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Improving the efficiency and effectiveness of the risk/needs assessment process for community-based offenders

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Aims: *The objectives of this study were (1) to explore the effects of applying a screening tool to determine who is administered the Level of Service Inventory – Revised (LSI-R); and (2) to examine the predictive utility of including LSI-R subscale scores along with standard risk factors in a model of recidivism.*

Method: *Aim (1) was addressed by developing a screening tool using routinely collected data. Predicted probabilities of re-offending were obtained from this tool. Alternative thresholds of predicted probabilities required for an LSI-R assessment were then applied. The effect of screening was examined in terms of whether those who went on to re-offend were predicted to do so, having met the applied screening tool and LSI-R risk category criteria. Aim (2) was addressed by constructing and comparing logistic regression models with and without LSI-R subscale scores to assess whether models which included LSI-R subscale scores in addition to routinely collected data were better at discriminating those who re-offended within 12 months from those who did not. Analyses were conducted separately for males and females.*

Results: *Aim (1): By administering the LSI-R to those with a predicted probability of re-offending of at least .15, 80 per cent of male and 71 per cent of female recidivists would have been identified as being likely to re-offend, using LSI-R risk level criteria of at least low-medium. Aim (2): For males and females, after controlling for standard risk factors, the LSI-R subscales education/employment and attitudes/orientation were associated with re-offending. Further, criminal history, alcohol/drugs and accommodation subscales were associated with re-offending in males, and the companions subscale was associated with re-offending in females.*

Conclusion: *More efficient identification of those at higher risk of re-offending could be achieved by using a screening tool based on routinely collected data to determine who the LSI-R is administered to. Further, the inclusion of LSI-R subscale scores in models of recidivism could improve the predictive accuracy of models developed for evaluation purposes.*

Keywords: *re-offending, risk assessment, LSI-R*

INTRODUCTION

Correctional agencies use offender risk assessment to guide intervention and management plans. Through risk assessment the overall likelihood that an individual will engage in future criminal behaviour can be estimated and specific factors related to an offender's criminal behaviour can be identified. Treatment services can then be matched accordingly, with the view that reducing criminogenic needs will result in a decrease in the chance of further criminal involvement. Risk assessments may influence such things as length of incarceration, program admission, and level of supervision.

The process of risk assessment has developed through several stages (Andrews & Bonta, 2006), from the first generation of assessments which used unstructured clinical judgement, to second generation assessments that involved actuarial methods based on a limited range of demographic, offence and criminal history factors; to a third generation of assessments that incorporated both clinical and actuarial techniques. Through this process risk assessment has become less subjective and more grounded in psychological and social learning theory (Andrews & Bonta, 2006).

While many risk assessment tools are available, the Level of Service Inventory – Revised (LSI-R) is the instrument routinely

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used by Corrective Services New South Wales (NSW) and forms the basis of all its assessments and case planning. The LSI-R was designed to identify the risks and needs of offenders incarcerated as well as those in community settings (Andrews & Bonta, 1995), and has been shown to be a valid and reliable tool for many offender populations (Andrews & Bonta, 2006). The instrument consists of 54 items covering both static and dynamic factors. Items are grouped into 10 subscales: criminal history, education/employment, financial, family/marital, accommodation, leisure/recreation, companions, alcohol/drug, emotional/personal, and attitudes/orientation. An overall summary risk score is produced that can be categorised into five risk levels of recidivism. Higher intensity interventions, increased supervision and monitoring, can then be targeted at offenders identified as being at higher risk of re-offending (Watkins, 2011). Perhaps more importantly, the LSI-R offers a structured basis for intervention. With a focus on dynamic risk factors, that are potentially changeable, the LSI-R can be used to identify criminogenic needs that rehabilitation programs can target for intervention. By focusing on changing these factors programs should be more successful at reducing offenders' recidivism.

In 2009/10, 29,513 LSI-R assessments were completed by Corrective Services NSW for offenders in the community and in correctional centres (Department of Justice & Attorney General, 2010). One of the difficulties with the LSI-R is that it is time-consuming and costly to administer. Weatherburn, Cush and Saunders (2007) and, more recently Lind (2011) have suggested that it may be more efficient to conduct a preliminary triage of offenders using a simple actuarial instrument to identify offenders at higher risk of re-offending before using a more rigorous tool, such as the LSI-R, to assess their criminogenic needs and develop an appropriate intervention or offender management plan. Triaging, or screening, offenders will result in a decrease in total LSI-R administration costs. Furthermore, low-risk offenders will be 'screened out' and will not receive potentially unnecessary interventions. However, this strategy is only feasible if it is possible to develop screening tools that are reasonably accurate at ruling out those who won't go on to re-offend without incorrectly ruling out those who will.

In classifying offenders into groups based on how likely they are to re-offend two types of error can occur: false-negatives (i.e. 'misses') and false-positives (i.e. 'false alarms'). A false-negative occurs when an offender is classified as being less likely to re-offend, but turns out to be a recidivist. Such an offender would likely miss out on an intervention program that may have been effective in reducing their recidivism. A false-positive occurs when an offender is classified as being likely to re-offend but in fact would not have gone on to re-offend. Such an offender may be unnecessarily placed on an intervention program. Thus, there are risks and costs associated with both types of errors. Box 1 displays these errors and provides some measures of assessing the accuracy of classification.

The validity of classifying offenders can be described in terms of the degree to which recidivists and non-recidivists are correctly categorised. 'Sensitivity' is a measure of the percentage of offenders who went on to re-offend who were predicted to re-offend, while 'specificity' refers to the percentage of offenders who did not re-offend who were predicted not to re-offend. The percentage of offenders predicted to re-offend who went on to re-offend is referred to as the 'positive predictive value', and the percentage of offenders predicted not to re-offend who did not go on to re-offend the 'negative predictive value'. One aim of the current study is to examine the effects on classification accuracy of applying a screening tool to determine who receives the LSI-R. In the current context, the question of accuracy in identifying those who will and who will not go on to re-offend arises at two points. The first is when we seek to determine to whom to administer the LSI-R. The second is following administration of the LSI-R to identify who is at risk of re-offending, and ought to be referred to treatment. We examine the accuracy of our assessments at both these stages.

