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\_\_\_\_\_ **Research Report** \_\_\_\_\_

**Prediction of Re-Offence  
Using the SIR-R1 and a Proxy**

Ce rapport est également disponible en français. Pour en obtenir un exemplaire, veuillez vous adresser à la Direction de la recherche, Service correctionnel du Canada, 340, avenue Laurier Ouest, Ottawa (Ontario) K1A 0P9.

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**Prediction of Re-Offence Using the SIR-R1 and a Proxy**

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May 2012

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## Executive Summary

**Key words:** *Statistical Information on Recidivism – Revised 1, SIR-R1, risk assessment, re-offence, recidivism*

The Correctional Service of Canada and the Parole Board of Canada use results from the Statistical Information on Recidivism – Revised 1 (SIR-R1) scale to estimate the likelihood of offenders committing an indictable offence within three years of release. This actuarial scale, which is used only with male non-Aboriginal offenders, is comprised of 15 empirically-supported items scored by a parole officer at intake. Scores on the SIR-R1 result in offenders being assigned to risk groups, ranging from *poor* (in which 1 out of every 3 offenders is expected not to re-offend) to *very good* (in which 4 out of every 5 offenders are expected not to re-offend).

The purpose of this study was to examine if the SIR-R1 continues, despite changes to the offender population, to be appropriate for use in assessing risk of re-offence among male non-Aboriginal offenders. A second goal of the research was to examine the potential applicability of the scale to male Aboriginal offenders and women offenders, both Aboriginal and non-Aboriginal.

To assess the SIR-R1's continued appropriateness, the public safety outcomes of all offenders released from 2005 to 2007 to whom it was applied (11,571 offenders) were examined. Given that the SIR-R1 is not currently applied to Aboriginal male offenders or women offenders, it was necessary to approximate the scale for analyses involving these groups; therefore, a proxy was constructed for all male Aboriginal offenders ( $N = 2,846$ ) and women offenders ( $N_{\text{Non-Aboriginal}} = 684$ ,  $N_{\text{Aboriginal}} = 251$ ) released in the study period.

Study results were clear: the SIR-R1 continues to appropriately predict general re-offence within three years among non-Aboriginal male offenders. In addition, despite the fact that the SIR-R1 was constructed only to predict general re-offence, its ability to predict violent re-offence is also satisfactory, though somewhat less than its ability with respect to general re-offence. The SIR-R1 was not predictive of sexual re-offence.

Applying an approximation of the SIR-R1 to male Aboriginal offenders and to women offenders demonstrated that the SIR-R1 is likely able to predict general re-offence at acceptable levels for these offenders, though its success with non-Aboriginal offenders (both men and women) is greater than that with Aboriginal offenders. Given that CSC and the Parole Board of Canada have at their disposal only structured risk measures of limited focus (e.g., criminal history risk or a risk of a specific type of re-offence), a prospective program of research is recommended to further explore and expand on these results. Specifically of interest is the identification of items from the SIR-R1, together with culturally-informed and gender-informed variables, that can be used to create strong and appropriate measures of risk of re-offence for Aboriginal and non-Aboriginal offenders of both genders. This program of research will strengthen CSC and the Parole Board of Canada's ability to predict risk of re-offence for offenders other than non-Aboriginal males.



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## **Introduction**

Offenders released to the community gradually and with supervision have better public safety outcomes than those released without supervision after serving their full sentence in custody (e.g., Ellis & Marshall, 2000). For this reason, federal offenders in Canada are eligible to be released to community supervision after serving a specified portion of their sentence (*Corrections and Conditional Release Act*, 1992). One of the most important criteria considered in deciding whether and when to release offenders, of course, is their risk of re-offence upon release. Assessing risk of re-offence is a complex process and is a responsibility shared by the Correctional Service of Canada (CSC) and the Parole Board of Canada. One tool used in this assessment is the Statistical Information on Recidivism – Revised 1 (SIR-R1; adapted from the General Information on Recidivism scale developed by Nuffield, 1982), an empirically-derived risk assessment scale that provides estimates of the percentage of offenders within a specific range of scores that will commit an indictable offence within three years (CSC, 2010a; Parole Board of Canada, 2011).

This scale was implemented in the early 1980s, and since that time, there have been important changes to the federal offender population (e.g., Public Safety Canada, 2010). As such, this research was undertaken to examine if the SIR-R1 continues to be valid for the population to which it is applied. Given that the SIR-R1 is currently applied only to non-Aboriginal male offenders, a second goal was to examine the potential applicability of the SIR-R1 to Aboriginal male offenders and to both Aboriginal and non-Aboriginal women offenders.

### **Predicting Re-Offence**

#### **Methods of predicting re-offence**

Given the public safety implications of correctly determining which offenders will re-offend when released from custody, it is not surprising that research on the prediction of re-offence has received considerable attention over the last decades. Numerous approaches to the assessment and prediction of risk of re-offence have been developed; these can be broadly categorized as clinical or structured. Clinical approaches, which involve a professional using their judgement to determine whether an offender is likely to re-offend, were the first to be used. Over time, however, clinical judgments came to be criticized as being difficult to replicate and as

lacking transparency (e.g., Grove & Meehl, 1996). There is also ample evidence that due to their unstructured and subjective nature, clinical approaches are less predictive than structured approaches (e.g., Bonta, 2002; Grove, Zald, Lebow, Snitz, & Nelson, 2000).

Over time, structured or actuarial approaches to risk assessment have become more common. Unlike clinical judgement, these approaches rely on measures that are statistically-based, objective, and based on observable information. Structured or actuarial risk measures consist of items that are scored and summed according to specific guidelines, and result in a score. The score, in turn, indicates the likelihood of the outcome of interest occurring, usually by applying the rates found in samples used to develop and validate the actuarial measure. Relative to clinical approaches, structured and actuarial measures have been found to be more equitable and defensible (Austin & Hardyman, 2004; Brennan, 1987). Their reliance on objective and observable information also means they produce more consistent and reproducible results.

Due to this reproducibility, structured actuarial measures can be evaluated more easily than clinical approaches (Alexander & Austin, 1992). Evaluation generally – and validation and revalidation specifically – of measures is a good practice given that correctional populations change over time (e.g., CSC, 2009; Public Safety Canada, 2010); validation studies allow for an examination of the extent to which measures continue to predict outcomes of interest despite changes in the target population.

### **Factors that predict re-offence**

There has been extensive investigation of the factors that predict re-offence (see Andrews & Bonta, 2010, for a summary). Based on a number of meta-analyses, Andrews, Bonta, and Wormith (2006) identified the ‘big four’ risk factors that are the strongest predictors of re-offence: history of antisocial behaviour, antisocial personality pattern, antisocial cognition, and antisocial associates. They also identified four other factors that are moderately related to re-offence: family/marital, school/work, leisure/recreation, and substance abuse. Together these factors comprise the ‘central eight’ risk factors for re-offence.

Risk factors can be categorized as static (i.e., unchangeable) or dynamic (i.e., changeable). Some researchers have raised concerns with respect to risk assessment instruments including only static risk factors (e.g., Andrews & Bonta, 2010; Andrews et al., 2006; Campbell, French, & Gendreau, 2009). However, there is consensus in the literature that static criminal history factors are amongst the best predictors of re-offence (Gendreau, Goggin, & Little, 1996;

Glover, Nicholson, Hemmati, Berfield, & Quinsey, 2002). Moreover, static factors have also been demonstrated to be better than dynamic ones at predicting the probability an offender will re-offend over a long period of time (Hanson, 1998). In contrast, dynamic factors are useful for predicting *when* the re-offence will occur or to inform treatment goals (Hanson & Harris, 2000).

### **Prediction of violent and sexual recidivism**

There has been considerable public and research interest in predicting violent and sexual re-offence. Whether these predictions can be made using a single risk assessment instrument – that is, whether the same instrument can predict general re-offence as well as violent and sexual re-offence – has been debated.

