (1)
% self-identifying as Aboriginal	23.9	26.7	0.16 (1)
% with determinate sentence[a]	99.2	86.7	24.11 (1)***
Average sentence length[b], years (sd)	3.1 (1.7)	4.0 (2.3)	2.82 (299)**
Most serious offence of current sentence (%)			p = 0.1031[c]
homicide-related	9.5	17.8	
robbery	15.5	26.7	
sex-related	0.8	0.0	
other violent offence	15.2	13.3	
drug-related	43.2	26.7	
break and enter	3.0	2.2	
other property	10.6	6.7	
other non-violent offence	2.3	6.7	
Security level at release (%)			13.38 (2)**
minimum	60.5	33.3	
medium	33.8	51.1	
maximum	5.7	15.6	
% recidivating within two years	29.2	20.0	1.61 (1)
Average time to recidivate[d] in days (sd)	367.3 (219.8)	311.6 (244.9)	0.71 (84)

[a]Determinate sentences are of a specified length, as opposed to indeterminate sentences. [b]Calculated for women with determinate sentences (n = 262 for women included in the model; n = 39 for women excluded from the model). [c]Fisher's Exact Test was conducted because 38% of the cells had expected counts less than five. [d]Calculated for women who recidivated within two years of release (n = 77 for women included in the model; n = 9 for women excluded from the model). *p<0.05. **p<0.01. ***p<0.001.

Identifying predictors most strongly associated with recidivism in the construction sample

To identify those variables most strongly associated with recidivism, a stepwise selection logistic regression was performed using an alpha level of 0.05 to enter and remain in the model (SAS Institute Inc., 2008). Specifically, the stepwise procedure starts with the intercept only model and then computes the score chi-square statistic for each predictor. If the largest score chi-square statistic is significant at the 0.05 level, it is added to the model. The process is then repeated to identify the next predictor most strongly associated with recidivism in the presence of the previously selected predictors. Effects selected in the model, however, do not necessarily remain. With the stepwise procedure, each forward selection step can be followed by one or more backward elimination steps if previously selected variables are no longer significant at the 0.05 level. The Wald chi-square test is used to determine if a variable remains in the model.

A conservative alpha level of 0.05 ensured a parsimonious model and minimized type 1 error. Minimizing the number of variables in the model helps to ensure the resultant model is more numerically stable and more easily generalized. Put differently, "the more variables included in a model, the greater the estimated standard errors become, and the more dependent the model becomes on the observed data" (Hosmer & Lemeshow, 2000, p.92).

Once the main model was established, selected continuous predictors were examined to ensure they were linearly related to the logit of the probability of recidivism, an assumption of the logistic regression model. Briefly, the continuous variable was categorized; the widths of intervals being decided by the data distribution and interpretability of regression coefficients. The main model was then refit using the categorical variable in place of the continuous variable. The estimated regression coefficients of the categorized variable were then plotted against the interval midpoints of the categorical variable with the reference level assigned a value of 0. The plotted points were then connected to aid visual assessment of the relationship. If the relationship appeared linear, the model with the continuous predictor was tested against the model with the categorical predictor using a partial likelihood ratio test at an alpha level of 0.05. A lack of statistical significance indicated that the more parsimonious continuous variable could be retained. Otherwise, a categorized version of the continuous variable was used. This approach to examining the assumption of linearity in the logit is discussed by Hosmer and Lemeshow (2000, p. 99).

Assessing model fit

The final model was assessed for fit using the Hosmer and Lemeshow goodness of fit test (Hosmer & Lemeshow, 2000, p.151), Akaike Information and Schwartz Criteria, Nagelkerke's generalized coefficient of determination, and regression diagnostics for influential observations. The Hosmer and Lemeshow goodness of fit test examines whether the model fits the data well; a statistically significant result indicates the model is not a good fit. The Akaike Information and Schwartz Criteria are overall measures of goodness of fit that adjust for the number of predictor variables in the model and the number of observations used; the smaller their value, the better the model fit (SAS Institute Inc., 2008, p.3328). Nagelkerke's generalized coefficient of determination can achieve a maximum of one and, for our specific case, would be interpreted as the proportion of variation in recidivism explained by the model (Nagelkerke, 1991); the larger Nagelkerke's generalized coefficient of determination, the better the model fit. C and CBAR, the regression diagnostics used to identify influential observations (SAS Institute Inc., 2008, p.3349), measure the overall change in regression coefficients that result from removal of a single observation (Pregibon, 1981). Hosmer and Lemeshow (2000, p.180) state, in their experience, this statistic must be larger than one for an observation to have an effect on the estimated coefficients.

Obtaining a risk score from the model

Once the model was developed, the estimated probability of recidivating within two years of release for a particular woman was obtained using the following formula (SAS Institute Inc., 2008, p.3337):

$$\text{predicted probability} = \frac{1}{1 + e^{(-\text{linear predictor})}} \qquad \text{(Equation 1)}$$

linear predictor = the actual value obtained from the model using a woman's specific characteristics for the model's variables

e = the mathematical constant 2.71828…

Simpler alternative risk scales

Recently, Gran and Lånstrom (2007) concluded that risk scores obtained from multivariate logistic regressions or complex weighting schemes, such as Nuffield's method (Nuffield, 1982), were not superior to a non-weighted reference when attempting to predict

reconviction for a violent crime during a two year follow-up period among mentally disordered adult violent offenders. To examine the generalizeability of this finding to our context, two other risk scales were developed for comparison with the logistic regression model: the Simple Sum Scale and the Nuffield Scale. Both of these scales use the predictors selected by the stepwise logistic regression procedure but they vary in the complexity of the weights they assign to the predictors.

Simple Sum Scale

To obtain a score for an offender using the Simple Sum Scale, one merely adds the number of risk factors (i.e., factors that increase the likelihood of recidivating) the offender has and subtracts the number of protective factors (i.e., factors that decrease the likelihood of recidivating).

Nuffield Scale

When using Nuffield's (1982) approach, weights are developed for each of the values a predictor can assume based on the degree to which offenders having the value recidivate relative to the overall construction sample. For each full 5% deviation above or below the base rate (i.e., the proportion recidivating in the construction sample), a value of one is added or removed, respectively, from the overall weight assigned to the value of a predictor. For example, assume that the overall rate of recidivism among the construction sample was 30%. Further, assume that the offender's security classification prior to release was an important predictor of recidivism and that the proportion recidivating within 2 years in each of the security levels was as follows: maximum 50%, medium 30%, and minimum 22%. The weights assigned to the values of security level would be: maximum 4 [(50%-30%)/5%], medium 0 [(30%-30%)/5%], and minimum -1 [(22%-30%)/5%]. Weights are developed in this manner for each of the predictors identified by the stepwise logistic regression procedure. An offender's score is then obtained by summing the weights assigned to her particular values of the predictors.

Measures of predictive accuracy of risk scales

Two indexes were utilized to examine the predictive accuracy of the three risk scales: the area under the receiver operator characteristics curve (AUC) and the point-biseral correlation coefficient (r_{pb}). AUC is a measure of the overall performance of a risk scale and is interpreted as

the average value of sensitivity (true positives) for all possible values of specificity (true negatives). The bigger its AUC, the better the overall performance of a risk scale (Park, Goo & Jo, 2004). An AUC = 0.5 indicates accuracy equivalent to chance while an AUC = 1.0 indicates perfect predictive accuracy (Hanley & McNeil, 1982). Alternatively, the AUC can be interpreted as the probability that a randomly selected recidivist will have a higher score on the developed scale (i.e., greater risk of recidivating) than a randomly selected non-recidivist (Bewick, Cheek & Ball, 2004; Delong, Delong, & Clarke-Pearson, 1988). Sjöstedt and Grann (2002) proposed that AUC be interpreted conservatively as follows: less than 0.60, low accuracy; 0.60 to 0.70, marginal accuracy; 0.70 to 0.80, modest accuracy; 0.80 to 0.90, moderate accuracy; and, greater than 0.90, high accuracy. Statistically, the AUC of the three scales were compared using the method described by DeLong, DeLong, and Clarke-Pearson (1988) (SAS Institute Inc., 2008, p.3345). This method acknowledges the correlation between AUCs caused by using the same sample of women to produce the three receiver operating characteristic curves.

The r_{pb} is a statistic used to measure the degree of association between a dichotomous variable (i.e., recidivism) and an interval or ratio variable, such as the risk scale scores. Its properties and interpretation are similar to the Pearson product-moment correlation coefficient. Specifically, it ranges from -1 to +1 with larger absolute values indicating a stronger relationship. Put differently, r_{pb} indicates the degree to which a scale discriminates between women who do or do not recidivate; larger absolute values of r_{pb} indicate better discrimination (Howell, 2002).