Box 1. Measures of classification accuracy

		Recidivism (observed)		
		Recidivist	Non-recidivist	
Assessment (predicted)	High risk	True-positive *a*	False-positive *c*	Positive predictive value *a/(a+c)*
	Low risk	False-negative *b*	True-negative *d*	Negative predictive value *d/(b+d)*
		Sensitivity *a/(a+b)*	Specificity *d/(c+d)*	

Risk assessment is only one of the potential uses of the LSI-R. Program evaluation is another potential use. Researchers are often compelled to use non-experimental methods to evaluate correctional programs. These methods generally require explicit (statistical) controls for factors that could bias comparisons of treatment and comparison group outcomes. It is not always easy to determine what factors should be included as controls in such analyses and in practice most studies only control for a small number of static demographic and criminal history factors. The LSI-R contains a rich source of additional controls that could possibly be incorporated into program evaluations. A second aim of the current study, then, is to determine what domains in the LSI-R predict re-offending after controlling for the usual demographic and criminal history factors and to assess how a model that includes LSI-R subscale scores compares with a model of recidivism using standard risk factors derived from routinely collected data.

Aims

The objectives of this study were:

(1) to investigate the effect, on the identification of recidivist offenders, of using a screening tool to determine who is administered the LSI-R; and

(2) to examine the predictive utility of including LSI-R subscale scores along with standard risk factors in a model of recidivism.

METHODS

DATA SOURCES

LSI-R data were provided by Corrective Services NSW and linked to the Re-offending Database (ROD) developed and maintained by the NSW Bureau of Crime Statistics and Research. The LSI-R data were obtained from assessments conducted by qualified staff within Corrective Services NSW, such as probation and parole officers and psychologists. The LSI-R data provided included the overall score and re-offending risk level category (low, low-medium, medium, medium-high, high), as well as scores on each of the ten domains/subscales: criminal history, education/employment, financial, family/marital, accommodation, leisure/recreation, companions, alcohol/drug problems, emotional/personal and attitudes/orientation. Low overall scores on the LSI-R indicate a low probability of committing future offences, while higher scores indicate a higher probability of committing future offences.

ROD contains information on all finalised appearances in NSW courts since 1994, as well as records of youth justice conferences and formal police cautions from 1998. Information includes demographic details of individuals (e.g., age, sex, and Indigenous status), offence characteristics (e.g., type of offence) and penalties received. Records in ROD are linked such that multiple appearances for any one individual can be identified (Hua & Fitzgerald, 2006), and an individual's criminal history can be constructed. LSI-R records were linked to ROD using details such as name and date of birth. This linkage enabled a comparison of observed re-offending against risk of re-offending predicted from the LSI-R and the screening tool.

PARTICIPANTS

The sample includes persons aged 18 years and over who were convicted in a NSW court in 2008 and received a principal penalty of a supervised bond or supervised suspended sentence. Thus, the current study focuses on offenders who received a non-custodial/community-based penalty involving supervision by Corrective Services NSW.[1] Where a person received multiple supervised sentences within 2008, one conviction was selected at random as their 'index' conviction. Those who were convicted and sentenced to prison after the index conviction for an offence that occurred prior to the index conviction were excluded. The final sample includes 5,523 male and 1,414 female offenders who had a LSI-R administration within 12 months (either side) of their index conviction,[2] representing 85.8 and 88.4 per cent, respectively, of all males and females given a supervised sentence (bond or suspended sentence) in 2008.[3]

DEFINITION OF RE-OFFENDING

Re-offending was defined as a re-offence that occurred within 12 months of the index conviction, for which the offender was convicted before July 2010.[4]

STATISTICAL ANALYSIS

Aim 1: A two-tiered assessment strategy using a screening tool and the LSI-R

The first aim of the study was to see whether it is possible to improve the efficiency of the existing offender risk/needs assessment process, by using a screening tool to guide who receives the LSI-R. The first step in addressing this aim was to develop a screening tool using a logistic regression model of recidivism.[5] Separate tools were developed for males and females. In line with other re-offending models developed by BOCSAR (e.g., Smith & Jones, 2008), a range of factors (e.g., age, Indigenous status, number and type of prior convictions, whether convicted as a juvenile, types of prior sentences, type of principal offence, number and type of concurrent offences) were considered for inclusion in the screening tools. Final models were then used to obtain a predicted probability of re-offending for each individual. The impact of changing the threshold of the predicted probability of re-offending required for an LSI-R

assessment and the LSI-R threshold for identification as 'higher risk' (based on LSI-R risk level categories) was then examined in terms of four measures:

- sensitivity - the percentage of offenders who went on to re-offend who were predicted to re-offend;
- specificity - the percentage of offenders who did not re-offend who were predicted not to re-offend;
- positive predictive value - the percentage of offenders predicted to re-offend who went on to re-offend; and
- negative predictive value - the percentage of offenders predicted not to re-offend who did not go on to re-offend.

Aim 2: Including LSI-R subscale scores in models of re-offending

To examine the utility of including LSI-R subscale scores as controls in models of recidivism typically used for program evaluation purposes, several logistic regression models were developed to predict whether an offence was committed within 12 months of the index conviction. These models included LSI-R subscale scores alone and in combination with routinely collected variables commonly included in BOCSAR's recidivism models (as per the screening tools developed in Aim 1). Analyses were conducted separately for males and females.

Models were assessed and compared in relation to their ability to discriminate those who re-offended within 12 months from those who did not. A key indicator of model fit was the area under the receiver operating characteristic curve (AUC). The receiver operating characteristic curve is a plot of the proportion of true-positives (those predicted to re-offend who are observed to re-offend) against false-positives (those predicted to re-offend who do not actually re-offend) at any given cut-off point for re-offending. The AUC can be interpreted as the likelihood that an offender who has a subsequent conviction will have a higher predicted probability of re-offending than a person who does not go on to have a further conviction (Hosmer & Lemeshow, 2000). This statistic takes a value between 0.5 and 1.0 where, as a rule of thumb, Hosmer and Lemeshow (2000) suggest that scores greater than or equal to 0.9 provide 'outstanding' discrimination, scores between 0.8 and 0.9 provide 'excellent' discrimination, scores between 0.7 and 0.8 provide 'acceptable' discrimination and models yielding AUC scores equal to 0.5 predict the outcome at no better than chance.

RESULTS

Aim 1: A two-tiered assessment strategy using a screening tool and the LSI-R

Classifying offenders at higher risk of re-offending using the LSI-R

An offender's LSI-R risk level is often considered when deciding whether to place them on a program. For example, offenders supervised by Corrective Services NSW who are identified as medium to high risk of re-offending receive a higher level of intervention, they may be required to participate in targeted group work programs and interventions, with closer supervision and monitoring, including more home visits and employment checks (NSW Department of Justice & Attorney General, 2010). Presented in Table 1 are the frequencies of offenders at each LSI-R risk level category, the percentage who re-offended within 12 months and bivariate relationships between LSI-R risk level categories and re-offending (expressed as odds ratios).