Researchers have found that some of the factors that predict violent (Campbell et al., 2009; Harris, Rice, & Quinsey, 1993; Quinsey, Harris, Rice, & Cormier, 2006) and sexual (Hanson & Bussière, 1996; Hanson & Morton-Bourgon, 2007) re-offence differ from those that predict general re-offence. Therefore, some have suggested that measures specific to each type of re-offence are necessary (e.g., Campbell et al., 2009; Hanson & Morton-Bourgon, 2007).

Other researchers contend that most of the strongest predictors of general re-offence, especially criminal history variables, are also quite predictive of violent and sexual re-offence. In their recent meta-analysis, Campbell, French, and Gendreau (2007) found that the measures most commonly used to predict general re-offence, including the SIR-R1, were moderately predictive of violent re-offence. Furthermore, measures designed to predict general, violent, and sexual re-offence have been found to be moderately to strongly associated with each other (Campbell et al., 2009). In fact, Bourgon and Bonta (2004) have suggested that the need for specialized assessments of violent and sexual re-offence has been overstated.

Though it is clear that some predictors of sexual offending or violent reoffending are not predictive of general re-offending (e.g., previous sexual offending, sexual interest; Hanson, 2009; Hanson & Bussière, 1996; Hanson & Morton-Bourgon, 2004), many predictors of general offending do appear to be relevant in predicting sexual and violent re-offence. This pattern suggests that general risk assessment measures may be capable of predicting violent and sexual re-offence.

### **SIR-R1**

The Correctional Service of Canada uses the SIR-R1 to categorize male non-Aboriginal

offenders in terms of the probability that they will re-offend in the three years following release (CSC, 2010a). The SIR-R1 is the successor to the General Statistical Information on Recidivism (GSIR), a scale developed primarily with non-Aboriginal male offenders in the late 1970s (Nuffield, 1982). In 1996, the GSIR underwent minor revisions to conform to new legislation and to reflect research findings and became the SIR-R1. The scale is comprised of fifteen items scored by a parole officer at admission using information gathered as part of the offender's intake assessment.

The SIR-R1's fifteen items incorporate several of the central eight risk factors, including history of antisocial behaviour (e.g., age of first offence), family/marital (e.g., number of dependents), and school/work (e.g., employment at time of arrest). The other SIR-R1 items were all also found to be predictive of re-offending among male federal offenders (Nuffield, 1982). All of the SIR-R1's items are static factors; this is appropriate given that the scale's objective is to predict if (rather than when) a re-offence will occur.

### **Previous validations**

The SIR-R1 has undergone several validations, both in its previous incarnation as the GSIR and its current form. Shortly after the GSIR's implementation, a number of studies confirmed a strong relationship between GSIR risk group membership and general re-offence (e.g., Motiuk & Porporino, 1989; Wormith & Goldstone, 1984). In fact, Hann and Harman (1989a) found that the relationship between risk group membership and general re-offending in their study was even stronger than that reported by the scale's creator. More recent revalidations of the GSIR have also been positive. For example, Bonta, Harman, Hann and Cormier (1996) found that the GSIR continued to predict general re-offence for non-Aboriginal male offenders. These researchers also examined the scale's predictive ability with respect to violent re-offence and found that the scale was somewhat predictive in this domain as well, though less so than for general re-offence.

As mentioned, the GSIR became the SIR-R1 in 1996. This scale was then revalidated in 2002 (Nafekh & Motiuk, 2002). Using a sample of federal offenders released from custody between 1995 and 1998 who were available for a three-year follow-up period, these authors found the SIR-R1 internally reliable and predictive of both general and violent re-offence, though as was previously the case (Bonta et al., 1996), more so for the former. They found that the scale was not predictive of sexual re-offending.

### **The SIR-R1, women, and Aboriginal offenders**

The SIR-R1 was originally developed and validated on a sample of primarily Caucasian male offenders. Some researchers believe that the factors that predict re-offence in male offenders are also predictive of re-offence for women offenders (e.g., Andrews & Bonta, 2010; Coid et al., 2009; Rettinger & Andrews, 2010), but others argue that given that women can have different pathways into criminality than their male counterparts, some of the factors that predict their risk to re-offend also differ (e.g., Chesney-Lind & Pasko, 2004; Hannah-Moffat, 2009). There has therefore been interest in discovering whether the SIR-R1 might be appropriate for use with women offenders (e.g., Nafekh & Motiuk, 2002).

Hann and Harman (1989b) examined the relationship between GSIR scores and success rates of non-Aboriginal women offenders. They found, using a relatively small sample, that GSIR risk scores were weakly and not uniformly associated with success in the community. In a more recent study, Nafekh and Motiuk (2002) created a proxy of the SIR-R1 to investigate its potential application to women offenders. In contrast to the 1989 results, these authors found that SIR-Proxy risk group membership had almost the same predictive power for women offenders as it did for non-Aboriginal male offenders with respect to both general and violent re-offence.

Questions also exist regarding the appropriateness of using the SIR-R1 with Aboriginal offenders (e.g., Rugge, 2006). Hann and Harman (1989b) found that the relationship between GSIR scores and success rates in the community was weaker for Aboriginal offenders than for non-Aboriginal male offenders. In a follow-up study, Hann and Harman's (1993) results were somewhat different – their examination demonstrated that the GSIR was approximately as predictive for Aboriginal and non-Aboriginal offenders, though the authors cautioned that more research was required given the small sample available in their study. When Nafekh and Motiuk (2002) later applied their SIR-Proxy to Aboriginal male offenders, they found that though it was somewhat predictive of general re-offence, the scale's predictive ability was much weaker for this group than for non-Aboriginal male offenders.

As a result of these patterns of mixed results, to date, the SIR-R1 continues to be applied only to non-Aboriginal male offenders within CSC (CSC, 2010a). For other offenders, however, no alternate scale presently exists and risk of re-offence is assessed using clinical judgment together with broad evaluations of criminal history risk, dynamic need, and reintegration potential (CSC, 2010a). Given the advantages of structured and actuarial measures over clinical

judgment, continued research in terms of the scale's applicability for these groups is highly relevant.

### **The Current Study**

Owing to the importance of predicting likelihood of re-offence with offenders being considered for release, a revalidation of the SIR-R1 was considered timely. The present revalidation was modeled roughly after that completed by Nafekh and Motiuk (2002) and addressed three research questions:

1. Is the SIR-R1 predictive of general re-offence for non-Aboriginal male offenders?
2. Is the SIR-R1 predictive of violent and sexual re-offence for non-Aboriginal male offenders?
3. Would the SIR-R1 potentially be appropriate for use with Aboriginal male offenders and women offenders?

In order to answer these research questions, two examinations were conducted. In the first, the relationship between SIR-R1 risk group membership and the different types of re-offence was examined for non-Aboriginal offenders. Secondly, a proxy of the SIR-R1 was calculated for all groups of offenders. The risk groupings produced by this proxy were compared to those based on the SIR-R1 for non-Aboriginal male offenders; once equivalence was confirmed, the relationship between the proxy's risk group membership and re-offence was investigated for Aboriginal male offenders and women offenders (both Aboriginal and non-Aboriginal).

## Method

### Sample

The revalidation of the SIR-R1 included all non-Aboriginal<sup>1</sup> male offenders released between January 1, 2005 and December 31, 2007 for whom Offender Intake Assessment and SIR-R1 data were available ( $n = 12,845$ ). The examination of the SIR-Proxy included all offenders for whom the SIR-Proxy data were available. This resulted in samples of 11,571 non-Aboriginal male offenders, 2,846 Aboriginal male offenders, 684 non-Aboriginal women offenders, and 251 Aboriginal women offenders.

### Data

Data were obtained from the Offender Management System, CSC's computerized database of offender information. First, non-Aboriginal male offenders' SIR-R1 data were retrieved. Second, for all offenders, items from the Offender Intake Assessment necessary to calculate the SIR-Proxy were obtained, including offenders' offence information, and other information from the Offender Intake Assessment. Finally, data were drawn on whether offenders re-offended within a three-year period following their release.