Generalizability and validity of risk scales

To examine the generalizability and validity of the various risk scales, their ability to predict recidivism in the validation sample of women was examined using the AUC and r_{pb}. The estimated AUC and r_{pb} were also compared across the construction and validation samples. Shrinkage refers to the usual decrease observed in these statistics in the validation sample compared to the construction sample. Substantial shrinkage suggests the scale is not performing well in the validation sample (Kleinbaum, Kupper, Muller & Nizam, 1998).

Results

Predictors Most Strongly Associated with Recidivism

Table 3 summarizes the results of the stepwise logistic regression procedure. In the end, eight variables remained significantly associated with recidivating within two years of release from a Canadian federal institution. Although offender security level was selected at step two, by step eight it was no longer significantly associated with recidivism in the presence of the other predictors indicating that subsequently selected variables explained the relationship between offender security level and recidivism. The final variables included in the model were: previous adult convictions (5+), termination/revocation of conditional release prior to current release, average number of major institutional misconducts per year of current sentence, history of unstable employment, break and enter offence prior to current sentence, contraband charge during current sentence, assault offence prior to current sentence, and previous youth convictions (2+). Overall, the final model explained 55% of the variation in recidivism.

Table 4 presents the regression coefficients, Wald chi-squares and odds ratios for the final model as well as fit statistics (see Model 1). All selected predictors were binary except for the continuous variable average number of major institutional incidents per year for the current sentence. The following are examples of the interpretation of binary and continuous variables, respectively:

i) the odds of recividivating were 7.37 (95% CI: 3.18, 18.97) times greater among women with five or more previous adult convictions compared to women with less adult convictions; and,

ii) for each additional major institutional incident per year, the odds of recidivating increase by a factor of 1.42 (95% CI: 1.15, 1.78) or 42%.

Table 3

Summary of Stepwise Selection Logistic Regression Modeling Procedure for Predicting Recidivism among Canadian Federal Women Offenders

Step	Variable Entered (Values)	Variable Removed	Score Chi-Square to Enter (df)	Wald Chi-Square to Remove (df)	Model R^2
1	Five or more previous adult convictions (yes/no)		50.90 (1)***		0.27
2	Offender security level prior to release (maximum/medium/minimum)		27.53 (2)***		0.38
3	Previous termination or revocation of conditional release prior to current release (yes/no)		11.13 (1)***		0.43
4	Average number of major institutional incidents[a] per year for the current sentence as of date of release (continuous variable)		10.15 (1)**		0.47
5	Unstable job history (yes/no)		6.27 (1)*		0.49
6	Break and enter offence prior to current sentence (yes/no)		6.03 (1)*		0.51
7	Charged with contraband during current sentence prior to release date (yes/no)		4.75 (1)*		0.53
8		Offender security level prior to release		4.66 (2)	0.51
9	Assault offence (not causing bodily harm) prior to current sentence (yes/no)		5.57 (1)*		0.53
10	Two or more previous youth convictions (yes/no)		4.70 (1)*		0.55

Note. n = 264 (77 recidivists). [a]Major institutional incidents include: murder, murder inmate, murder staff, hostage-taking, hostage taking with sexual assault, forcible confinement with sexual assault, major disturbance, inmate fight, assault on inmate, assault on staff, assault on visitor, possession of contraband, escape from facility, walkaway, escape from Correctional Service Canada escort, failure to return from temporary absence, escape other custody, escape attempt, fire and arrest of offender.

*p<0.05. **p<0.01. ***p<0.001.

Table 4

Factors Associated with Recidivating within Two Years of Release among Canadian Federal Women Offenders in the Construction Sample

	Model 1			Model 2		
	Regression Coefficient (SE)	Wald Chi-square (df)	OR (95% CI)[a]	Regression Coefficient (SE)	Wald Chi-square (df)	OR (95% CI)
Intercept	-4.46 (0.62)	52.02 (1)***		-4.50 (0.62)	52.73 (1)***	
Five or more previous adult convictions	2.00 (0.45)	19.54 (1)***	7.37 (3.18,18.97)	1.87 (0.44)	18.05 (1)***	6.51 (2.85,16.30)
Previous termination or revocation of conditional release prior to current release	0.99 (0.46)	4.56 (1)*	2.69 (1.09,6.81)	0.95 (0.48)	3.91 (1)*	2.60 (1.01,6.80)
Average number of major institutional incidents per year for the current sentence as of date of release	0.35 (0.11)	10.09 (1)**	1.42 (1.15,1.78)	1.47 (0.40)	13.48 (1)***	4.34 (2.00,9.68)
Unstable job history	1.38 (0.52)	6.92 (1)**	3.97 (1.51,12.15)	1.39 (0.53)	6.89 (1)**	4.03 (1.52,12.57)
Break and enter offence prior to current sentence	2.09 (0.97)	4.63 (1)*	8.10 (1.42,71.45)	2.40 (0.97)	6.09 (1)*	11.01 (1.94,97.5)
Charged with contraband during current sentence prior to release date	1.31 (0.47)	7.73 (1)**	3.71 (1.49,9.62)	1.33 (0.48)	7.67 (1)**	3.76 (1.49,9.84)
Assault offence (not causing bodily harm) prior to current sentence	1.20 (0.56)	4.61 (1)*	3.33 (1.15,10.60)	1.31 (0.58)	5.15 (1)*	3.72 (1.23,12.26)
Two or more previous youth convictions	0.97 (0.45)	4.57 (1)*	2.63 (1.09,6.47)	0.89 (0.46)	3.73 (1)[b]	2.43 (0.99,6.06)
		Model Fit Statistics			Model Fit Statistics	
Overall Likelihood Ratio Test, chi-square (df)		127.77 (8)***			130.80 (8)***	
Hosmer and Lemeshow Goodness-of-Fit Test, chi-square (df)		4.24 (7)			2.25 (7)	
Nagelkerke's Adjusted R^2		0.55			0.56	
Akaike Information Criterion		208.95			205.92	
Schwarz Criterion		241.14			238.11	
Area Under the Receiver Operating Characteristic Curve		0.895			0.893	

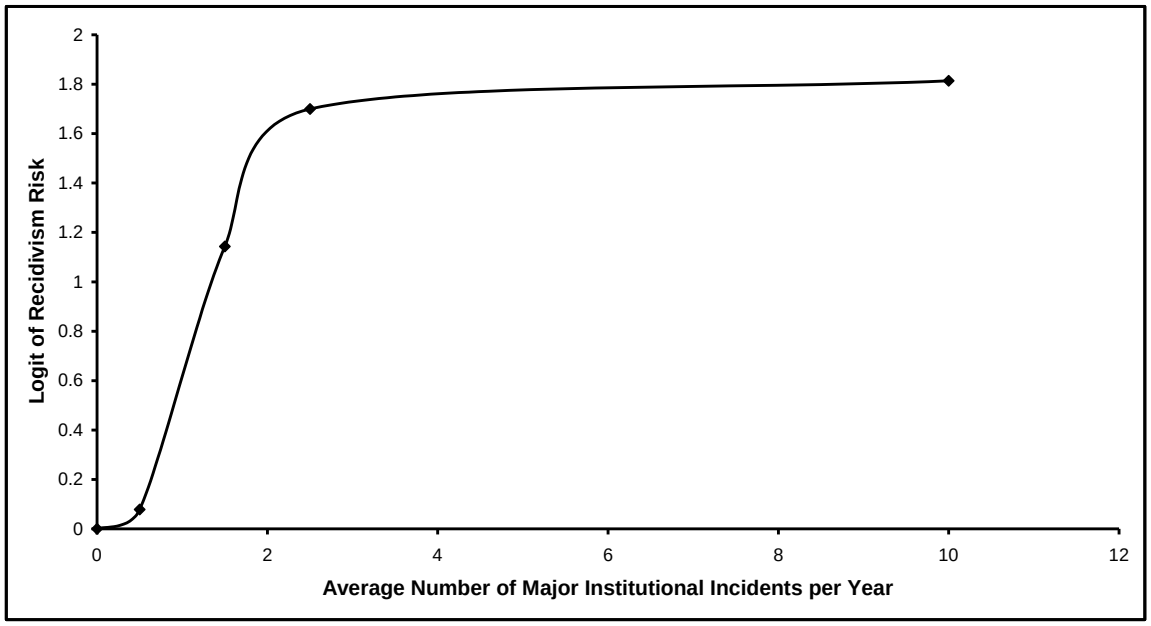
Note. Reference groups are not displayed. For all binary variables, the reference group does not possess the characteristic. In model 1, average number of major institutional incidents per year is a continuous variable; in model 2, it is a binary variable with greater than one incident per year being compared to one or less (i.e., the reference group). n = 264 (77 recidivists).