Overall, 22.5 per cent of males and 19.4 per cent of females re-offended within 12 months of receiving a sentence of a supervised bond or suspended sentence. In both males and females the majority of offenders (around 60%) were classified as being at less than medium risk of re-offending according to

Table 1. LSI-R risk levels and rate and odds of re-offending within 12 months

	Males					Females				
			Unadjusted					Unadjusted		
	n (%)	% re-offend	Odds ratio	(95% CI)	*p*	n (%)	% re-offend	Odds ratio	(95% CI)	*p*
All	5,523 (100.0)	22.5				1,414 (100.0)	19.4			
LSI-R risk level (score)										
Low (0-13)[a]	1,364 (24.7)	10.2	1.00			294 (20.8)	6.8	1.00		
Low-medium (14-23)	2,143 (38.8)	19.2	2.10	(1.71, 2.58)	<.001	544 (38.5)	15.8	2.57	(1.55, 4.28)	<.001
Medium (24-33)	1,603 (29.0)	31.2	3.99	(3.26, 4.90)	<.001	432 (30.6)	25.2	4.62	(2.80, 7.65)	<.001
Medium-high (34-40)	364 (6.6)	44.5	7.07	(5.39, 9.27)	<.001	128 (9.1)	40.6	9.37	(5.28, 16.66)	<.001
High (41-54)	49 (0.9)	59.2	12.78	(7.04, 23.19)	<.001	16 (1.1)	43.8	10.66	(3.59, 31.60)	<.001

[a] Reference category

the LSI-R. Only 1 per cent of offenders were classified as high risk. As expected, the rate of re-offending within 12 months (observed) increased with increasing risk level. For males, the odds of re-offending for those classified as being at medium risk were 4.0 times the odds of those at low risk, while the odds of re-offending for those classified as being at high risk were 12.8 times the odds of those at low risk. A similar association was seen for females: the odds of re-offending for those classified as being at medium risk were 4.6 times the odds of those at low risk, and the odds of re-offending for those classified as being at high risk were 10.7 times the odds of those at low risk. Of interest, while rates of re-offending were less than 20 per cent in those at low-medium risk, due to around 40 per cent of the sample being low-medium risk, over 30 per cent of offenders in this study who re-offended within 12 months were classified as low-medium risk.

Using a screening tool to guide who is administered the LSI-R

The screening tools developed to guide who receives LSI-R assessment are based on logistic regression models of re-offending using information readily accessible from ROD. These models are presented in Table 2 (bivariate/unadjusted analyses are included in Table A1 of the Appendix). For males and females, age, Indigenous status, principal offence type at index conviction and various factors related to prior convictions were found to be independently associated with re-offending within 12 months. In addition, for males, the type and length of penalty received (i.e., a supervised bond or suspended sentence, for more or less than 12 months) were also associated with re-offending, as was a prior prison sentence. AUC values for these models were .71, suggesting 'fair' performance in terms of discriminating those who re-offended from those who did not.

Table 2. Screening tools: Models predicting re-offending within 12 months using routinely collected data

		Males (n=5,523)			Females (n=1,414)		
		Odds Ratio	(95% CI)	*p*	Odds Ratio	(95% CI)	*p*
Age	18-21 years vs 45+ years	2.28	(1.72, 3.02)	<.001	1.70	(0.91, 3.16)	.094
	22-24 years vs 45+ years	1.39	(1.03, 1.87)	.029	2.20	(1.19, 4.08)	.012
	25-34 years vs 45+ years	1.23	(0.96, 1.58)	.107	1.82	(1.09, 3.03)	.021
	35-44 years vs 45+ years	1.30	(1.01, 1.67)	.042	1.66	(0.99, 2.79)	.054
Indigenous status	Indigenous vs Non-Indigenous/Unknown	1.40	(1.15, 1.69)	.001	0.62	(0.43, 0.91)	.013
Principal offence type	Violent vs Driving	1.63	(1.33, 2.01)	<.001	1.07	(0.68, 1.69)	.769
	Theft vs Driving	1.63	(1.24, 2.14)	<.001	1.58	(0.98, 2.54)	.060
	Drugs vs Driving	1.13	(0.82, 1.57)	.458	0.78	(0.38, 1.60)	.504
	Property damage vs Driving	2.15	(1.58, 2.94)	<.001	1.91	(0.95, 3.81)	.068
	Offences against justice procedures vs Driving	1.86	(1.46, 2.37)	<.001	1.69	(1.02, 2.78)	.041
	Other vs Driving	1.71	(1.29, 2.27)	<.001	1.07	(0.62, 1.87)	.798
Concurrent public order offence	Yes vs No				1.99	(1.28, 3.09)	.002
Principal penalty	Supervised suspended sentence vs Bond	1.84	(1.53, 2.22)	<.001			
Length of sentence	At least 12 months vs Less than 12 months	0.61	(0.50, 0.74)	<.001			
Number of convictions in prior 5 years*		1.21	(1.16, 1.26)	<.001	1.23	(1.11, 1.35)	<.001
Prior conviction as a juvenile	Yes vs No/Unknown	1.22	(1.02, 1.46)	.029	1.48	(1.00, 2.21)	.052
Prior conviction for non-driving related offence	Yes vs No/Unknown	1.36	(1.10, 1.68)	.005	1.94	(1.27, 2.95)	.002
Prior drug conviction	Yes vs No/Unknown	1.39	(1.18, 1.63)	<.001			
Prior prison sentence	Yes vs No/Unknown	1.43	(1.20, 1.71)	<.001			
		AUC= .708 (.692, .724)			*AUC= .706 (.673, .740)*		

* For males this variable was coded from 0 to 8+, and for females from 0 to 5+.

Figure 1. Sensitivity and per cent of sample corresponding to predicted probabilities of re-offending from screening tools