### Measures

As mentioned, the SIR-R1 is a statistically-derived actuarial tool used by CSC with non-Aboriginal male offenders only as part of the Offender Intake Assessment (CSC, 2010a). It provides an estimate of the chance that offenders, categorized according to their scale scores, will commit an indictable offence in the community within three years of release. The SIR-R1 consists of fifteen items, scored by a staff member, related to an offender's demographic information and criminal history (the full list of items is available in Appendix B). When the SIR-R1 is completed the item scores are summed and yield a value ranging from +27 to -30. Offenders are then classified into one of five risk groups according to their risk of re-offence, ranging from *poor risk* (1 out of every 3 offenders will succeed in the community) to *very good risk* (4 out of every 5 offenders will succeed).

The SIR-Proxy was developed by Nafekh and Motiuk (2002) as an approximation of the

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<sup>1</sup> An offender was classified as Aboriginal if they identified themselves as being First Nations, Métis, or Inuit. All other offenders, including those who did not report their ethnicity were categorized as non-Aboriginal offenders.

SIR-R1 and is used to examine the SIR-R1's possible utility with male Aboriginal offenders and women offenders. The SIR-Proxy is comprised of a series of items from the Offender Intake Assessment that replicate, to the extent possible, those within the SIR-R1.<sup>2</sup> Relevant data include the offender's criminal history and ratings on seven need domains: employment, marital/family, associates/social interaction, substance abuse, community functioning, personal/emotional orientation, and attitude.

The outcome measure in these analyses was re-offence within three years. Re-offence was defined in three ways: general, violent, and sexual. General re-offence was defined as any new offence resulting in federal custody (either revocation of a conditional release due to a new offence or a new conviction after the period of conditional release had ended). Violent re-offence (e.g., assault, robbery, and homicide) and sexual re-offence (e.g., sexual assault, exploitation, or interference) were limited to offences in those categories.

## **Analyses**

Two separate series of analyses were calculated in order to answer the research questions. With respect to the revalidation of the SIR-R1, first, sample and scale descriptive statistics were calculated. Second, rank-biserial correlation coefficients were calculated to determine the relationship between offenders' SIR-R1 risk group membership and re-offence. The ability of SIR-R1 risk group membership to predict re-offence was examined by calculating Receiver Operating Characteristic (ROC) curves. Next, a recalibration of the SIR-R1 was conducted to examine whether its predictive validity could be improved. Given that the GSIR on which the SIR-R1 is based was created in the late 1970s (Nuffield, 1982) and the characteristics of the offender population have changed since that time, it was important to explore whether the scale's item weights and cut-offs continued to be the most appropriate.

Recalibration was conducted using the same method as used to originally calibrate the GSIR, the Burgess method. In this case, the method was used to recalibrate the SIR-R1 such that a change of 1 point on an item corresponded to a 5% change in the probability of success in the community. The recalibration process uses data from a randomly chosen half of the offender sample; to examine the success of recalibration, the predictive ability of the recalibrated SIR-R1 was assessed with the second half of the offender sample.

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<sup>2</sup> The methodology used to create the SIR-Proxy is presented in Appendix B of Nafekh and Motiuk's (2002) report.

A second series of analyses were conducted using the SIR-Proxy to examine the potential applicability of the SIR-R1 to women offenders and to Aboriginal male offenders. First, the consistency of the SIR-R1 and the SIR-Proxy was explored by calculating the rank-biserial correlations between SIR-R1 and SIR-Proxy total scores and the two measures' risk group classifications. Next, the predictive ability of the SIR-Proxy was examined using the same analyses as previously described. Recalibration of the SIR-Proxy was also explored; this recalibration attempt paralleled that described above.

## Results: SIR-R1

### Sample Descriptive Information

Overall, 12,845 non-Aboriginal offenders had SIR-R1 data and were included in the revalidation analyses. On average, offenders were 34 years old ( $SD = 10.7$ ) at the time of admission. The majority of offenders reported they were either single (50%), in a common-law relationship (30%), or married (9%). Table 1 summarizes the ethnicity of the offenders. Most offenders identified themselves as White (85%), while small groups of offenders identified themselves as Black (7%), South East Asian (2%), or ‘other’ (2%).

Table 1  
*Non-Aboriginal Male Offenders’ Ethnicity*

Ethnicity	Percentage	( <i>n</i> )
White	85	(10,899)
Black	7	(958)
Other	2	(318)
South East Asian	2	(230)
Arab	1	(113)
South Asian	1	(100)
Latin American	1	(87)
Chinese	1	(77)
Unknown	<1	(63)

*Note.*  $N = 12,845$ . Offenders were categorized as “unknown” if this is how the ethnicity information was categorized in the Offender Management System or if no ethnicity data were entered.

Almost all (97%) non-Aboriginal male offenders were serving determinate sentences – that is, sentences of fixed duration. Of these, the average sentence was of 4.3 years ( $SD = 3.9$ ). Table 2 summarizes the most serious offences of which offenders were convicted. The most common serious offences were property offences (22%), robbery (21%), and drug offences (19%); homicide or attempted homicide (6%) was the least common.

Table 2  
*Non-Aboriginal Male Offenders' Most Serious Offence*

Offence Category	Percentage	(n)
Violent Offences		
Homicide & Attempted Homicide	6	(717)
Sexual Offences	9	(1,114)
Robbery	21	(2,708)
Assault	9	(1,114)
Other Violent Offences	6	(751)
Non-Violent Offences		
Drug Offences	19	(2,387)
Property Offences	22	(2,734)
Other Non-Violent Offences	9	(1,140)

*Note.*  $N = 12,665$ . Offence categories are ranked by seriousness and are mutually exclusive, though many offenders were convicted of other, less serious offences not reflected in this table. Offence data was missing for 180 offenders. Percentages do not sum to 100 due to rounding.

Offenders were followed for a three-year period after their release. Overall, less than one in five offenders (19%) re-offended during that time period. Small numbers of offenders returned to custody with a violent (6%) or sexual (<1%) offence.

### **SIR-R1 Descriptive Information**

Offenders were not equally distributed among the five SIR-R1 risk groups. Table 3 summarizes the percentage of offenders in each risk group, in both the current study and Nafekh & Motiuk's (2002) previous research, as well as whether they succeeded in the community. As expected, as risk decreased, the percentage of offenders who succeeded in the community increased,  $\chi^2(4, N = 12,845) = 1080.34, p < .001$ . Overall, offenders in the current study were assessed as poorer risks than were their counterparts in the previous study,  $\chi^2(4, N = 12,845) = 557.94, p < .001$ . However, both overall and within each risk group, a greater percentage of offenders were now succeeding in the community.

Table 3

*Distribution of Offenders by SIR-R1 Risk Groups and Success Rates for Each Group (Current Study and Historical Data)*

SIR-R1 Risk Group	Current Study		Nafekh & Motiuk (2002)	
	Total % ( <i>n</i> )	% Successful	Total % ( <i>n</i> )	% Successful
Poor	28 (3,630)	66	23 (1,539)	56
Fair / Poor	15 (1,870)	77	12 (848)	69
Fair	16 (2,096)	83	15 (1,014)	76
Good	13 (1,703)	87	13 (907)	84
Very Good	28 (3,546)	96	37 (2,523)	94
Total	12,845	81	6,831	79

Violent and sexual re-offence rates by SIR-R1 risk group are summarized in Appendix A (Table A1). As expected, the percentage of offenders who re-offended violently decreased as risk decreased. In contrast, there was little difference in sexual re-offence across SIR-R1 risk groups.

### **Predictive Validity of the SIR-R1**

The predictive validity of the SIR-R1 was examined with respect to general re-offence. In addition, although the SIR-R1 was not designed to predict sexual or violent re-offence, its predictive ability with respect to these forms of re-offence was also investigated.