[a]Odds ratio and 95% profile likelihood confidence interval. [b]p = 0.0533.

*p<0.05. **p<0.01. ***p<0.001.

Figure 1 indicates that the average number of major institutional incidents per year is not linearly related to the logit of recidivism risk after adjusting for the remaining predictors in the model. This indicates that average number of major institutional incidents per year should be modeled as a categorical variable. The regression coefficient for the "greater than 0 to 1" category did not significantly differ from the reference category of 0 [χ^2(n = 264, df = 1) = 0.0215, p = 0.8835], but the three remaining categories did significantly differ from the reference category. Further, the regression coefficient for the category "greater than 1 to 2" did not significantly differ from offenders in the "greater than 2 to 3" category [χ^2(n = 264, df = 1) = 0.5197, p = 0.4710]. Consequently, average number of major institutional incidents per year was modeled as a binary variable (i.e., greater than one institutional incident per year vs. one or less) (see Table 4, model 2). According to the model, the odds of recidivating were 4.34 (95% CI: 2.00, 9.68) times greater among women averaging more than one major institutional incident per year compared to women averaging one or less.

Figure 1. Logit of the Risk of Recidivism by Average Number of Major Institutional Incidents per Year for Canadian Federal Women Offenders in the Construction Sample



Note. Average number of major institutional incidents per year was categorized as follows: 0, greater than 0 to 1, greater than 1 to 2, greater than 2 to 3, and greater than 3. The adjusted regression coefficients for this categorical variable, obtained from the multivariable logistic regression model, are plotted against the midpoints of the categories.

The R^2, Akaike Information and Schwarz Criteria, and AUC all indicated that the model with average number of major institutional incidents per year categorized performed just as well as the model using a continuous form (see Table 4, model 2 vs. model 1), without making the inappropriate assumption of linearity in the logit. Regression diagnostics did not identify any influential observations for either of the models presented in Table 4.

Development of the Nuffield Scale

Once the important predictor variables and their appropriate form were established (see Table 4, Model 2), the Nuffield Scale was developed (see Table 5). The weights assigned to values of the predictor variables ranged from a low of –3 for those women with less than five previous adult convictions and with stable job histories to a high of 10 for women with a previous offence for break and enter. Overall, Nuffield Scale scores could range from a low of –10 to a high of 41.

Table 5
Development of the Nuffield Scale Using the Construction Sample

Important Predictors Identified through Modeling	Predictor Distributions (%)	Rate of Recidivism per Predictor Category (%)	Intervals of a Full 5% Above or Below the Base Recidivism Rate (27.83%)	Final Weight for the Category
Five or more previous adult convictions				
no	48.6	7.9	(7.91-27.83)/5 = -3.98	-3
yes	51.4	48.3	(48.30-27.83)/5 = 4.09	4
Previous termination or revocation of conditional release prior to current release				
no	84.1	21.9	(21.92-27.83)/5 = -1.18	-1
yes	15.9	59.2	(59.18-27.83)/5 = 6.27	6
Average number of major institutional incidents per year				
one or less	72.8	17.8	(17.78-27.83)/5 = -2.01	-2
more than one	27.2	54.8	(54.76-27.83)/5 = 5.39	5
Unstable job history				
no	32.2	9.8	(9.78-27.83)/5 = -3.61	-3
yes	67.8	37.6	(37.63-27.83)/5 = 1.96	1
Break and enter offence prior to current sentence				
no	96.4	25.8	(25.84-27.83)/5 = -0.40	0
yes	3.6	81.8	(81.82-27.83)/5 = 10.80	10
Charged with contraband during current sentence prior to release date				
no	82.2	22.8	(22.83-27.83)/5 = -1	-1
yes	17.8	50.9	(50.91-27.83)/5 = 4.62	4
Assault offence (not causing bodily harm) prior to current sentence				
no	90.6	23.6	(23.57-27.83)/5 = -0.85	0
yes	9.4	69.0	(68.97-27.83)/5 = 8.23	8
Two or more previous youth convictions				
no	82.5	24.7	(24.68-27.83)/5 = -0.63	0
yes	17.5	46.0	(46.00-27.83)/5 = 3.63	3

Note. n = 309.

Obtaining Risk Scores from the Scales

Once the three scales were developed, risk scores were generated for each woman released. As an example, risk scores will be calculated for a woman with the following characteristics:

i) less than five previous adult convictions;
ii) a previous termination or revocation of conditional release prior to the current release;
iii) one or fewer major institutional incidents per year, on average, for the current sentence;
iv) an unstable job history;
v) no break and enter offence prior to the current sentence;
vi) charged with contraband during the current sentence prior to the release date;
vii) no assault offence prior to the current sentence; and,
viii) two or more previous youth convictions.

Model-based risk score

Using the final model (see Table 4, model 2) and Equation 1, the probability of recidivating within two years of release is calculated as follows:

$$\text{Linear predictor} = -4.50 + 0 + 0.95 + 0 + 1.39 + 0 + 1.33 + 0 + 0.89$$
$$= 0.06$$

$$\text{predicted probability} = \frac{1}{1 + e^{(-0.06)}}$$
$$= 0.51$$

Nuffield Scale score

Using the Nuffield Scale (see Table 5), the woman's score would be 9 (- 3 + 6 - 2 + 1 + 0 + 4 + 0 + 3).

Simple Sum Scale score

Using the Simple Sum Scale, the woman's score would be 4 (0 + 1 + 0 + 1 + 0 + 1 + 0 + 1).

Comparing the Accuracy of Prediction across the Three Scales in the Construction Sample

Table 6 presents the basic distributional characteristics of the three scales and measures of predictive accuracy for the construction sample. The r_{pb} and AUC were very similar across all three scales and indicated moderate predictive accuracy. The ability of the scales to discriminate recidivists from non-recidivists is visually reinforced when the score distributions are compared between these two groups (see Figures 2 to 4, left panels).

Table 6
A Comparison of Three Scales for Predicting Recidivism among Canadian Federal Women Offenders in the Construction Sample

Statistic	Model	Nuffield Scale	Simple Sum Scale
Possible range	0.00 to 1.00	-10 to 41	0 to 8
Mean (sd)	0.29 (0.30)	1.56 (9.56)	2.05 (1.55)
Percentiles (%)			
0	0.01	-10	0
25	0.04	-6	1
50	0.18	1	2
75	0.49	8	3
100	1.00	31	6
r_{pb}[a]	0.68	0.65	0.64
AUC[b] (95% CI)	0.893 (0.850, 0.936)	0.884 (0.839, 0.929)	0.883 (0.840, 0.927)

Note. The overall test for differences between the model AUC and the two simpler scales' AUC was not statistically significant [χ^2(n=264, df=2) = 4.47, p = 0.1069]. n = 264. CI = confidence interval.
[a]Point-biserial correlation coefficient. [b]Area under the receiver operating characteristic curve.