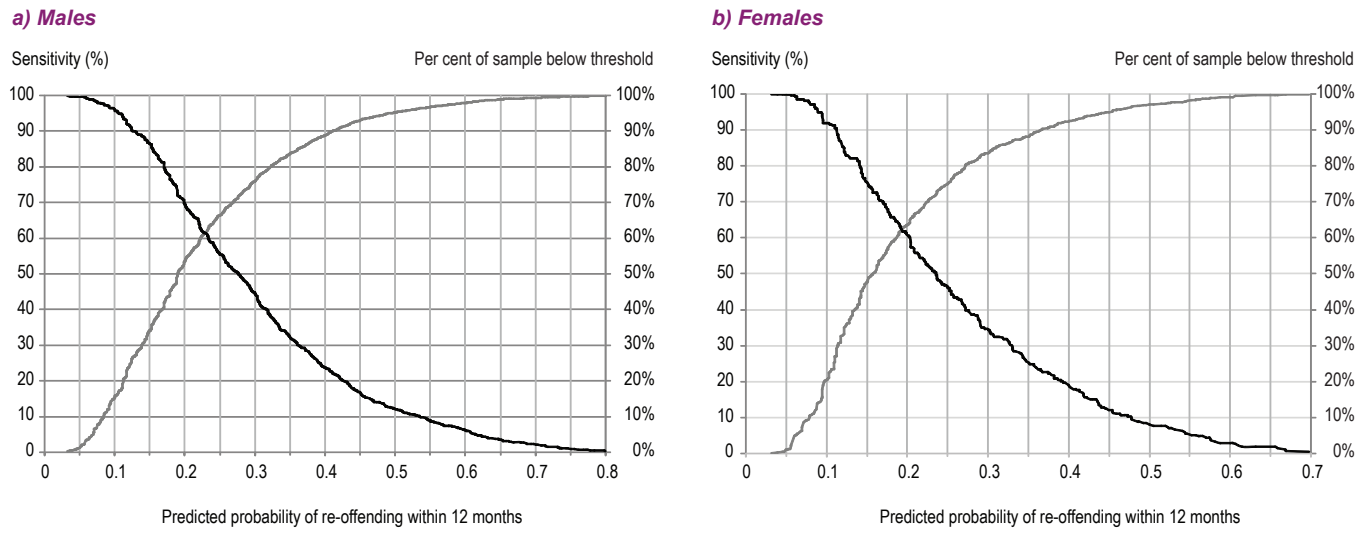

Table 3. Discriminatory accuracy associated with predicted probabilities of re-offending

	Predicted probability of re-offending	n (%)	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Males	>=.10	4,684 (85)	96.1	18.5	25.5	94.3
	>=.15	3,642 (66)	86.4	40.0	29.5	91.1
	>=.20	2,559 (46)	69.5	60.4	33.7	87.2
Females	>=.10	1,126 (80)	92.0	23.3	22.4	92.4
	>=.15	743 (53)	75.6	53.0	27.9	90.0
	>=.20	516 (36)	60.6	69.3	32.2	88.0

In using a screening tool to guide who receives the LSI-R it is important to apply a sufficiently low threshold of predicted probability of re-offending so that virtually all offenders at high risk of re-offending are referred for further LSI-R assessment. When the threshold used has high sensitivity (i.e. a high percentage of recidivists are predicted to re-offend), those with predicted probabilities falling below the threshold can be ruled out in terms of being likely recidivists.

In Figure 1 sensitivity is plotted against the predicted probability of re-offending, along with the corresponding proportion of the sample. To take an example from Figure 1a, in males a predicted probability of re-offending of at least .15 is related to sensitivity of 85 per cent (i.e., 85 per cent of those who re-offended within 12 months had a predicted probability of re-offending from the model of at least .15). If a predicted probability threshold of at least .15 was applied to determine who received the LSI-R, approximately 35 per cent of the male sample would not be administered the LSI-R. Similarly, in females a predicted probability of re-offending of at least .15 corresponds to sensitivity of 76 per cent, and if a predicted probability threshold of at least .15 was applied 47 per cent of the sample with a predicted probability of re-offending of less than .15 would not be administered the LSI-R.

Sensitivity values for thresholds of .10, .15 and .20 are shown in Table 3, along with the numbers of offenders with predicted probabilities above the threshold, and corresponding specificity, positive and negative predictive values. From the table it can be seen that as the predicted probability threshold increases, sensitivity and negative predictive values decrease, while specificity and positive predictive values increase. There is a trade-off: for example, as the threshold increases the percentage of true recidivists with a predicted probability of re-offending

above the threshold decreases, while the percentage of those with a predicted probability of re-offending above the threshold who are true recidivists increases. In the next section we examine how the accuracy of classification of those at higher risk of re-offending changes if we only administer the LSI-R to offenders with predicted probabilities of at least .10, .15 and .20.

The effect of screening on the classification of offenders at higher risk of re-offending

In Table 4 we show the effect of applying a screening tool prior to the LSI-R to classify offenders at higher risk of re-offending (i.e. we assume that the LSI-R is only administered to those with a predicted probability of re-offending from the screening tool above a certain threshold). In using a screening tool to guide who is administered the LSI-R, there is the chance that the LSI-R may not be administered to some offenders who may indeed have been classified as being at higher risk of re-offending had the LSI-R been administered to all offenders, without consideration of the screening tool. For example, it is possible that an individual may have a predicted probability of re-offending of .1 according to the screening tool and that on this basis a decision may be made not to administer the LSI-R. However, had they been administered the LSI-R they may have been classified as being at high risk of re-offending. Descriptive statistics on predictive probabilities of re-offending from the screening tool by LSI-R risk level category are presented in Table A3 of the Appendix.

To enable comparison of diagnostic accuracy of different scenarios we present the sensitivity, specificity, positive and negative predictive values (as defined in the methods section) associated with various hypothetical scenarios. In these scenarios we vary the thresholds of predicted probabilities from the screening tools (using values of .10, .15 and .20) and the risk categories from the LSI-R used to classify those at higher risk (using low-medium to high, and medium to high). For comparative purposes, these values are calculated for scenarios in which the LSI-R is used alone, as per current practice. The performance of the LSI-R when used alone to classify offenders at higher risk of re-offending should be kept in mind.

As an example from Table 4, we describe the first line of results for males. By using the LSI-R alone (i.e., administering the LSI-R to all) and classifying offenders at higher risk of re-offending as those with at least low-medium risk, 89 per cent of those who went on to re-offend within 12 months would have been identified as high-risk (sensitivity), however only 27 per cent of those classified as being higher-risk offenders would have re-offended within 12 months (positive predictive value). Thus 11 per cent of those who went on to re-offend would not have been classified as being at higher risk of re-offending, and

Table 4. Discriminatory accuracy of various scenarios using the screening tool and the LSI-R risk category to classify offenders at higher risk of re-offending

	Criteria for classifying higher-risk offenders			LSI-R administrations, n (%)	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
	Screening tool		LSI-R					
Males	*Not applied*		Low-medium to High	5,523 (100)	88.8	28.6	26.5	89.8
	>=.10	&	Low-medium to High	4,684 (85)	86.2	37.8	28.7	90.5
	>=.15	&	Low-medium to High	3,642 (66)	79.7	51.0	32.0	89.6
	>=.20	&	Low-medium to High	2,559 (46)	65.9	65.4	35.6	86.8
	Not applied		Medium to High	5,523 (100)	55.6	69.1	34.3	84.3
	>=.10	&	Medium to High	4,684 (85)	54.5	71.8	35.9	84.5
	>=.15	&	Medium to High	3,642 (66)	52.0	75.8	38.4	84.5
	>=.20	&	Medium to High	2,559 (46)	46.4	81.1	41.6	83.9
Females	*Not applied*		Low-medium to High	1,414 (100)	92.7	24.0	22.7	93.2
	>=.10	&	Low-medium to High	1,126 (80)	85.8	37.7	24.9	91.7
	>=.15	&	Low-medium to High	743 (53)	71.2	58.6	29.2	89.4
	>=.20	&	Low-medium to High	516 (36)	57.7	71.6	32.8	87.6
	Not applied		Medium to High	1,414 (100)	61.3	64.2	29.2	87.4
	>=.10	&	Medium to High	1,126 (80)	58.8	68.2	30.7	87.3
	>=.15	&	Medium to High	743 (53)	51.5	75.4	33.5	86.6
	>=.20	&	Medium to High	516 (36)	44.2	81.1	36.0	85.8