As expected, as SIR-R1 risk groups decreased fewer offenders were returned to custody. This was supported by a strong and significant relationship between SIR-R1 risk group membership and general re-offence,  $r_{rb} = -.42, p < .001$ .<sup>3</sup> The same pattern was found for violent re-offence,  $r_{rb} = -.36, p < .001$ . For sexual re-offence, this association was in the correct direction but of relatively weak magnitude and did not quite attain statistical significance,  $r_{rb} = -.14, p = .06$ .

The relationships of each of the scale's component items with the three types of re-offence are reported in Appendix B (Table B1). All of the associations were in the expected direction for general re-offence, with the exception of previous convictions for sexual offences

<sup>3</sup> Given that SIR-R1 group membership was coded such that a higher value indicated membership in a lower risk group, a negative correlation coefficient indicates that, as expected, membership in a lower risk SIR-R1 group is associated with lower rates of re-offence.

which was not associated with re-offence. The strength of the relationships ranged from minimal to moderate. The results concerning violent re-offence were similar, with only two items (i.e., sentence length and previous convictions for sexual offences) not significantly associated with violent re-offence. The remaining associations were in the expected direction and also ranged from minimal to moderate in strength. Finally, only two items were significantly associated with an offender sexually re-offending.<sup>4</sup> In summary, at both the overall level and item-specific level, as risk, determined by the SIR-R1, increased general and violent re-offence decreased. However, there was little to no association between SIR-R1 risk group membership and sexual re-offence.

The predictive ability of a measure is often examined by calculating Receiver Operating Curves (ROC; Hosmer & Lemeshow, 2000). An index of the predictive ability of a measure based on the ROC curve is the Area Under the Curve (AUC), which can range from 0.5 (chance prediction) to 1.0 (perfect prediction).<sup>5</sup> In practice, a measure that produces an AUC of 0.6 or greater is considered an ‘acceptable’ predictor and a measure with an AUC of 0.7 or greater is considered a ‘good’ predictor (Hosmer & Lemeshow, 2000).

The results of the AUC analyses paralleled that of the associations. Table 4 summarizes the current study’s AUC values together with those previously reported by Nafekh and Motiuk (2002). SIR-R1 risk group membership predicted the occurrence of general and violent re-offence at rates around the threshold considered ‘good’, though for both types of re-offence, AUC values were slightly less than those reported in the previous report. SIR-R1 risk group membership was not predictive of sexual re-offence.

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<sup>4</sup> Few offenders re-offended sexually (0.5%). When the split of a dichotomous variable exceeds 90/10 the rank-biserial correlation coefficient is underestimated and significance tests are therefore overly conservative (Tabachnick & Fidell, 2007). Therefore, analyses involving sexual re-offence should be interpreted cautiously.

<sup>5</sup> Unlike measures of association the AUC is not affected by the low incidence of a particular event (Bradley, 1997). Therefore, the AUC provides the best index of predictive ability for the occurrence of sexual and violent re-offence.

Table 4

*AUC Values for Prediction of Re-Offence Using the SIR-R1: Current and Previous Validation*

Type of Re-offence	Current Study			Nafekh and Motiuk (2002)
	AUC	Lower 95% CI	Upper 95% CI	AUC
General	.71	.70	.72	.75
Violent	.68	.66	.70	.71
Sexual	.57	.50	.64	.54

*Note.*  $N = 12,845$ .

**Recalibration of the SIR-R1**

A recalibration of the SIR-R1 resulted in few improvements in predictive ability. Table 5 summarizes the recalibrated risk group cut-off scores and the distribution of general re-offence successes. Overall, recalibration resulted in a reduction in the range of possible SIR-R1 scores.

Table 5

*Recalibrated SIR-R1: Cut-Off Values, Distribution of Offenders by Risk Group, and Success Rates for Each Group*

SIR-R1 Risk Group	Cut-Off Values		Total % ( $n$ )	% Successful
	Lower	Upper		
Poor	-14	-6	24 (1,533)	64
Fair / Poor	-5	-2	20 (1,265)	76
Fair	-1	3	20 (1,256)	83
Good	4	9	19 (1,191)	91
Very Good	10	20	18 (1,177)	97
Total			6,422	81

*Note.* Analyses are based on the randomly selected half of the non-Aboriginal male offender sample not used to compute the recalibrated SIR-R1. Cut-off values are inclusive. Percentages do not sum to 100 due to rounding.

The predictive ability of the recalibrated SIR-R1 was similar to that of the non-recalibrated scale (Table 6; see also Table A1 in Appendix A). Though the recalibrated SIR-R1 reached “good” and “acceptable” levels of predictive ability for general and violent re-offence, respectively, in practical terms, the AUC values derived from the recalibrated SIR-R1 were not sufficiently greater than those of the original SIR-R1 to be useful.

Table 6

*Associations and AUC Values for Prediction of Re-Offence Using the Recalibrated SIR-R1*

Re-Offence	$r_{rb}$	AUC	95% AUC CI	
			Upper	Lower
General	-.43***	.72	.70	.73
Violent	-.38***	.69	.67	.71
Sexual	-.12	.56	.46	.66

*Note.*  $N = 6,442$ . Analyses are based on the randomly selected half of the non-Aboriginal male offender sample not used to compute the recalibrated SIR-R1.

\*\*\*  $p < .001$ .

## Results: SIR-Proxy

### Verification of the Utility of the SIR-Proxy

As a verification of the rough equivalence of the SIR-R1 and the SIR-Proxy, the association between the two measures was measured for non-Aboriginal male offenders. As expected, offenders' total SIR-Proxy scores were strongly and significantly associated with their total SIR-R1 scores,  $r(11,439) = .87, p < .001$ , as were their risk group memberships on each measure,  $r_{\phi}(11,439) = .97, p < .001$ . Table 7 summarizes the distribution of SIR-Proxy risk groups and their success in the community, as well, for purposes of comparison, as corresponding information for the SIR-R1. As risk decreased the percentage of offenders who succeeded increased,  $\chi^2(4, N = 11,441) = 810.16, p < .001$ . Distributions and success rates were similar for the SIR-Proxy risk groups and SIR-R1 risk groups. Success rates for each SIR-Proxy risk group were also examined in terms of violent and sexual re-offence (Table A1 in Appendix A). As expected given results from SIR-R1 analyses, success rate increased with lower risk group membership for violent but not sexual re-offending.

Table 7

*Distribution and Success Rates of Male Non-Aboriginal Offenders by SIR-Proxy and SIR-R1 Risk Group*

Risk Group	SIR-Proxy		SIR-R1	
	Total % (n)	% Successful	Total % (n)	% Successful
Poor	26 (2,951)	69	28 (3,630)	66
Fair / Poor	14 (1,584)	74	15 (1,870)	77
Fair	16 (1,866)	80	16 (2,096)	83
Good	15 (1,720)	86	13 (1,703)	87
Very Good	29 (3,320)	95	28 (3,546)	96
Total	11,441	81	12,845	81

The relationship of SIR-Proxy risk groups with re-offence and the groups' predictive ability were also examined (see Table 8; item-level associations were also examined and are presented in Appendix B, Table B1). The relationships of SIR-Proxy risk groups with both general and violent re-offence were in the expected direction, strong, and significant. In general,

relationships were of similar strength as those for the SIR-R1. The AUC values also demonstrated that the SIR-Proxy risk group membership was ‘acceptably’ predictive of general and violent re-offence; though these AUC values were lower than those based on SIR-R1 risk group membership in terms of statistical significance, in practical terms the difference in the AUC values did not represent an important change in predictive ability.<sup>6</sup> As expected, SIR-Proxy risk group membership was neither associated with nor predictive of sexual re-offending.

Table 8

*Associations and AUC Values for Prediction of Re-Offence Using the SIR-Proxy*

Re-offence Outcome	SIR-Proxy				SIR-R1	
	$r_{fb}$	AUC	Upper 95% CI	Lower 95% CI	$r_{fb}$	AUC
General	-.38***	.69	.68	.70	-.42***	.71
Violent	-.32***	.66	.64	.68	-.36***	.68
Sexual <sup>a</sup>	-.13	.57	.49	.65	-.14	.57

Note.  $N_{SIR-Proxy} = 11,441$ .  $N_{SIR-R1} = 12,845$ .