Figure 2. Histogram of Model Scores by Release Outcome for the Construction and Validation Samples of Canadian Federal Women Offenders

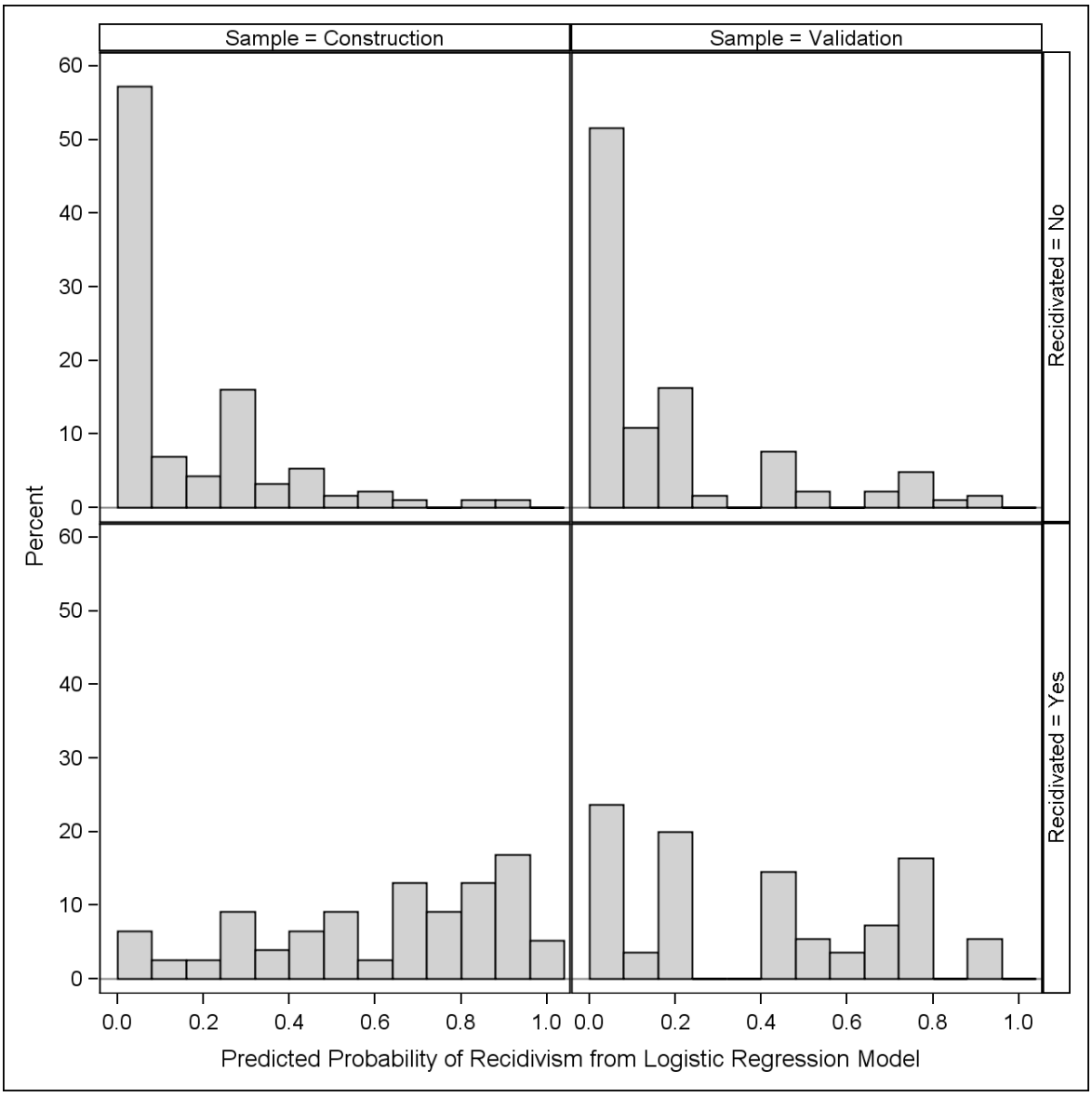


Figure 3. Histogram of Nuffield Scale Scores by Release Outcome for the Construction and Validation Samples of Canadian Federal Women Offenders

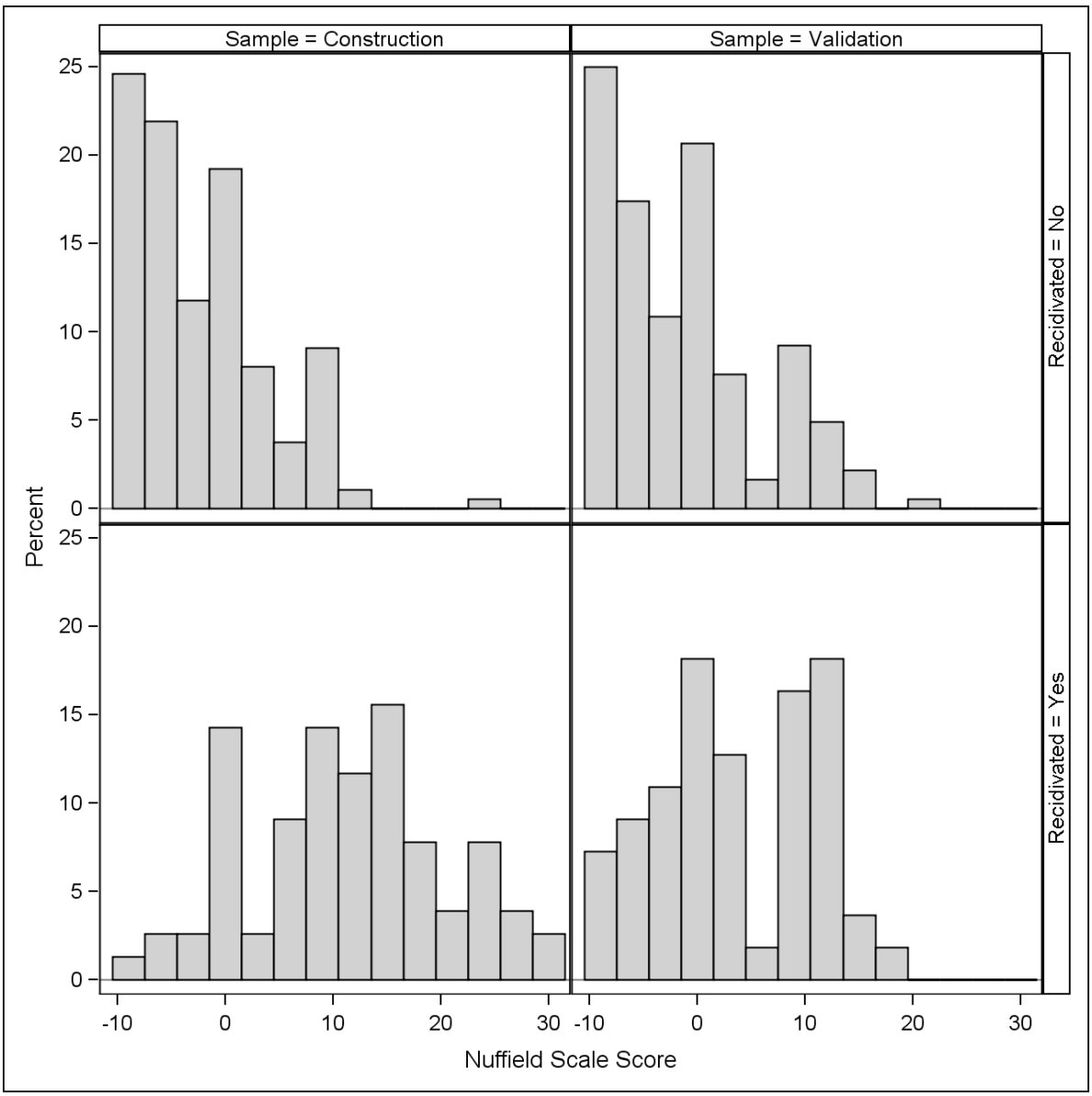
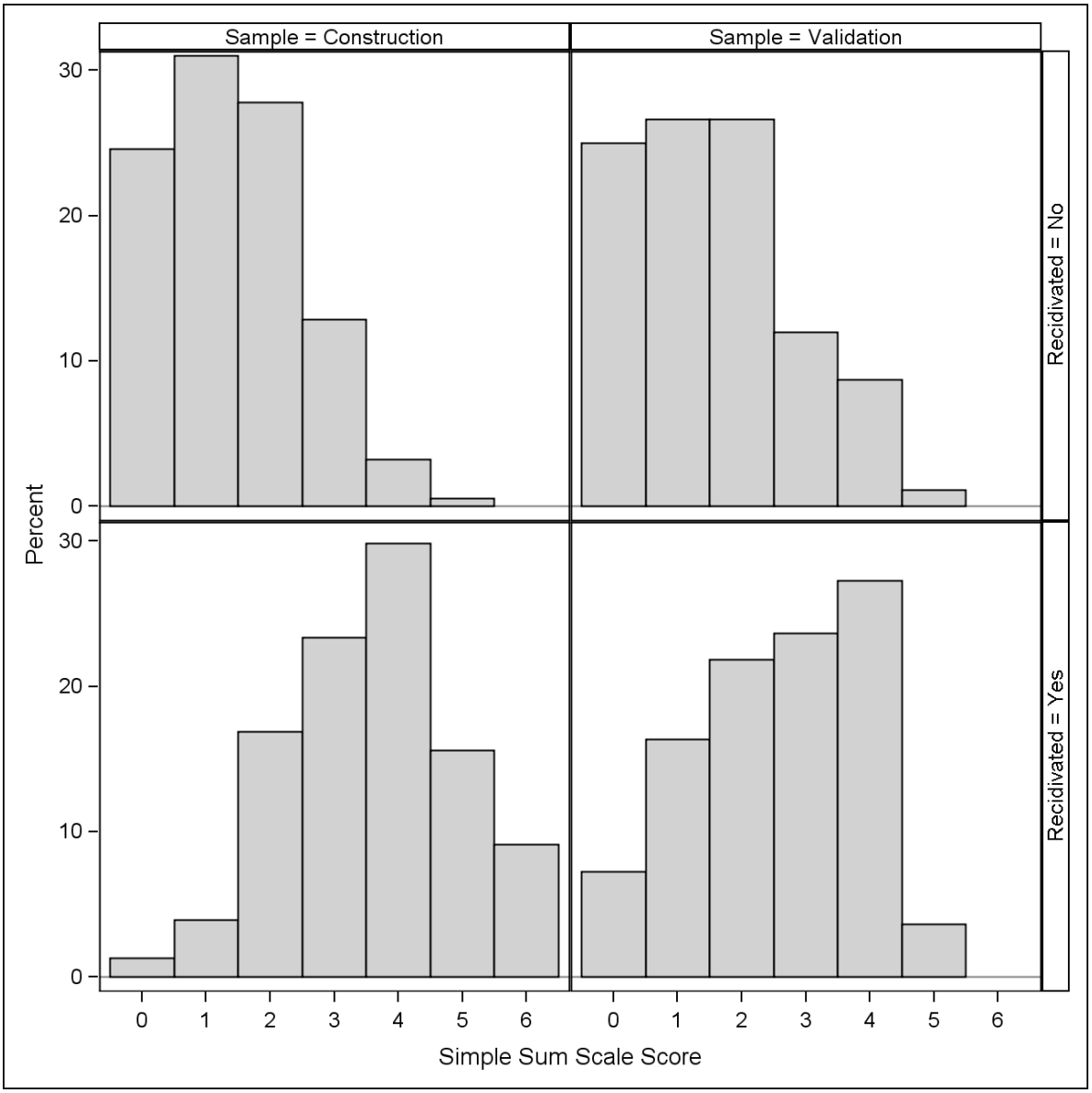