73 per cent of those classified as being at higher risk of re-offending would not have re-offended within 12 months. Looking at the specificity and negative predictive value presented in the table, only 29 per cent of non-recidivists (i.e., those who did not re-offend within 12 months) would have been correctly classified as being at lower risk of re-offending, while 90 per cent of those classified as being at lower risk of re-offending would not have re-offended.

As shown in Table 4, the accuracy of the scenarios in identifying recidivists varies markedly, as a function of the thresholds applied and whether the LSI-R is used alone or with the screening tool. Of the scenarios presented, the one that would have resulted in the identification of the greatest proportion of recidivists (sensitivity, 89% for males and 93% for females) involved a threshold of low-medium LSI-R risk level. However, on the flipside, this scenario would have produced the highest rate of false positives (non-recidivists incorrectly classified as being at higher risk of re-offending), with low positive predictive values (27% of males and 23% of females classified as being at higher risk of re-offending according to the criteria re-offended), and low specificity (29% of non-recidivist males and 24% of non-recidivist females correctly classified as being at lower risk of re-offending). The scenario that would have resulted in the lowest rate of false positives (positive predictive value, 42% for males and 36% for females) was a threshold of .20 predicted probability of re-offending from the screening tool along with at least a medium-high LSI-R risk level. In this scenario the LSI-R would have been administered only to those offenders with a predicted probability of re-offending of at least .20, corresponding to 46 per cent of the male sample and 36 per cent of the female sample. However, only 46 per cent of male and 44 per cent of female recidivists would have been classified as being at higher risk of re-offending (sensitivity).

The scenarios that involve administering the LSI-R only to a subset of offenders who met a threshold predicted probability of re-offending from the screening tool are of particular interest in showing how resources expended administering the LSI-R could be reduced. For example, in males, had the LSI-R been administered only to the two-thirds of the sample with a predicted probability of re-offending of at least .15, and higher-risk offenders were defined as those with at least a low-medium LSI-R risk level, then 80 per cent of recidivists would have been identified (sensitivity). This scenario had higher sensitivity than did a scenario in which 100 per cent of offenders were administered the LSI-R and those with at least medium risk classified as higher-risk offenders (sensitivity 56%), as per current practice.

While somewhat arbitrary and primarily chosen for illustrative purposes, the criteria applied in this study were guided by the observed rate of re-offending in the sample as well as by current practice. The thresholds of predicted re-offending probability used were around or below the rate of re-offending observed overall (22.5% of males and 19.4% of females re-offended within 12 months). In line with current practice, whereby offenders identified as medium to high risk on the LSI-R may receive a higher level of supervision by Corrective Services NSW, medium to high LSI-R risk level categories were used to classify those at higher risk of re-offending in this study. Due to the finding that around 30 per cent of recidivist offenders in the study sample had a LSI-R risk level of low-medium, consideration was also given to classifying offenders as being at higher risk of re-offending when they had a LSI-R risk category of low-medium to high. In practice, consideration would need to be given to available resources and the costs and benefits of the proposed intervention or management plan before determining the criteria.

Aim 2: Including LSI-R subscale scores in models of re-offending

The previous section explored the effects of classifying offenders at higher risk of re-offending using the LSI-R along with a screening tool. Such assessment strategies could be adopted to more effectively guide decisions relating to management and program placement. In the analyses that follow we examine the utility of including LSI-R subscale scores, along with standard risk factors, in models developed to evaluate the effectiveness of a particular program or sentencing outcome. Typically, such evaluations involve controlling for factors that could bias comparisons of treatment and comparison group outcomes. The LSI-R contains information on factors not ordinarily controlled for in these evaluations.

We start with an examination of LSI-R subscale scores as predictors of re-offending within 12 months, without the inclusion of standard controls. As shown in Table 5, when all subscale scores were treated as continuous variables and entered into a model at the same time, some were found not to be independently associated with re-offending. In males, three of the ten domains (financial, family/marital and emotional/personal domains) were not found to be independently associated with the risk of re-offending within 12 months, while the leisure/recreation domain was weakly associated. In females, only three of the ten subscales were found to be independently associated with re-offending: criminal history, education/employment, and companions.

The relationship between some subscale scores and the likelihood of re-offending was non-linear. For this reason, these subscale scores were converted into categorical variables. For example, for males alcohol/drug scores were categorised into 0-1, 2-5, 6-9, and attitudes/orientation into 0, 1, 2-4. Models were then developed which included only those subscales that were independently associated with re-offending. In males these were: criminal history, education/employment,

Table 5. LSI-R total score and subscale scores as predictors of re-offending

		Males (n=5,523)			Females (n=1,414)		
		Odds Ratio	(95% CI)	*p*	Odds Ratio	(95% CI)	*p*
Original, all entered	Criminal history (0-10)	1.12	(1.09, 1.16)	<.001	1.14	(1.07, 1.22)	<.001
	Education/Employment (0-10)	1.09	(1.06, 1.13)	<.001	1.07	(1.00, 1.13)	.036
	Financial (0-2)	0.95	(0.86, 1.06)	.402	1.12	(0.87, 1.43)	.374
	Family/Marital (0-4)	1.01	(0.94, 1.07)	.854	0.95	(0.84, 1.08)	.472
	Accommodation (0-3)	1.14	(1.04, 1.24)	.003	1.14	(0.96, 1.34)	.128
	Leisure/Recreation (0-2)	1.11	(1.01, 1.23)	.032	1.04	(0.84, 1.28)	.740
	Companions (0-4)	1.16	(1.08, 1.24)	<.001	1.33	(1.15, 1.53)	<.001
	Alcohol/Drugs (0-9)	1.06	(1.02, 1.10)	.001	0.99	(0.93, 1.06)	.783
	Emotional/Personal (0-5)	0.98	(0.93, 1.02)	.295	0.98	(0.89, 1.08)	.684
	Attitudes/Orientation (0-4)	1.13	(1.07, 1.19)	<.001	1.10	(0.98, 1.24)	.110
		AUC= .687 (.670, .704)			*AUC= .698 (.664, .732)*		
Modified, selected	Criminal history (0-10)	1.12	(1.09, 1.16)	<.001	1.14	(1.07, 1.22)	<.001
	Education/Employment (0-10)	1.09	(1.06, 1.12)	<.001			
	1-3 vs 0				3.10	(0.94,10.16)	.062
	4-10 vs 0				4.38	(1.34,14.29)	.014
	Accommodation (0-3)	1.15	(1.06, 1.25)	.001	1.16	(0.99, 1.35)	.061
	Companions (0-4*)	1.17	(1.09, 1.25)	<.001	1.47	(1.25, 1.74)	<.001
	Alcohol/Drugs 2-5 vs 0/1	1.53	(1.17, 1.99)	.002			
	6-9 vs 0/1	1.71	(1.29, 2.25)	<.001			
	Attitudes/Orientation 1 vs 0	1.34	(1.12, 1.61)	.002			
	2-4 vs 0	1.50	(1.29, 1.76)	<.001			
		AUC=.687 (.670, .704)			*AUC=.701 (.667, .734)*		