<sup>a</sup> Given low base rates for sexual re-offending, these correlation coefficients should be interpreted cautiously.

\*\*\*  $p < .001$

### Application of SIR-Proxy to Other Offenders

Given the similarities in patterns of results between the SIR-R1 and the SIR-Proxy, it was concluded that the SIR-Proxy was sufficiently similar to the SIR-R1 for use in further investigations. As such, it was applied to three other groups of offenders: male Aboriginal offenders, non-Aboriginal women offenders, and Aboriginal women offenders.

#### Aboriginal male offenders

Among the 2,560 male Aboriginal offenders for whom all required data were available, the average age at admission was 31 years ( $SD = 9.4$ ). The majority of offenders reported they were single (53%), in a common-law relationship (34%), or married (6%). Most offenders identified themselves as First Nations (69%) or Métis (28%); only a small percentage of

<sup>6</sup> SIR-Proxy AUC values were compared to SIR-R1 AUC values using cases with all data necessary to complete both measures. Therefore, the comparison SIR-R1 AUC values were based on a different sample than those reported in the previous section (which reports on a larger sample for which all SIR-R1 data were available). Given that results were statistically identical, as well as for reasons of brevity, the new SIR-R1 AUC values are not reported here.

offenders identified themselves as Inuit (3%).

Almost all (99%) male Aboriginal offenders were serving determinate sentences, with an average sentence length of 3.8 years ( $SD = 3.3$ ). Table 9 summarizes their most serious offences, of which the most common were robbery, property, and assault offences.

Table 9  
*Aboriginal Male Offenders' Most Serious Offence*

Offence Category	Percentage	( <i>n</i> )
Violent Offences		
Homicide & Attempted Homicide	8	(199)
Sexual Offences	14	(340)
Robbery	21	(538)
Assault	17	(422)
Other Violent Offences	6	(157)
Non-Violent Offences		
Drug Offences	8	(197)
Property Offences	19	(472)
Other Non-Violent Offences	8	(189)

*Note.*  $N = 2,514$ . Offence data was missing for 46 offenders. Percentages may not add up to 100 due to rounding.

Almost one quarter (25%) of male Aboriginal offenders re-offended over the three-year follow-up period (in comparison, 19% of male non-Aboriginal offenders did so). Only 8% and 1% of offenders re-offended violently or sexually, respectively (as compared to 6% and <1%, respectively, for male non-Aboriginal offenders).

Table 10 presents the percentage of offenders classified into each SIR-Proxy risk group, as well as the success rates for each group. Again, the distribution of offenders was unequal across the SIR-Proxy risk groups, with almost half of the offenders being classified as a poor risk. This percentage was much higher than that so-classified among non-Aboriginal male offenders (26%). Nonetheless, as offenders' risk increased there was a trend for success rates to decrease,  $\chi^2(4, N = 2,560) = 115.11, p < .001$ .

Table 10

*Distribution and Success Rates of Aboriginal Male Offenders by SIR-Proxy Risk Groups*

SIR-Proxy Risk Group	Total % (n)	% Successful
Poor	46 (1,173)	67
Fair / Poor	16 (419)	73
Fair	15 (391)	77
Good	12 (308)	86
Very Good	11 (269)	94
Total	2,560	75

The SIR-Proxy risk group's success rates are presented in Appendix A (Table A2). Briefly, for violent re-offence, as risk increased success rates tended to decrease. For sexual re-offence, however, the very high rate of overall success prevented any patterns from emerging.

Taken together, results of predictive validity analyses were less positive for male Aboriginal offenders than for their non-Aboriginal counterparts (Table 11; see also item-level correlations in Appendix B, Table B2). While all of the associations were in the expected directions and statistically significant, they were of lesser magnitude than those of non-Aboriginal men. Further, the AUC analyses revealed that the SIR-Proxy predicted both general re-offence at 'acceptable' levels, though it did not reach that threshold for violent re-offence nor, once confidence intervals were considered, sexual re-offence. This pattern was somewhat different than that found for non-Aboriginal men for whom both the SIR-R1 and the SIR-Proxy were predictive of general and violent re-offending.

Table 11

*AUC Values for Prediction of Re-Offence in Aboriginal Male Offenders Using the SIR-Proxy*

Re-Offence Outcome	$r_{rb}$	AUC	95% AUC CI	
			Upper	Lower
General	-.25***	.63	.60	.65
Violent	-.15***	.57	.54	.61
Sexual	-.23*	.62	.50	.73

Note.  $N = 2,560$ .

<sup>a</sup> Only 21 offenders sexually re-offended; therefore, correlation coefficients should be interpreted cautiously.

\*  $p < .05$ . \*\*\*  $p < .001$ .

An attempt was made to increase the SIR-Proxy’s predictive validity by recalibrating it. Although associations were positive and AUC values were in the acceptable range for general and sexual re-offence, the recalibration was not successful in increasing the SIR-Proxy’s predictive strength. Further data on the recalibration attempt are available in Appendix C.

**Women offenders**

A total of 246 Aboriginal and 666 non-Aboriginal women had all the data on file required to calculate the SIR-Proxy. On average, Aboriginal women were younger ( $M = 31$  years;  $SD = 8.6$ ) than non-Aboriginal women ( $M = 35$  years;  $SD = 9.6$ ). The majority of Aboriginal and non-Aboriginal women reported they were single (56% and 44%, respectively), or in a common-law relationship (27% for both groups). A greater percentage of non-Aboriginal offenders (11% vs. 4%) reported they were married. Almost all Aboriginal women identified themselves as either First Nations or Métis, while the majority of non-Aboriginal women identified themselves as either White or Black (see Table 12).

Table 12  
*Women Offenders’ Ethnicity*

Ethnicity	Aboriginal		Non-Aboriginal	
	%	(n)	%	(n)
First Nations	68	(167)		
Métis	31	(77)		
Inuit	1	(2)		
White			81	(525)
Black			11	(71)
South Asian			2	(11)
South East Asian			1	(8)
Other			5	(35)

*Note.*  $N_{\text{Aboriginal}} = 246$ .  $N_{\text{Non-Aboriginal}} = 650$  (ethnicity information was missing for 16 non-Aboriginal women).

Almost all Aboriginal (98%) and non-Aboriginal (99%) women were serving determinate sentences, with an average length of 3.3 years ( $SD = 2.2$ ) and of 3.2 years ( $SD = 1.9$ ) respectively. In examining the most serious offence of which the women were convicted, the most common for Aboriginal women were drug and robbery offences while the most common for non-Aboriginal women were drug and property offences (see Table 13).

Table 13

*Women Offenders' Most Serious Offence*

Offence Category	Aboriginal Offenders		Non-Aboriginal Offenders	
	%	(n)	%	(n)
Violent Offences				
Homicide and Attempted Homicide	18	(45)	6	(39)
Sexual Offences	0	(1)	1	(6)
Robbery	23	(56)	16	(108)
Assault	15	(36)	6	(42)
Other Violent Offences	6	(14)	4	(28)
Non-Violent Offences				
Drug Offences	23	(57)	37	(249)
Property Offences	9	(21)	21	(136)
Other Non-Violent Offences	6	(14)	8	(52)

*Note.* Offence data was missing for 6 non-Aboriginal and 2 Aboriginal offenders.

Overall, a greater percentage of Aboriginal (16%) than of non-Aboriginal (10%) women re-offended. A small group of Aboriginal (3%) and non-Aboriginal (4%) women re-offended violently; even fewer re-offended sexually (less than 1% of each group).