Figure 4. Histogram of Simple Sum Scale Scores by Release Outcome for the Construction and Validation Samples of Canadian Federal Women Offenders



The AUC for the model (0.893) did not significantly differ from the AUC for the Nuffield Scale (0.884) or Simple Sum Scale (0.883) [χ^2(n = 264, df = 2) = 4.47, p = 0.1069] (see Figure 5). Further, all three scale scores were highly correlated with Pearson product-moment correlation coefficients of 0.93 or greater and Spearman rank-order correlations of 0.97 or greater (see Table 7). The findings suggested that the Simple Sum scale, the simplest and most user friendly of the three scales, would be adequate for predicting recidivism.

Figure 5. Receiver Operating Characteristic Curves for the Model, Nuffield, and Simple Sum Scales for the Construction Sample of Canadian Federal Women Offenders

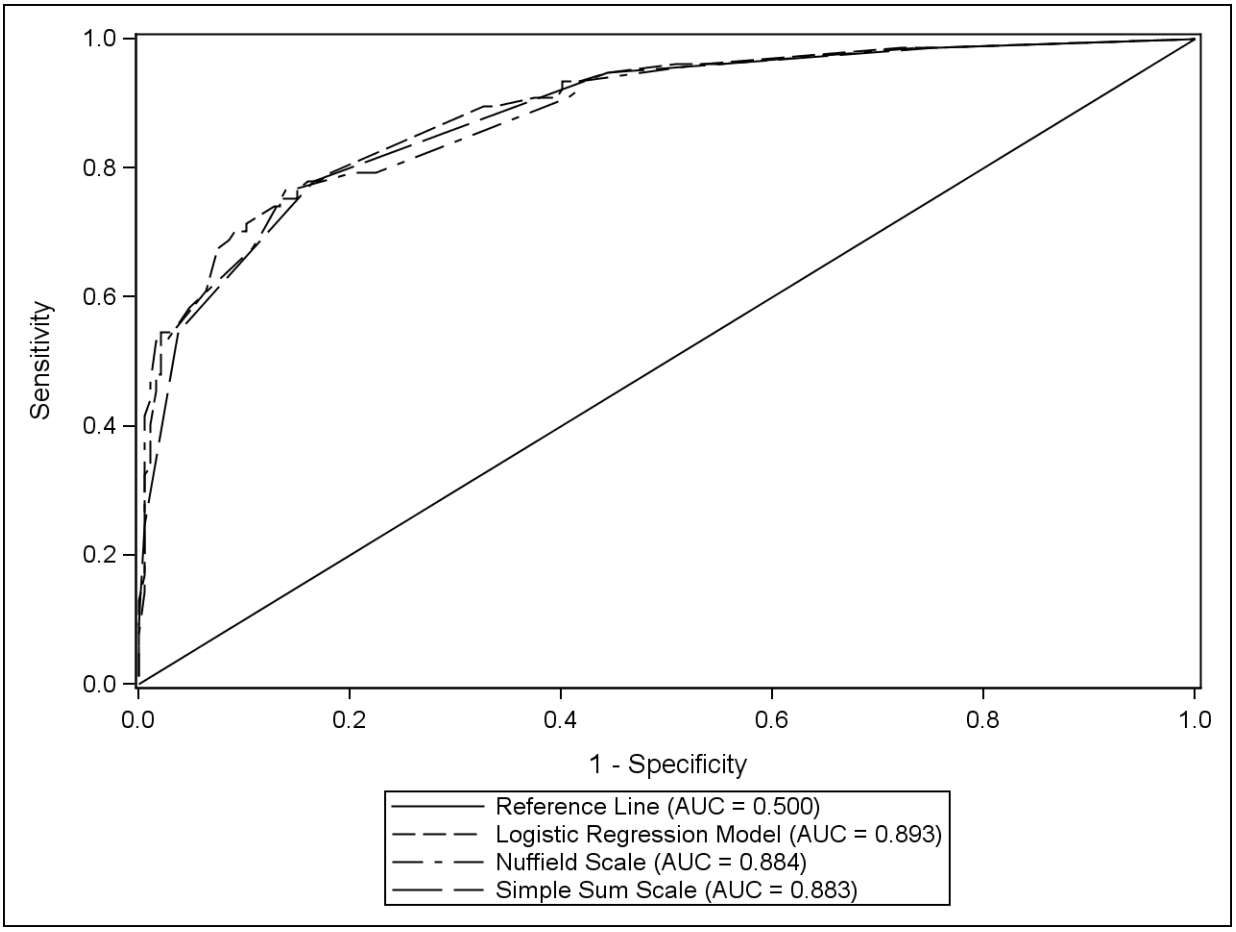


Table 7
Correlations among the Three Scales for Predicting Recidivism in Canadian Federal Women Offenders in the Construction Sample

Pearson Product-Moment Correlation Coefficients			
	Model	Nuffield Scale	Simple Sum Scale
Model	1.00		
Nuffield Scale	0.94	1.00	
Simple Sum Scale	0.93	0.98	1.00
Spearman Rank-Order Correlation Coefficients			
Model	1.00		
Nuffield Scale	0.97	1.00	
Simple Sum Scale	0.97	0.98	1.00

Note. n=264.

Comparing the Accuracy of Prediction across the Three Scales in the Validation Sample

Table 8 presents the basic distributional characteristics of the three scales and measures of predictive accuracy for the validation sample. The r_{pb} and AUC were very similar across all three scales and indicated modest predictive accuracy. The ability of the scales to discriminate recidivists from non-recidivists is visually presented by the comparisons of the score distributions for the two groups (see Figures 2 to 4, right panels).