* For females the companions scale was examined from 0 to 3+, rather than 0 to 4.

alcohol/drugs, accommodation, companions and attitudes/orientation. For females, the domains were: criminal history, education/employment, accommodation and companions. For the model developed for males, the area under the curve was .69, indicating the model performed between 'poor' and 'fair' in differentiating those who re-offended from those who did not (Hosmer & Lemeshow, 2000). The area under the curve for the model for females was .70, suggesting the model's performance was 'fair' in terms of its ability to discriminate those who re-offended from those who did not. The screening tool developed to address aim 1 (presented in Table 1) showed similar predictive accuracy in terms of discriminating those who re-offended from those who did not.

The models presented in Table 6 were developed by considering the LSI-R subscale scores along with standard ROD variables included in the screening tools in Table 1. Only factors found to be independently associated with re-offending were included. These variables differed for males and females.

For males, the LSI-R subscales criminal history, education/employment, alcohol/drugs, accommodation, and attitudes/orientation remained independently associated with re-offending in the presence of standard ROD variables such as age, Indigenous status, principal offence type, type and length of penalty, number of convictions in the last five years and prior drug conviction. For females, the LSI-R subscales education/employment, companions and attitudes/orientation were independently associated with re-offending, as were a concurrent public order offence, having a prior (non-traffic) conviction, a prior conviction as a juvenile, and the number of convictions in the previous five years. AUC values for these models, compared with the models using routinely collected data from ROD, presented earlier, and the models that included LSI-R subscales alone, suggest an improvement in predictive accuracy when LSI-R subscale scores and standard risk factors are combined in models to predict re-offending (Table 7).

Table 6. Models of re-offending using the LSI-R and standard risk factors from ROD

a) Males			Odds Ratio	(95% CI)	p
LSI-R subscales (modified)	Criminal history (0-10)		1.13	(1.09, 1.18)	<.001
	Education/Employment (0-10)		1.05	(1.02, 1.08)	<.001
	Alcohol/Drugs	2-5 vs 0/1	1.53	(1.17, 2.00)	.002
		6-9 vs 0/1	1.73	(1.31, 2.29)	<.001
	Accommodation (0-3)		1.09	(1.01, 1.19)	.037
	Attitudes/Orientation	1 vs 0	1.34	(1.11, 1.62)	.002
		2-4 vs 0	1.53	(1.30, 1.80)	<.001
Age	18-21 years vs 45+ years		2.89	(2.17, 3.85)	<.001
	22-24 years vs 45+ years		1.65	(1.23, 2.22)	.001
	25-34 years vs 45+ years		1.38	(1.08, 1.77)	.010
	35-44 years vs 45+ years		1.29	(1.00, 1.67)	.050
Indigenous status	Indigenous vs Non-Indigenous/Unknown		1.29	(1.06, 1.57)	.010
Principal offence type	Violent vs Driving		1.50	(1.21, 1.85)	<.001
	Theft vs Driving		1.48	(1.13, 1.95)	.005
	Drugs vs Driving		1.05	(0.75, 1.46)	.784
	Property damage vs Driving		1.80	(1.31, 2.47)	<.001
	Offences against justice procedures vs Driving		1.54	(1.21, 1.98)	.001
	Other vs Driving		1.54	(1.15, 2.05)	.004
Principal penalty	Supervised bond vs Supervised suspended sentence		1.87	(1.55, 2.26)	<.001
Length of sentence	At least 12 months vs Less than 12 months		0.64	(0.52, 0.78)	<.001
Number of convictions in prior 5 years			1.15	(1.10, 1.20)	<.001
Prior drug conviction	Yes vs No/Unknown		1.23	(1.05, 1.46)	.013
			AUC= .729 (.713,.745)		

b) Females			Odds Ratio	(95% CI)	p
LSI-R subscales (modified)	Education/Employment	1-3 vs 0	3.22	(0.97, 10.62)	.055
		4-10 vs 0	4.11	(1.25, 13.51)	.020
	Companions (0-3+)		1.42	(1.19, 1.68)	<.001
	Attitudes/Orientation (0, 1-2, 3-4)		1.21	(1.00, 1.48)	.055
Indigenous status	Indigenous vs Non-Indigenous/Unknown		0.58	(0.40, 0.84)	.004
Concurrent public order offence	Yes vs No		2.11	(1.37, 3.25)	.001
Prior conviction, not traffic	Yes vs No/Unknown		1.64	(1.08, 2.47)	.020
Prior conviction as a juvenile	Yes vs No/Unknown		1.56	(1.09, 2.22)	.014
Number of convictions in prior 5 years			1.17	(1.06, 1.29)	.002
			AUC= .730 (.700, .762)		

Table 7. Accuracy of models predicting re-offending within 12 months

	Males		Females	
Model	**AUC**	**(95% CI)**	**AUC**	**(95% CI)**
Routinely collected data from ROD (screening tool)	0.708	(.692, .724)	0.706	(.673, .740)
All LSI-R subscale scores	0.687	(.670, .704)	0.698	(.664, .732)
Selected LSI-R subscale scores combined with routinely collected data from ROD	0.729	(.713, .745)	0.730	(.700, .762)

DISCUSSION

The objectives of this study were to explore whether the LSI-R could be used in conjunction with a screening tool to optimise the identification of offenders at higher risk of re-offending, and to examine the effect of including LSI-R subscale scores in a model of recidivism. Accordingly, the findings of this study have numerous practical applications.