Table 14 summarizes the percentage of Aboriginal and non-Aboriginal women classified into each SIR-Proxy risk group and the success rates for each risk group. Greater percentages of non-Aboriginal women than of Aboriginal women were classified in the better risk groups,  $\chi^2(4, N = 912) = 58.80, p < .001$ . That said, as risk increased there was a decrease in success rate for both Aboriginal,  $\chi^2(4, N = 246) = 10.77, p < .05$ , and non-Aboriginal women,  $\chi^2(4, N = 666) = 70.65, p < .001$ . Notably, however, for the Aboriginal women, the percentages of women who were successful in the two higher risk groups were not ordered as would be expected – that is, a slightly higher percentage of women in the *poor* risk group than in the *fair / poor* risk group were successful.

Table 14

*Distribution and Success Rates of Women Offenders by SIR-Proxy Risk Groups*

SIR-Proxy Risk Group	Aboriginal Offenders		Non-Aboriginal Offenders	
	Total % (n)	% Successful	Total % (n)	% Successful
Poor	22 (53)	77	13 (89)	69
Fair / Poor	15 (37)	73	5 (36)	81
Fair	22 (55)	82	17 (110)	91
Good	17 (41)	93	15 (101)	94
Very Good	24 (60)	93	50 (330)	96
Total	246	84	666	90

Table 15 summarizes the results of the predictive validity analyses (item-level correlations were also calculated and are presented in Tables B3 and B4 in Appendix B). All associations were significant and in the expected direction. For both Aboriginal and non-Aboriginal women, the SIR-Proxy was able to predict both general re-offence at rates considered ‘acceptable’ or better. For non-Aboriginal women, it was also attained ‘good’ prediction of violent re-offence; after considering confidence intervals, it was not predictive of violent re-offence for Aboriginal women. In fact, the SIR-Proxy was more predictive of general and violent re-offence for non-Aboriginal women than it had been for non-Aboriginal men.<sup>7</sup>

Table 15

*AUC Values for Prediction of Re-Offence in Women Offenders Using the SIR-Proxy*

Re-offence Outcome	Aboriginal Women				Non-Aboriginal Women			
	r <sub>rb</sub>	AUC	Upper CI	Lower CI	r <sub>rb</sub>	AUC	Upper CI	Lower CI
General	-.30**	.65	.56	.74	-.48***	.74	.67	.81
Violent <sup>a</sup>	-.39*	.70	.35	1.00	-.65***	.82	.75	.90

Note.  $N_{\text{Aboriginal}} = 246$ .  $N_{\text{Non-Aboriginal}} = 666$ .

<sup>a</sup> Associations and significance levels should be interpreted cautiously as only 10 Aboriginal and 21 non-Aboriginal offenders re-offended violently.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

<sup>7</sup> Due to the extremely small number of women offenders who sexually re-offended no reliable statistical analyses could be performed on this outcome. Therefore, there are no analyses reported for sexual re-offence.

Again, an attempt was made to recalibrate the SIR-Proxy for women offenders. The associations and resulting AUC values indicated that the recalibration was not successful in increasing the predictive ability of the SIR-Proxy for either group (see Appendix C).

## Discussion

Likelihood of re-offence is very heavily weighted in discretionary release decisions. One of the tools that both CSC and the Parole Board consider in assessing risk of re-offence for non-Aboriginal male offenders is the SIR-R1 (CSC, 2010a). The current study examined the continued validity of the SIR-R1 for use with this group, as well as the applicability of a proxy of the SIR-R1 to Aboriginal men and to women.

### The SIR-R1 for Non-Aboriginal Male Offenders

#### Predicting re-offence

Results demonstrate that the SIR-R1 continues to be able to predict general re-offence among non-Aboriginal male offenders. The predictive ability of the SIR-R1 found in the current study was roughly comparable to that obtained in the last revalidation (Nafekh & Motiuk, 2002), thereby demonstrating that there have not been any important changes in its appropriateness for use in the time between their study and the current one.

That said, one item, ‘previous sexual offence’, was not predictive of general re-offence. If future revalidations find the same result, it may be appropriate to remove the item from the scale; for the present, however, retaining the item has no negative impact on the prediction of risk of re-offence. The item is scored such that having no or one previous conviction for serious sexual offences is associated with a score of zero – in other words, only those with a significant history of serious sexual offences have their SIR-R1 score impacted by the item. For these offenders, however, sex offence specific risk assessment measures are also administered to predict risk of re-offence (CSC, 2010b) and therefore the SIR-R1 is not considered in isolation for these offenders.

Though the SIR-R1 is intended to predict general re-offence, its predictive value with respect to violent and sexual offending was also explored. As was the case in the previous revalidation study, the SIR-R1 reached acceptable levels for the prediction of violent re-offence. This pattern is in keeping with findings that the majority of factors that predict general re-offence can adequately predict violent re-offence (Campbell et al., 2007). With respect to sexual re-offending, however, the SIR-R1 was not satisfactorily predictive. Again, this result is consistent with that previously found by Nafekh and Motiuk (2002) and with relevant literature that demonstrates that many predictors of sexual re-offence differ from those used in predicting other

types of re-offence (e.g., Hanson & Morton-Bourgon, 2007).

### **SIR-R1 risk groups and success rates**

Though the SIR-R1 remains highly predictive of re-offence, contrasting the present study's results with previous ones suggests that there have been shifts in the percentage of offenders falling within each SIR-R1 risk group. Specifically, in comparison with Nafekh and Motiuk's (2002) revalidation, a greater percentage of offenders were classified in the poorer risk groups. This trend is in keeping with changes in the population of federal offenders. For example, relative to both when the SIR-R1 was originally developed and to when it was last revalidated, federal offenders are younger and have more extensive criminal histories (e.g., Boe, Nafekh, Vuong, Sinclair, & Cousineau, 2003; Public Safety Canada, 2010). Given that these characteristics are associated with being rated as a higher risk on the SIR-R1, these changes have a direct impact on the distribution of offenders among the risk groups.

That said, relative to the earlier revalidation, it was also found that a greater percentage of offenders are succeeding in the community, both overall and within each risk group. In comparison to what was found in Nafekh and Motiuk's (2002) revalidation, the percentage of offenders who did not re-offend within three years in this study was 2% lower. Though this difference does not appear large, it masks the fact that there were greater differences in the poorer risk groups – in fact, the range across the risk groups was from 2% (very good risk group) to 10% (poor risk group).

This pattern of changes is important because, within the guidelines provided to aid in interpreting the SIR-R1, each of the risk groups is associated with a specific success rate (e.g., amongst those in the 'very good risk' group, 4 out of 5 will not commit an indictable offence in the three years after release). The shifts in the success rate relative to the earlier validation suggest that the overall success rates provided as guidelines may require verification. Unfortunately, given that the current (and previous) revalidation study used federal re-incarceration as its measure of re-offence and the scale development, from which the success rate guidelines are derived, used police records (which encompass provincial and federal convictions), it was impossible to conduct this verification using the presently available data. Considering police records in order to verify the success rates associated with each SIR-R1 risk group would be an important goal for future research.

## **Estimating the Applicability of the SIR-R1 to Other Groups of Offenders**

A proxy of the SIR-R1 was derived. Verifications demonstrated that the SIR-Proxy adequately approximated SIR-R1 results; it was therefore used to examine the potential applicability of the SIR-R1 for Aboriginal male offenders and women offenders.

### **Aboriginal male offenders**

For Aboriginal offenders, the SIR-Proxy surpassed the level of prediction considered ‘acceptable’ for general re-offence, though not for violent or sexual re-offence. That said, it was less predictive for Aboriginal offenders than it was for non-Aboriginal offenders. These results were consistent with those of Nafekh and Motiuk (2002).

### **Women offenders**

Overall, the SIR-Proxy surpassed the level considered acceptably predictive of general re-offence for both Aboriginal and non-Aboriginal women offenders. It was predictive of violent re-offence for non-Aboriginal women, but was not predictive of sexual offence for women regardless of ethnicity. Notably the SIR-Proxy’s predictive strength with respect to general and violent re-offence for non-Aboriginal women was quite strong and surpassed that for non-Aboriginal men, the group for whom the scale was originally created.