Table 8

A Comparison of Three Scales for Predicting Recidivism among Canadian Federal Women Offenders in the Validation and Construction Samples

Statistic	Model	Nuffield Scale	Simple Sum Scale
Possible range	0.00 to 1.00	-10 to 41	0 to 8
Mean (sd) Validation	0.23 (0.26)	-0.40 (7.59)	1.79 (1.36)
Mean (sd) Construction	0.29 (0.30)	1.56 (9.56)	2.05 (1.55)
Percentiles (%)			
0	0.01	-10	0
25	0.04	-6	1
50	0.14	-1	2
75	0.41	4	3
100	0.93	20	5
r_{pb}[a] Validation	0.33	0.29	0.32
r_{pb}[a] Construction	0.68	0.65	0.64
AUC[b] (95% CI) Validation	0.717 (0.641,0.794)	0.699 (0.621, 0.777)	0.707 (0.630, 0.784)
AUC[b] (95% CI) Construction	0.893 (0.850,0.936)	0.884 (0.839, 0.929)	0.883 (0.840, 0.927)

Note. The overall test for differences between the Model AUC and the two simpler scales' AUC was statistically significant [χ^2(n=239, df=2) = 7.85, p = 0.0197]. Pairwise comparisons indicated that the Model AUC was significantly greater than the Nuffield Scale AUC [difference = 0.0182, SE = 0.00651, χ^2(n=239, df=1) = 7.83, p = 0.0051] but not the Simple Sum Scale AUC [difference = 0.0105, SE = 0.00874, χ^2(n=239,df=1) = 1.44, p = 0.2306]. n = 239. CI = confidence interval. [a]Point-biserial correlation coefficient. [b]Area under the receiver operating characteristic curve.

The AUC for the model (0.717) did significantly differ from the AUC for the Nuffield Scale (0.699) and/or Simple Sum Scale (0.707) [χ^2(n = 239, df = 2) = 7.85, p = 0.0197] (see Figure 6). Pairwise comparisons indicated that the Model AUC was significantly greater than the

Nuffield Scale AUC [difference = 0.0182, SE = 0.00651, χ^2(n=239, df=1) = 7.83, p = 0.0051] but not the Simple Sum Scale AUC [difference = 0.0105, SE = 0.00874, χ^2(n=239, df=1) = 1.44, p = 0.2306]. All three scale scores were highly correlated with Pearson product-moment correlation coefficients of 0.94 or greater and Spearman rank-order correlations of 0.98 or greater (see Table 9).

Figure 6. Receiver Operating Characteristic Curves for the Model, Nuffield, and Simple Sum Scales for the Validation Sample of Canadian Federal Women Offenders

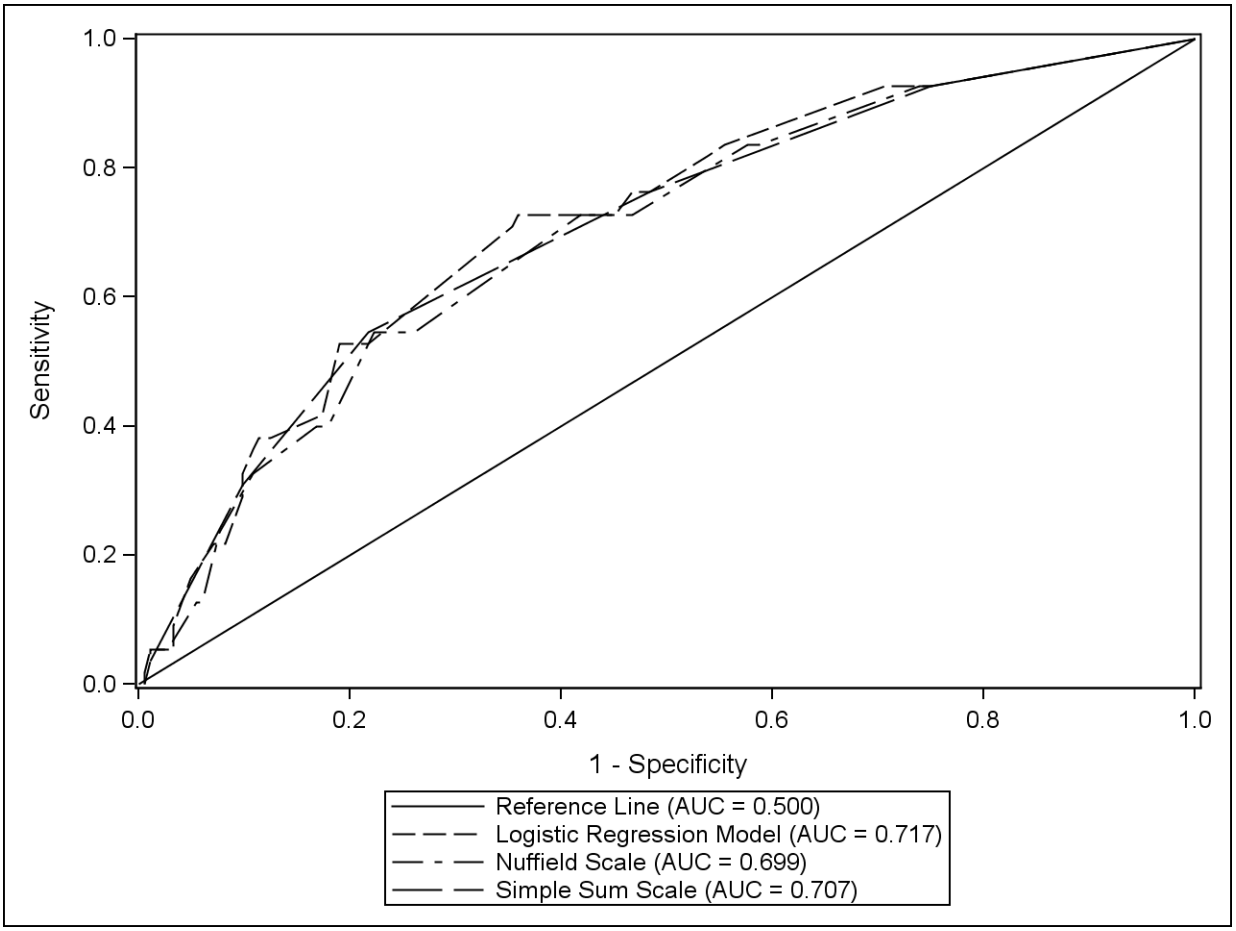


Table 9
Correlations among the Three Scales for Predicting Recidivism in Canadian Federal Women Offenders in the Validation Sample

Pearson Product-Moment Correlation Coefficients			
	Model	Nuffield Scale	Simple Sum Scale
Model	1.00		
Nuffield Scale	0.94	1.00	
Simple Sum Scale	0.94	0.98	1.00
Spearman Rank-Order Correlation Coefficients			
Model	1.00		
Nuffield Scale	0.98	1.00	
Simple Sum Scale	0.98	0.98	1.00

Note. n = 239.

Comparing the Accuracy of Prediction across the Construction and Validation Samples

For all three scales, shrinkage was substantial for both the r_{pb} and AUC (compare Tables 6 and 8). This indicates that the predictive accuracy of the scales substantially declined in the validation sample. Specifically, the AUC declined from 0.893 to 0.717 for the Model, from 0.884 to 0.699 for the Nuffield Scale, and from 0.883 to 0.707 for the Simple Sum Scale. This can also be seen by comparing the left and right panels in Figures 2 to 4. For all three scales, the distribution of scale scores for non-recidivists and recidivists are less distinguishable among the validation sample compared to the construction sample.

To gain insight into the decline in predictive accuracy, the bivariate relationships between the selected predictors and recidivism were examined in the validation sample (see Table 10). Only three of the eight predictors remained significantly associated with recidivism in the validation sample: five or more previous adult convictions; unstable job history; and, two or more previous youth convictions.

Table 10

Results of Univariate Logistic Regressions of Recidivism on Selected Predictors for the Construction and Validation Samples of Canadian Federal Women Offenders

	Construction Sample *n* = 309			Validation Sample *n* = 256		
Variables Identified as Important Predictors of Recidivism using the Construction Sample	p-value	AUC	R^2	p-value	AUC	R^2
Five or more previous adult convictions (yes vs. no)	<0.0001	0.747	0.2799	<0.0001	0.654	0.1021
Previous termination or revocation of conditional release prior to current release (yes vs. no)	<0.0001	0.624	0.1151	0.2314	0.536	0.0084
Average number of major institutional incidents per year for the current sentence as of date of release (more than one vs. one or less)	<0.0001	0.682	0.1717	0.1896	0.530	0.0100
Unstable job history (yes vs. no)	<0.0001	0.649	0.1284	<0.0001	0.649	0.1098
Break and enter offence prior to current sentence (yes vs. no)	0.0001	0.548	0.0661	0.4185	0.509	0.0038
Charged with contraband during current sentence prior to release date (yes vs. no)	<0.0001	0.602	0.0741	0.2174	0.535	0.0089
Assault offence (not causing bodily harm) prior to current sentence (yes vs. no)	<0.0001	0.596	0.1066	0.8361	0.502	0.0003
Two or more previous youth convictions (yes vs. no)	0.0034	0.576	0.0426	0.0002	0.620	0.0857
Model AUC		0.893			0.717	

Note. AUC = area under the receiver operating characteristic curve.