The LSI-R is commonly used to assess risk and guide intervention and management plans in the NSW correctional setting. Indeed, targeting those most at risk of re-offending should be a priority, as resources and program capacity are limited and placing offenders on programs who when they are likely to cease offending anyway is not an optimal strategy for allocating scarce resources. However, the LSI-R itself is time-consuming and costly to administer and it could be argued that there is little value in administering the LSI-R to offenders at low risk of re-offending. It has therefore been suggested that offenders are triaged, with those deemed at higher risk at this initial assessment referred for a more thorough assessment with the LSI-R.

While a screening version of the LSI-R does exist, the current study provided an illustration of how a screening tool developed from routinely collected data may be used to guide who is administered the LSI-R. For example, by applying criteria from a screening tool and only administering the LSI-R to two-thirds of the male sample, 80 per cent of male recidivists would have been classified as being at higher risk of re-offending (having at least a low-medium risk on the LSI-R), with a positive predictive value of 32 per cent (i.e., 32% of those classified as being at higher risk of offending went on to re-offend within 12 months, 68% did not re-offend). The degree to which this is acceptable would very much depend on the purpose and implications of identifying offenders at higher risk of re-offending. Of note, had the LSI-R been used alone, with those having at least a medium risk classified as being at higher risk, 56 per cent of male recidivists would have been identified, with a positive predictive value of 34 per cent. Findings were similar for females. Regardless of the criteria used, in selecting a targeted group to receive the LSI-R there will be a chance that not all of those at high risk of re-offending will be identified and also, that some offenders at low risk of re-offending will be unnecessarily placed on an intervention program. In weighing up the importance of these scenarios, and setting criteria for identifying offenders at higher risk of re-offending, the capacity, cost and effectiveness of both the LSI-R and the proposed intervention or management plan need to be considered.

The second aim of this study involved assessing how a model that includes LSI-R subscale scores compares with a model using standard risk factors derived from routinely collected data. In considering whether the LSI-R should be included in models of recidivism used for evaluation purposes, models that included LSI-R subscale scores along with routinely collected data did prove to be of greatest predictive accuracy, over and above models based on routinely collected data and LSI-R subscale scores used alone. As found in previous studies, not all subscales were independent predictors of re-offending, and those that were varied for males and females. In models for both males and females, education/employment and attitudes/orientation were independently associated with re-offending, after controlling for other standard risk factors. Further, alcohol/drugs and accommodation were independent predictors of re-offending for males, and companions for females. In addition, despite controlling for prior criminal history using routinely collected data from ROD, in males the LSI-R criminal history subscale remained independently associated with re-offending.

While future studies, with different offender groups, may yield different outcomes for LSI-R subscales, the results of this study nevertheless provide support for including LSI-R data in re-offending databases such as ROD, and controlling for LSI-R subscale scores in models of recidivism used for evaluation purposes. Controlling for specific LSI-R items, rather than subscales more generally, may confer additional benefits, however this was unable to be examined in the current study. The finding that some LSI-R subscales did not predict re-offending may have implications for interventions aimed at reducing offenders' risk of recidivism. For example, given that financial, family/marital and emotional/personal subscales were not found to be associated with re-offending, programs or interventions relating to these domains may not be effective in reducing the risk of recidivism. The allocation of resources to interventions addressing education/employment, for example, may be of greater benefit in terms of reducing recidivism.

Measures of discriminative ability of the LSI-R in this study, while similar to other Australian studies (Hsu, Caputi, & Byrne, 2009; Watkins, 2011), suggest that the performance of the LSI-R in predicting recidivism can only be considered fair. However, the extent to which the true relationship between the LSI-R and re-offending was masked by offenders receiving increased supervision and intervention is unknown. As previously stated, offenders supervised by Corrective Services NSW who are identified as medium to high risk of re-offending on the LSI-R receive a higher level of intervention, which may have resulted in reduced re-offending. Participation in programs and increased supervision were not accounted for in this study and may have obscured the relationship between the LSI-R and re-offending.

This study focused on an adult offender population who had received supervised sentences and were at relatively low risk of re-offending, as evidenced by the 20 per cent rate of re-offending within 12 months. The extent to which findings from this study would be generalisable to a custodial sample, or to re-offending in the longer term, are uncertain and should be the focus of future investigations.

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NOTES

1. Offenders who received custodial penalties had differing LSI-R and re-offending profiles, follow up and 'free' time to those who received non-custodial penalties, and for these reasons it was not appropriate to include them in this study.
2. The LSI-R data included may have been obtained from an assessment conducted in relation to a conviction other than the index conviction, such as a prior conviction. In the absence of significant events which could change recidivism risk, Corrective Services NSW considers an LSI-R completed within 12 months sufficient to guide an initial case plan.
3. Corrective Services NSW aims to administer the LSI-R to all offenders subject to community based orders. While not all eligible offenders were found to have LSI-R assessments within 12 months of their index offence, in part this may be due to the process of linking ROD and Corrective Services NSW data.
4. At the time of data extraction and linkage, records of finalised court appearances were available up until June 30, 2010. Re-offending was restricted to 12 months following the index conviction to allow for a minimum of 6 months for re-offences to be finalised in court.
5. The screening tools developed in this study were derived from data on the same sample of offenders for whom LSI-R data were available. Of course, in practice this would not be possible (re-offending outcomes would not be known), and screening tools developed using data from one sample of offenders would be applied to another. In developing a screening tool for ongoing, routine use, further validation and testing would be required involving other samples of offenders.

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APPENDIX

Table A1. Unadjusted/bivariate relationships between variables from ROD and re-offending within 12 months