These results parallel those of previous research. In Nafekh and Motiuk’s (2002) previous revalidation, the SIR-Proxy reached levels considered ‘good’ in predicting general and violent re-offence (though these authors did not disaggregate women by ethnicity). By separating women by ethnicity for analyses, the current study both supported the previous findings and indicated that the SIR-R1 is most predictive for those not of Aboriginal ethnicity.

### **Next steps for Aboriginal male offenders and women offenders**

Given that results of analyses involving the SIR-Proxy demonstrate that this approximation of the SIR-R1 can contribute to the prediction of risk of general re-offence for offenders other than non-Aboriginal males, it is clear that further research into the use of the SIR-R1 for Aboriginal and women offenders is required. That said, there are a number of necessary cautions that must be considered in formulating next steps in this regard. First, a number of SIR-Proxy items were more or less predictive for specific groups (e.g., employment status). Second, some items are associated with gender (e.g., employment status) or ethnicity (e.g., age at admission and seriousness of offence; Public Safety Canada, 2010) – these items may have associations with gender or ethnicity that are independent of risk of re-offence.

Third, and very importantly, there are theoretical and evidence-based arguments for the use of culturally-informed and gender-informed risk assessment instruments with Aboriginal and women offenders. Researchers in this area, however, have not yet achieved consensus. With respect to ethnicity, some researchers have suggested that factors predictive of re-offence differ for Aboriginal and non-Aboriginal offenders (e.g., Rugge, 2006), while others have found that risk assessment instruments are equally predictive for Aboriginal and non-Aboriginal offenders (e.g., Andrews & Bonta, 1995; Bonta, LaPrairie, & Wallace-Capretta, 1997; Dempsey, 2002). Turning to women offenders, research suggests that at least some of the predictors of re-offence in women are gender-neutral (e.g., Andrews & Bonta, 2010; Coid et al., 2009) – or that gender-neutral predictors of re-offence work with at least some women (Van Voorhis, Wright, Salisbury, & Bauman, 2010). That said, some women have been shown to have unique pathways to crime that are poorly captured by gender-neutral risk assessments (Van Voorhis et al., 2010) – in practice, for these women, final decisions are often inconsistent with scale recommendations. The failure of gender-neutral assessment items to capture unique pathways is a strong argument for the development of gender-informed risk assessment measures (Van Voorhis et al., 2010).

Given this context, it is recommended that further research be conducted on the extent to which a number of SIR-R1 items, together with other gender-informed and culturally-informed variables reflective of offenders' social history and unique pathways to crime, can be of utility in predicting risk of re-offence for Aboriginal and women offenders. This process would necessarily involve broad consultation with specialists in each area to identify a list of variables, in addition to those included in the SIR-R1, to be assessed prospectively. After assessing these and allowing for a follow-up period wherein offenders would have the opportunity to re-offend, the gender- and culturally-neutral, gender-informed, and culturally-informed items most predictive of risk of general re-offence for each group could be combined to create appropriate measures for risk of re-offence. This would also be an opportunity to incorporate items of a more dynamic nature. Critically, the prospective nature of the proposed approach would allow for gender- and culturally-informed factors that are not presently consistently documented to be reliably collected and measured; this should minimize some of the difficulties encountered in a previous attempt at developing a gender-informed risk assessment instrument (Zakaria, Allenby, Derkzen, & Jones, in press).

## **Conclusion**

This study's main goal was to ensure the SIR-R1 continues to be appropriate for use with non-Aboriginal offenders. The results are unequivocal: the SIR-R1 continues to predict general re-offence for this group. Indeed, despite changes in the offender population, the SIR-R1's ability to predict re-offence remains comparable to previous validation studies (Bonta et al., 1996; Nafekh & Motiuk, 2002). In addition, despite the fact that the SIR-R1 was constructed only to predict general re-offence, its ability to predict violent re-offence is also satisfactory, though somewhat less than its ability with respect to general re-offence. In practice, this means that when assessing the likelihood of violent recidivism amongst inmates, results from the SIR-R1 and violence-specific risk assessments are likely to converge. The SIR-R1 was not predictive of sexual re-offence.

Applying an approximation of the SIR-R1 to male Aboriginal offenders and to women offenders (both Aboriginal and non-Aboriginal) demonstrated that the SIR-R1 is likely able to predict general re-offence for all groups of offenders at acceptable levels, though its success with non-Aboriginal offenders (both men and women) is greater than that with Aboriginal offenders. It is recommended that CSC undertake a program of research to prospectively examine whether items from the SIR-R1, together with culturally-informed and gender-informed variables, can be used to create strong and appropriate measures of risk of general re-offence for Aboriginal and non-Aboriginal offenders of both genders. This would strengthen CSC and the Parole Board of Canada's ability to predict risk of general re-offence for offenders other than non-Aboriginal males. At present, measures focused on risk of general re-offence are lacking for these groups; the structured risk assessment measures presently available is limited and focused on criminal history risk, criminogenic need, likelihood of successful reintegration, or specialized by type of re-offence.

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## Appendices

### Appendix A: Violent and Sexual Re-offending Rates by Risk Group

Table A1

*Distribution of Non-Aboriginal Male Offenders by Risk Groups and Success Rates for Each Risk Group*

Risk Group	% (n) Successful					
	Violent Re-Offence			Sexual Re-Offence		
	SIR-R1 <sup>a</sup>	SIR-Proxy <sup>b</sup>	Recalibrated SIR-R1 <sup>c</sup>	SIR-R1 <sup>a</sup>	SIR-Proxy <sup>b</sup>	Recalibrated SIR-R1 <sup>c</sup>
Poor	90 (3,264)	91 (2,671)	90 (1,374)	99 (3,608)	99 (2,933)	99 (1,523)
Fair / Poor	93 (1,732)	92 (1,453)	91 (1,152)	99 (1,860)	99 (1,576)	100 (1,260)
Fair	94 (1,971)	94 (1,758)	95 (1,193)	100 (2,091)	100 (1,859)	100 (1,252)
Good	96 (1,636)	95 (1,638)	98 (1,162)	99 (1,690)	100 (1,715)	99 (1,181)
Very Good	99 (3,505)	98 (3,269)	99 (1,168)	100 (3,537)	100 (3,308)	100 (1,176)
Total	94 (12,108)	94 (10,789)	94 (6,049)	100 (12,786)	100 (11,391)	100 (6,392)

<sup>a</sup> N = 12,845. <sup>b</sup> N = 11,441. <sup>c</sup> N = 6,422.

Table A2

*Distribution of Aboriginal Male Offenders by SIR-Proxy Risk Groups and Success Rates for Each Risk Group*

Risk Group	% (n) Successful	
	Violent Re-Offence	Sexual Re-Offence
Poor	90 (1,054)	99 (1,158)
Fair / Poor	92 (384)	100 (417)
Fair	92 (360)	100 (390)
Good	93 (287)	100 (308)
Very Good	100 (262)	99 (266)
Total	92 (2,347)	99 (2,539)

Note. N = 2,560.