Discussion

The goal of the current study was to develop a gender-informed and dynamic assessment measure that could be used to predict risk of re-offending in federal women offenders. While previous research has attempted to validate already existing, gender-neutral measures (e.g., Brews, 2009; Smith, Cullen & Latessa, 2009), or supplement these measures with ad-hoc gender-responsive indices (e.g., Van Voorhis et al., 2010), the current study aimed to develop a risk assessment protocol specific to women from the ground up.

Appropriate risk and need assessment tools can be used for a variety of purposes with correctional populations (Morash, 2009). First, these assessments can be administered at intake to predict institutional adjustment, such as risk to commit institutional misconduct. Second, dynamic risk predictors can also be used at intake to identify current needs and assign offenders to appropriate levels of treatment and intervention throughout their incarceration. Unlike static risk assessment tools that predict risk based on immutable variables thereby assigning a permanent level of risk, dynamic risk assessment tools predict an offender's level of risk based on factors that are amenable to change and can thereby reflect progress an offender has made through programming and interventions. Notably, third- and fourth-wave risk assessment measures support the inclusion of dynamic risk factors to bolster the predictive accuracy of purely static measures (e.g., Andrews & Bonta, 2006; Bonta & Andrews, 2007; Brown et al., 2009). A third and final purpose can be to re-administer dynamic risk scales prior to release or while in the community to reassess risk in order to reflect the progress an offender has made during her sentence.

It was anticipated that the current research would be used to develop a scale that could be administered prior to a woman's release to inform and guide appropriate release-planning and community reintegration strategies. It was also anticipated that, due to its intended dynamic nature, the scale could be re-administered once a woman was on release in order to monitor her progress while in the community and re-assess her level of risk.

Although these were the primary goals of the current study, results revealed that none of the variables that contributed to the final model were dynamic in the traditional sense. Of the variables that made up the model, five were related to criminal history, one was related to offender background and two were related to events that could occur while incarcerated on the

current sentence. Despite collecting data on a number of dynamic variables (e.g., self-esteem, associates with criminal peers, motivation, drug/alcohol use), none of these variables significantly contributed to increasing the predictive accuracy of the final model.

An additional goal of this study was to develop a risk assessment scale that was gender-responsive and reflective of women's unique needs. For this purpose, data were collected on a number of variables and characteristics that previous research has found to be specific to women offenders (e.g., Blanchette & Brown, 2006; Bloom, Owen, & Covington, 2003). While traditionally gender-informed factors such as histories of abuse and trauma, mental health, substance abuse, parenting responsibilities and self-esteem were collected for the construction sample, none of these factors were found to increase the predictive accuracy provided by the more gender-neutral variables (e.g., criminal history, employment).These outcomes are similar to other research which has examined gender-specific and gender-neutral risk factors and revealed that gender-specific variables do not add predictive accuracy to measures considered to be gender-neutral. Rettinger and Andrews (2010) examined the Level of Service/Case Management Inventory (LS/CMI; Andrews, Bonta & Wormith, 2004), a revised version of the LSI-R that includes eight scales related to risk and need (e.g., criminal history, leisure/recreation, substance abuse). Their findings revealed that while this measure did not enhance the ability to predict risk in women offenders, it may be more imperative to consider gender-specific factors as responsivity issues than indicators of risk (Rettinger & Andrews, 2010).

The current research provides additional support that gender-informed factors may not increase traditional criminogenic need/risk scales' ability to predict risk for re-offending in women offenders (e.g., Dowden & Andrews, 1999; Heilbrun, Dematteo, Fretz, Erickson, Yasuhara, Anumba, 2008; Rettinger & Andrews, 2010). With this we are in no way suggesting that gender differences in offender populations are irrelevant. On the contrary, there is ample research which demonstrates the importance of considering how gender-salient factors impact women's criminal behavior, incarceration and rehabilitation (e.g., Blanchette & Brown, 2006; Bloom, Owen & Covington, 2003); however, the current research may demonstrate that gender-specific factors should be considered as responsivity issues and targeted through correctional interventions, rather than being seen as indicators predictive of risk to recidivate.

Other researchers (e.g., Baird, 2009; Davidson, 2009) have raised similar arguments that, for the purposes of assessment and identification within offender populations, it is important to

distinguish between those measures that assess level of risk (i.e., risk to reoffend) and those that assess criminogenic needs (i.e., areas in need of intervention). It is likely that variables used in scales designed to predict risk of recidivating are different than those variables used to assess criminogenic needs and assign offenders to appropriate programs and interventions. Therefore, when developing gender-informed assessment measures, it is important to make the distinction between these two goals (i.e., risk and need) in order to ensure the appropriate use and inclusion of static and dynamic variables. As was found in the current study, static factors are greater contributors to the prediction of recidivism, while criminogenic needs are less predictive.

Despite the lack of dynamic variables in the final scale, it is important to acknowledge that the scale is still gender-informed. Given the scale was developed with a cohort of released female offenders, and further given that the specific variables selected for consideration in the analyses were variables based on constructs reported to be gender-specific in the literature, the resultant model can be classified as gender-informed. Superficially, however, one may argue that the variables are not gender-specific given that they might be predictive of re-offending in male offenders as well.

Despite our efforts, the current study did not result in the anticipated outcome of a dynamic risk scale specific to women offenders. Nonetheless, this research, as is any research in the area of gender-informed risk assessment, is important and adds to our understanding of women's risk for recidivism. Continued research in this area will help guide future attempts to develop assessment measures (be that for risk or need) specific to women offender populations.

Limitations

While the current study is a first attempt at developing a dynamic, gender-informed risk tool from the ground-up, ultimately the goal of creating a dynamic scale was not achieved; however, the tool is gender-informed. This could be due to the methodological limitations that occurred in this study; these limitations will now be discussed.

First, the nature of the data was limited by its source (i.e., OMS). While many variables could be automatically downloaded from the system, this method could not be used to accurately capture those variables typically considered to be the most gender-informed and dynamic (e.g., child and adulthood abuse, depression, family support and contact). As a result, these variables had to be manually extracted from offender files by a team of coders. While coding from documentation on the Offender Management System, it was noted that data could be retrieved

from different sources (e.g., program files, progress reports) and that information was often incongruent or ambiguous across sources. Unfortunately, due to poor inter-rater reliability, a number of these variables were dropped from all subsequent analyses and were not considered for the logistic regression model. As examples, self-esteem, involvement with a criminal partner and maintaining contact with partner/family were not included in higher level analyses. Therefore, it is possible that gender-specific variables that could be predictive of women's risk and that could have potentially increased the accuracy of an assessment measure were excluded from analyses due to the reliability of the method of data extraction.

Given these challenges, future research would benefit from developing a more extensive means for the ongoing and systematic collection of dynamic variables. For many of the constructs or dynamic variables, the inconsistencies in availability and the manner in which they were coded could have resulted in the measured variables being insensitive to change (i.e. too simplistic) and therefore not predictive of outcomes. This limitation may be minimized by developing a more rigorous coding process and manual which ensures that each variable is properly operationalized prior to data collection. This would increase the likelihood of the reliability and agreement of constructs and result in more consistent data.

Further to these data collection issues, another concern in this study is the reliance on archival data in order to devise the risk assessment measure. Another factor that may have contributed to the lack of reliability found within this study may have been the source from which the information was coded. Despite the OMS being a reliable database, there are weaknesses with respect to its comprehensiveness, and this may especially be the case with respect to variables that are more relevant for a subsample of the offender population (i.e. women, e.g. parenting). One possible solution to this concern could be to devise a gender-specific questionnaire based on known gender-responsive factors and include this questionnaire as part of an intake assessment process for women offenders. Collecting this detailed information may ensure that each of the related constructs is addressed and that relevant and reliable data are available for future examinations of risk. For example, if future research continues to attempt to create a gender-informed risk assessment scale, there may be value in conducting these types of interviews in order to collect data and information directly from the women offenders. Interviews with women discussing a number of gender-informed areas would minimize relying on data that comes from a second source (i.e., offender files). In relying on

second source data, discrepancy can occur in a number of ways: files will vary depending on the offender and on the staff writing the file; and, interpretation of files will vary depending on the individual coding during the manual review process. Conducting interviews with women could bypass the need to draw from secondary data sources, avoid discrepant data collection, and contribute more direct and less conflicting data to the research study. The development of a research agenda focusing on more extensive and systematic data collection, specifically with a focus on dynamic variables, should be considered in order to improve CSC's ability to capture change due to treatment and better understand the true contributions of gender-specific and dynamic variables.