		Males					Females				
				Unadjusted					Unadjusted		
		n (%)	% re-offend	Odds ratio	(95% CI)	p	n (%)	% re-offend	Odds ratio	(95% CI)	p
All		5,523 (100)	22.5				1,414 (100)	19.4			
Age	18-21 years	866 (15.7)	31.9	3.07	(2.39, 3.94)	<.001	186 (13.2)	20.4	2.18	(1.24, 3.81)	.006
	22-24 years	672 (12.2)	24.0	2.07	(1.58, 2.71)	<.001	142 (10.0)	27.5	3.21	(1.82, 5.66)	<.001
	25-34 years	1,794 (32.5)	22.6	1.92	(1.52, 2.42)	<.001	469 (33.2)	22.0	2.39	(1.47, 3.87)	<.001
	35-44 years	1,389 (25.1)	21.1	1.76	(1.38, 2.24)	<.001	399 (28.2)	17.8	1.84	(1.11, 3.03)	.018
	45+ years	802 (14.5)	13.2	1.00			218 (15.4)	10.6	1.00		
Indigenous status	Non-Indigenous/ Unknown	4,881 (88.4)	20.9	1.00			1,155 (81.7)	19.2	1.00		
	Indigenous	642 (11.6)	34.9	2.03	(1.70, 2.43)	<.001	259 (18.3)	20.1	1.06	(0.75, 1.48)	.753
Principal offence type	Driving	1,205 (21.8)	13.3	1.00			319 (22.6)	12.5	1.00		
	Violent	1,932 (35.0)	22.3	1.88	(1.54, 2.29)	<.001	379 (26.8)	18.2	1.55	(1.02, 2.37)	.041
	Theft	498 (9.0)	30.3	2.84	(2.21, 3.66)	<.001	222 (15.7)	27.5	2.64	(1.70, 4.12)	<.001
	Drugs	384 (7.0)	17.7	1.41	(1.03, 1.92)	.032	93 (6.6)	12.9	1.03	(0.52, 2.06)	.926
	Property damage	299 (5.4)	32.4	3.14	(2.34, 4.21)	<.001	57 (4.0)	31.6	3.22	(1.68, 6.16)	<.001
	Offences against justice procedures	752 (13.6)	29.4	2.72	(2.16, 3.42)	<.001	175 (12.4)	27.4	2.64	(1.65, 4.21)	<.001
	Other	453 (8.2)	25.2	2.20	(1.68, 2.88)	<.001	169 (12.0)	15.4	1.27	(0.74, 2.16)	.383
Concurrent offence	No	2,578 (46.7)	21.0	1.00			622 (44.0)	15.6	1.00		
	Yes	2,945 (53.3)	23.8	1.18	(1.04, 1.34)	.012	792 (56.0)	22.4	1.56	(1.18, 2.05)	.001
Principal penalty	Supervised suspended sentence	1,844 (33.4)	20.8	1.00			395 (27.9)	18.2	1.00		
	Supervised bond	3,679 (66.6)	23.4	1.03	(1.00, 1.05)	.030	1,019 (72.1)	19.8	1.02	(0.97, 1.07)	.496
Length of sentence	Less than 12 months	1,137 (20.6)	26.5	1.00			269 (19.0)	22.3	1.00		
	>=12 months	2,115 (38.3)	22.8	0.76	(0.65, 0.88)	<.001	1,145 (81.0)	18.7	0.80	(0.58, 1.11)	.178
Prior conviction, not traffic	No/Unknown	1,331 (24.1)	11.7	1.00			442 (31.3)	8.8	1.00		
	Yes	4,192 (75.9)	25.9	2.66	(2.22, 3.18)	<.001	972 (68.7)	24.2	3.29	(2.30, 4.72)	<.001
Prior conviction as a juvenile	No/Unknown	4,409 (79.8)	19.3	1.00			1,198 (84.7)	16.8	1.00		
	Yes	1,114 (20.2)	35.2	2.27	(1.97, 2.63)	<.001	216 (15.3)	33.8	2.53	(1.84, 3.49)	<.001
Number of convictions in prior 5 years*				1.34	(1.30, 1.39)	<.001			1.33	(1.24, 1.42)	<.001
Prior violent conviction	No/Unknown	2,967 (53.7)	17.5	1.00			886 (62.7)	16.4	1.00		
	Yes	2,556 (46.3)	28.3	1.86	(1.64, 2.11)	<.001	528 (37.3)	24.4	1.65	(1.27, 2.16)	<.001
Prior drug conviction	No/Unknown	4,081 (73.9)	19.2	1.00			1,164 (82.3)	17.2	1.00		
	Yes	1,442 (26.1)	31.9	1.98	(1.73, 2.26)	<.001	250 (17.7)	29.6	2.03	(1.48, 2.77)	<.001
Prior property conviction	No/Unknown	3,666 (66.4)	17.9	1.00			926 (65.5)	14.2	1.00		
	Yes	1,857 (33.6)	31.6	2.12	(1.87, 2.42)	<.001	488 (34.5)	29.3	2.52	(1.92, 3.29)	<.001
Prior breach conviction	No/Unknown	4,067 (73.6)	19.3	1.00			1,146 (81.0)	16.4	1.00		
	Yes	1,456 (26.4)	31.3	1.90	(1.66, 2.18)	<.001	268 (19.0)	32.1	2.41	(1.78, 3.25)	<.001
Prior prison sentence	No/Unknown	4,482 (81.2)	19.5	1.00			1,245 (88.0)	17.7	1.00		
	Yes	1,041 (18.8)	35.3	2.24	(1.94, 2.60)	<.001	169 (12.0)	32.0	2.19	(1.53, 3.12)	<.001

Table A2. Descriptive statistics of predicted probabilities of re-offending from screening tool against LSI-R risk categories

		Predicted probabilities from screening tool				
	LSI-R risk category	**n**	**mean**	**median**	**min**	**max**
Males	Low	1,364	.151	.130	.033	.646
	Low-medium	2,143	.209	.184	.033	.772
	Medium	1,603	.273	.248	.033	.828
	Medium-high	364	.357	.343	.067	.784
	High	49	.400	.389	.170	.820
	Total	5,523	.225	.190	.033	.828
Females	Low	294	.128	.112	.046	.473
	Low-medium	544	.168	.142	.039	.658
	Medium	432	.236	.208	.032	.669
	Medium-high	128	.285	.244	.056	.696
	High	16	.406	.416	.165	.668
	Total	1,414	.194	.157	.032	.696

Table A3. Unadjusted/bivariate relationships between LSI-R subscale scores and re-offending within 12 months

		Males			Females		
		Odds ratio	**(95% CI)**	***p***	**Odds ratio**	**(95% CI)**	***p***
LSI-R subscales	Criminal history (0-10)	1.24	(1.20, 1.27)	<.001	1.25	(1.17, 1.33)	<.001
	Education/Employment (0-10)	1.18	(1.16, 1.21)	<.001	1.18	(1.12, 1.24)	<.001
	Financial (0-2)	1.56	(1.44, 1.68)	<.001	1.62	(1.31, 1.99)	<.001
	Family/Marital (0-4)	1.28	(1.21, 1.35)	<.001	1.22	(1.10, 1.36)	<.001
	Accommodation (0-3)	1.51	(1.41, 1.63)	<.001	1.47	(1.28, 1.70)	<.001
	Leisure/Recreation (0-2)	1.55	(1.43, 1.69)	<.001	1.49	(1.24, 1.80)	<.001
	Companions (0-4)	1.48	(1.40, 1.58)	<.001	1.61	(1.43, 1.82)	<.001
	Alcohol/Drugs (0-9)	1.20	(1.16, 1.24)	<.001	1.14	(1.08, 1.21)	<.001
	Emotional/Personal (0-5)	1.08	(1.04, 1.13)	<.001	1.05	(0.97, 1.14)	.242
	Attitudes/Orientation (0-4)	1.32	(1.26, 1.39)	<.001	1.34	(1.21, 1.48)	<.001

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