## Appendix B: Associations of SIR-R1 and SIR-Proxy Items with Re-Offence

Table B1

*Correlations ( $r_{rb}$ ) of SIR-R1 and SIR-Proxy Items with Re-Offence for Non-Aboriginal Male Offenders*

Measure	General Re-Offence		Violent Re-Offence		Sexual Re-Offence	
	SIR-R1 <sup>a</sup>	Proxy <sup>b</sup>	SIR-R1 <sup>a</sup>	Proxy <sup>b</sup>	SIR-R1 <sup>a</sup>	Proxy <sup>b</sup>
Risk Group Membership	-.42**	-.38**	-.36**	-.32**	-.14	-.13
Individual Items						
Current Offence	-.30**	-.19**	-.17**	-.10**	.04	.21
Age at Admission	-.14**	-.15**	-.17**	-.16**	.21*	.15
Previous Incarceration	-.31**	-.29**	-.26**	-.21**	-.14	-.10
Previous Revocation or Forfeiture	-.18**	-.21**	-.18**	-.19**	-.05	-.10
Act of Escape	-.14**	-.22**	-.14**	-.18**	.03	.00
Security Classification	-.03**	–	-.04**	–	-.01	–
Age at First Adult Conviction	-.26**	-.22**	-.22**	-.22**	-.06	.09
Previous Assault	-.15**	-.15**	-.21**	-.26**	-.07	-.05
Marital Status	-.10**	-.09**	-.11**	-.08**	-.13	-.11
Interval at Risk	-.32**	-.26**	-.31**	-.23**	-.07	-.13
Number of Dependants	-.04**	–	-.04**	–	-.03	–
Sentence Length	-.08**	.05**	-.03	.10**	.07	-.02
Previous Sexual Offences	.00	.00	.00	-.01	-.35**	-.54**
Previous Break and Enter	-.29**	-.33**	-.19**	-.28**	-.07	-.02
Employment Status at Arrest	-.17**	-.16**	-.17**	-.17**	.01	.06

*Note.* <sup>a</sup>  $N = 12,845$ . <sup>b</sup>  $N = 11,441$ . “–” = Item not estimated on SIR-Proxy. “Proxy” = SIR-Proxy.

\*  $p < .003$  (equivalent to  $p < .05$  with Bonferonni correction). \*\*  $p < .0006$  (equivalent to  $p < .01$  with Bonferonni correction).

Table B2

*Correlations ( $r_{rb}$ ) of SIR-Proxy Items with Re-Offence for Aboriginal Male Offenders*

Measure	Re-Offence		
	General	Violent	Sexual <sup>a</sup>
Risk Group Membership	-.25**	-.15**	-.23
Individual Items			
Current Offence	-.12**	.00	.24
Age at Admission	-.08**	-.15**	.14
Previous Incarceration	-.13**	.02	-.14
Previous Revocation or Forfeiture	-.15**	-.07	-.04
Act of Escape	-.17**	-.16**	-.14
Security Classification	—	—	—
Age at First Adult Conviction	-.18**	-.20**	.03
Previous Convictions for Assault	-.05	-.08	-.08
Marital Status at Most Recent Admission	-.01	-.03	-.03
Interval at Risk Since Last Offence	-.15**	-.14**	-.20
Number of Dependants at Most Recent Admission	—	—	—
Current Total Aggregate Sentence	.01	.07	-.05
Previous Convictions for Sexual Offences	.05*	.10**	-.54**
Previous Convictions for Break and Enter	-.26**	-.16**	-.16
Employment Status at Arrest	-.05	-.04	.02

Note.  $N = 2,560$ . “—” = Item not estimated on SIR-Proxy.

<sup>a</sup> Only 21 Aboriginal male offenders re-offended sexually. Thus, associations should be interpreted cautiously.

\*  $p < .003$  (equivalent to  $p < .05$  with Bonferonni correction). \*\*  $p < .0006$  (equivalent to  $p < .01$  with Bonferonni correction).

Table B3

*Correlations ( $r_{rb}$ ) of SIR-Proxy Items with Re-Offence for Non-Aboriginal Women Offenders*

Measure	Re-Offence	
	General <sup>a</sup>	Violent <sup>b</sup>
Risk Group Membership	-.48**	-.65**
Individual Items		
Current Offence	-.31**	-.29
Age at Admission	-.26**	-.29*
Previous Incarceration	-.37**	-.50**
Previous Revocation or Forfeiture	-.31**	-.37**
Act of Escape	-.25**	-.11
Security Classification	—	—
Age at First Adult Conviction	-.27**	-.41**
Previous Convictions for Assault	-.26**	-.47**
Marital Status at Most Recent Admission	-.06	-.07
Interval at Risk Since Last Offence	-.33**	-.23
Number of Dependants at Most Recent Admission	—	—
Current Total Aggregate Sentence	-.01	.04
Previous Convictions for Sexual Offences	-.01	-.04
Previous Convictions for Break and Enter	-.41**	-.59**
Employment Status at Arrest	-.17	-.25

Note.  $N = 684$ . “—” = Item not estimated on SIR-Proxy.

<sup>a</sup> Only 64 non-Aboriginal women offenders re-offended. Thus, associations should be interpreted cautiously.

<sup>b</sup> Only 21 non-Aboriginal women offenders re-offended violently. Thus, associations should be interpreted cautiously.

\*  $p < .003$  (equivalent to  $p < .05$  with Bonferonni correction). \*\*  $p < .0006$  (equivalent to  $p < .01$  with Bonferonni correction).

Table B4

*Correlations ( $r_{rb}$ ) of SIR-Proxy Items with Re-Offence for Aboriginal Women Offenders*

Measure	Re-Offence	
	General <sup>a</sup>	Violent <sup>b</sup>
Risk Group Membership	-.30*	-.39
Individual Items		
Current Offence	.06	-.21
Age at Admission	-.06	-.21
Previous Incarceration	-.25	-.01
Previous Revocation or Forfeiture	-.19	.19
Act of Escape	-.10	-.08
Security Classification	–	–
Age at First Adult Conviction	-.13	-.36
Previous Convictions for Assault	-.17	-.36
Marital Status at Most Recent Admission	-.12	-.06
Interval at Risk Since Last Offence	-.04	.01
Number of Dependants at Most Recent Admission	–	–
Current Total Aggregate Sentence	.05	.10
Previous Convictions for Sexual Offences <sup>c</sup>	–	–
Previous Convictions for Break and Enter	-.37**	-.39
Employment Status at Arrest	-.12	-.16

Note.  $N = 251$ . “–” = Item not estimated on SIR-Proxy.

<sup>a</sup> Only 39 Aboriginal women offenders re-offended. Thus, associations should be interpreted cautiously.

<sup>b</sup> Only 10 Aboriginal women offenders re-offended violently. Thus, associations should be interpreted cautiously.

<sup>c</sup> No Aboriginal women offender was previously convicted of a sexual offence. Therefore, an association could not be calculated for this SIR-Proxy item.

\*  $p < .003$  (equivalent to  $p < .05$  with Bonferonni correction). \*\*  $p < .0006$  (equivalent to  $p < .01$  with Bonferonni correction).

**Appendix C: Results of SIR-Proxy Recalibration**

SIR-Proxy Risk Group	Cut-Off Values		% Successful			Total % (n)	$r_{fb}$ , (AUC)		
	Lower	Upper	General	Violent	Sexual		General	Violent	Sexual
<b>Aboriginal Male Offenders</b>									
Poor	-10	-4	59	88	100	25 (315)	-.35**** (.68)	-.25**** (.63)	-.02 (.51)
Fair / Poor	-3	-1	72	90	99	22 (279)			
Fair	0	1	77	93	99	14 (182)			
Good	2	6	80	93	99	22 (283)			
Very Good	7	21	96	98	100	17 (221)			
Total			75	92	99	100 (1,280)			
<b>Non-Aboriginal Women Offenders</b>									
Poor	-18	-4	75	88	100	20 (67)	-.50**** (.75)	-.53** (.75)	--
Fair / Poor	-3	1	91	92	97	22 (74)			
Fair	2	7	93	96	100	21 (69)			
Good	8	10	95	98	100	20 (66)			
Very Good	11	14	100	100	100	17 (57)			
Total			90	97	100	100 (333)			
<b>Aboriginal Women Offenders</b>									
Poor	-10	-4	81	94	98	26 (32)	-.34* (.67)	-.33 (.67)	--
Fair / Poor	-3	-1	86	86	100	17 (21)			
Fair	0	2	74	100	98	22 (27)			
Good	3	5	100	95	100	20 (25)			
Very Good	6	15	100	100	100	15 (18)			
Total			87	96	99	100 (123)			

Note. ‘--’ indicates that the correlation or AUC value was not estimated due to the very small number of women who re-offended sexually.