A second area of limitation within the current study was the relatively limited sample size for both the construction and validation samples. The samples were substantial enough to permit statistical analyses; however, in terms of scale development, it is ideal to have a relatively large sample that is representative of the population of interest. Despite samples which were composed of complete one-year release cohorts (i.e., all federal women offenders released in a given year) and are therefore relatively representative of the women offender population, the current sample sizes are small in terms of what should be considered for the development of a scale. Future studies could benefit from expanding the time frame to ensure that a larger sample size of women offenders is considered.

Next Steps

The intended purpose of this research was to develop a scale that could inform release decision-making processes and monitor risk levels while under community supervision. The original methodology did not propose that the scale would be utilized to inform or direct correctional intervention; presumably, this purpose would require a more extensive examination of criminogenic needs or dynamic factors. Given the absence of dynamic variables, this scale could not be used to monitor the progress an offender makes while under community supervision. Given the substantial decline in scale performance in the validation sample and the aforementioned limitations, we propose two future research initiatives that could be considered as next steps to this research: validating an already existing measure; and, a more elaborate, long-term research framework to build upon the outcomes of this study.

As an interim measure, the validity of existing gender neutral scales could be evaluated for use with Canadian federal women offenders. That is, until a valid and reliable risk assessment

protocol is developed and implemented for women offenders, there could be value in validating gender-neutral tools in order to assist with identifying women's risk or needs. The Operational Research Division of the Research Branch is planning to revalidate the Statistical Information on Recidivism Scale (SIR-R1) with male offenders and examine its predictive validity with women and Aboriginal offenders.

Finally, future initiatives could consider additional, improved data sources in order to collect variables and information that accurately reflect the dynamic and gender-informed needs of women offenders. Doing so would address the above noted limitations of the current study and could be beneficial in more accurately defining variables. Such an initiative may contribute to decreasing the discrepancy that occurred in the manual file review process and thereby increasing the number of gender-informed and dynamic variables included in the creation of the model.

Conclusions

The findings of this study suggest that further research is necessary in order to create a gender-informed dynamic risk scale. The current measure, although gender-informed, is static in nature and is not necessarily considered traditionally gender-specific. As discussed previously, when developing appropriate assessment measures for women offenders, future research endeavors would benefit from further distinguishing the unique contributions of *criminal history risk* and *criminogenic needs* to re-offending for women. Developing unique tools with these goals in mind may produce results that are more gender-specific and suitable for use with women offender populations. Based on evidence from the current study, it may be more appropriate to utilize a static tool when assessing risk, while we continue with further efforts to develop a tool which assess dynamic factors. Currently, CSC has not implemented a static or dynamic risk assessment measure designed specifically for women offenders. Therefore, while a static risk measure may not be ideal for women, the interim implementation of such a tool to assess women's risk for recidivism may be of benefit to the Service.

Unfortunately, there were a number of challenges and limitations that impacted the outcomes of this study (e.g., poor inter-rater reliability, small sample sizes). Additional research should be conducted addressing these challenges in attempts to increase the likelihood of developing a valid and reliable scale. While the current research contributed somewhat to increasing our understanding of women and risk assessment, given that the model produced was

neither dynamic nor gender-responsive, future research initiatives should be undertaken that continue to explore the influence of gender-responsive and dynamic variables on women's recidivism.

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Appendices

Appendix A: Data Sources Used and Information Captured for the Construction Sample

Correctional Service Canada's Offender Management System

Demographics

Date of birth
Age at admission
Ethnicity
Marital status

Offender Characteristics at Admission

Offender motivation
Reintegration potential
Overall need
Overall risk
Substance abuse history and treatment (alcohol and drugs)
Mental health (diagnoses and treatment)
Suicide intentions or plan
Employment
Marital/family background
Social interactions (e.g., criminal acquaintances, substance abusers, gang affiliation)
Community functioning (e.g., finances, accommodation, leisure activities)
Cognition (e.g., poor problem solving, unrealistic goal setting, impulsive, inflexible)
Behaviour (e.g., aggressive, poor time management, gambling problem, manipulative)
Sexual behaviour (e.g., inappropriate sexual preferences, problematic sexual attitudes)
Attitude (e.g., towards justice system, community, substance abuse, property, violence)
Number of previous youth convictions
Number of previous adult convictions
Previous violent offences

Current Sentence Characteristics

Sentence length
Sentence type (specified length vs. indeterminate)
Types and counts of offences (e.g., homicide, sexual, robbery, drugs, break and enter)
Security classification recommendation (incorporates escape history, institutional adjustment, and security risk)
Actual offender security level
Urinalysis (positive tests and refusals)
Institutional charges (alcohol, drugs, contraband)
Involvement in major and minor institutional incidents (as victim, associate or perpetrator)
Number of times in segregation
Program participation (e.g., violence, education, substance abuse, living skills, employment)
Conditional releases
Private family visits

Correctional Service Canada's Offender Management System (continued…)

Previous Criminal History

Age at admission for first federal sentence
Number of previous federal sentences
Aggregate sentence length for all federal sentences
Aggregated length of federal time served over offender's lifetime
Previous offence types
Previous revocation of conditional release from federal institution

Standardized Manual File Review

Sociodemographics

Age at first offence
Homelessness or temporary shelter during year prior to incarceration†
Highest level of education attained
Prosocial lifestyle prior to incarceration

Offence History

Presence of co-accused for current sentence
Expresses remorse†
Accepts responsibility for offence†
Offence committed to support self financially
Offence committed to support an addiction
Offence committed under influence of alcohol
Offence committed under influence of drugs
Offence committed under community supervision
Pattern of offending (frequency/severity) †

Marital/Family Background

Criminally involved partner†
Degree of partner support†
Degree of family support
Maintains regular contact with partner†
Maintains regular contact with family†
Number of children
Number of dependent children
Maintains regular contact with children
Lost/relinquished custody of children during current sentence
Significant child custody issues during current sentence
Offender's feeling about child's current custody situation†
Offender raised by someone other than her birth family†
Offender was adopted†
Offender was involved in the foster care system†
Offender was raised for a significant period in a group home/youth facility†

Standardized Manual File Review (continued…)

Abuse, Neglect, and Family Violence

Offender abused in childhood (physically, sexually, emotionally†, or neglected†)
Offender abused in adulthood (physically, sexually, emotionally)
Witnessed abuse/assault in home while growing up
Offender isolated/controlled by partner in adulthood
Involved with romantic partner immediately prior to index offence
Perpetrator of abuse in this romantic relationship (e.g., physical, sexual, emotional)
Victim of abuse in this romantic relationship (e.g., physical, sexual, emotional)

Attitudes

Cooperative (e.g., with staff) †
Compliance with institutional rules and regulations†
Effective and responsible interaction with others†
Rationalizes criminal activity†

Personal and Emotional Traits

Self-esteem†
Coping skills†
Anger management†
Self control†
Regulates emotions†
Persistence†
Tolerance of boredom†
Ability to seek help†

Substance Abuse

Family members have/had substance abuse problems
Offender's alcohol/drug use

Mental Health

Problems with depression
Problems with anxiety
Self-injurious behaviour during current sentence
Self-injurious behaviour ever (excludes suicidal thoughts/attempts)
Exhibited suicidal ideation/planning since intake†
Confirmed mental health diagnosis†
Tentative mental health diagnosis†
Complies with medication regimen†

Institutional Adjustment

Motivation with correctional plan†
Progress in programs†
Criminal activity during incarceration

Standardized Manual File Review (continued…)

Aboriginal Culture

Aboriginal or identifies with native culture/spirituality
Involved in Aboriginal cultural activities in the community prior to sentence
Involved with Aboriginal specific programs in prison
Involved with Aboriginal specific ceremonies in prison
Aboriginal Elder involved in rehabilitation
Conditional releases to participate in Aboriginal activities
Culturally appropriate community support has been established
Ethnicity and background considered during correctional plan development
Ethnicity and background considered during release plan development
Interested in release plan under the Corrections and Conditional Release Act section 84

Other

Symptoms of Attention Deficit Hyperactivity Disorder[†]
Lived major negative life event during current incarceration
Informal pro-social mentor/role model[†]

Canadian Police Information Centre System

Conviction for new offence
Date of new offence
Offence type

[†]These variables were not further considered because of low inter-rater agreement (i.e., kappa < 0.65 or ICC < 0.65).