Washington State
Institute for
Public Policy

110 Fifth Avenue Southeast, Suite 214 • PO Box 40999 • Olympia, WA 98504-0999 • (360) 586-2677 • FAX (360) 586-2793 • www.wsipp.wa.gov

December 2003

WASHINGTON'S OFFENDER ACCOUNTABILITY ACT: AN ANALYSIS OF THE DEPARTMENT OF CORRECTIONS' RISK ASSESSMENT

I. BACKGROUND

In 1999, the Washington State Legislature enacted the Offender Accountability Act (OAA). The OAA affects how the state provides community supervision to adults convicted of felony crimes.[1] In terms of broad policy direction, the OAA added a seventh goal to Washington's sentencing policy: to reduce the "risk of re-offending by offenders in the community."[2]

To implement this policy, the OAA directs the Washington State Department of Corrections (DOC) to:

a) Classify felony offenders according to their risk for future offending and the amount of harm they have caused society in the past;

b) Deploy more resources to higher-risk offenders and, as a result, spend correspondingly fewer dollars on lower-risk offenders.[3]

As part of the 1999 law, the Washington State Institute for Public Policy (Institute) was directed to study the impact of the OAA on recidivism and other outcome measures. This report presents the Institute's analysis of DOC's classification of felony offenders according to their risk for future offending.

Summary

In 1999, the Washington State Legislature passed the Offender Accountability Act (OAA), with full implementation starting in 2001. The OAA affects how the state provides community supervision to adults convicted of felony crimes. The OAA directs the Department of Corrections (DOC) to classify felony offenders according to the risk they pose to re-offending in the future and the amount of harm they have caused society in the past. The OAA then directs DOC to allocate more of its community-based resources to the higher-risk offenders. The primary goal is to reduce the subsequent criminal behavior of offenders when they are back in the community.

The Legislature directed the Washington State Institute for Public Policy (Institute) to determine if the OAA achieves reduced re-offense rates (recidivism) and improvements in other outcomes. The Institute must report annually on the evaluation.

It is too early in the life of the OAA to determine if it has influenced recidivism rates. Because a sufficient follow-up period is needed to observe recidivism, our January 2005 report will offer the first opportunity to learn whether the OAA reduces crime cost-effectively.

In this report, we examine how well the risk assessment instrument adopted by DOC—the Level of Service Inventory-Revised (LSI-R)—predicts recidivism in a sample of 22,533 Washington offenders. We also explore possible improvements t the instrument and how a revised classification approach might work within the OAA.

This report contains many detailed statistics, but the basic findings are just four:

1. The LSI-R predicts recidivism moderately well.
2. The predictive power of the LSI-R can be improved significantly by adding several readily available measures.
3. An enhanced prediction instrument would improve the classification of DOC offenders by specifically measuring the likelihood of the most serious form of recidivism—violent felonies.
4. There are no distinct changes in recidivism rates at specific risk scores, thus there are no obvious "cut-off scores" to create risk categories.

[1] *Department of Corrections' Offender Accountability Act* http://www.doc.wa.gov/.

[2] RCW 9.94A.010 establishes seven policy purposes for Washington's sentencing laws: (1) ensure that the punishment for a criminal offense is proportionate to the seriousness of the offense and the offender's criminal history; (2) promote respect for the law by providing punishment which is just; (3) be commensurate with the punishment imposed on others committing similar offenses; (4) protect the public; (5) offer the offender an opportunity to improve him or herself; (6) make frugal use of the state's and local governments' resources; and (7) reduce the risk of re-offending by offenders in the community.

[3] The OAA also gives DOC new authority to hold hearings and to sanction offenders who violate conditions of community custody (for offenders with crimes committed after July 1, 2000).

In anticipation of the OAA, DOC began using a formal risk for re-offense assessment called the Level of Service Inventory-Revised (LSI-R) in 1999. Canadian researchers developed this 54-question copyrighted instrument in the 1980s. Previous research had indicated that the LSI-R was a valid measure of the likelihood to re-offend.[4] The LSI-R is the risk for re-offense component in DOC's Risk Management Identification (RMI) system.

The 54 questions on the LSI-R are organized into ten domains: prior criminal history; education and employment; finances; family situation; living situation; leisure and recreation activities; associates; alcohol and drug problems; emotional or personal problems; and offender's attitude. An offender's LSI-R score can range from 1 to 54, where higher numbers indicate a higher probability of re-offending.

In addition to this risk measure, DOC developed measures of the amount of harm done to crime victims and the community. The LSI-R score is combined with the harm-done measures to produce the RMI score. The RMI places offenders into one of four levels: RMA and RMB for higher-risk/harm-done offenders and RMC and RMD for lower-risk/harm-done offenders.

Recidivism rates associated with the RMI system will not be available until 2005, since DOC began classifying offenders in 2001. However, it is possible to obtain recidivism rates for a sample of offenders who received an LSI-R score from DOC. This analysis examines the predictive accuracy of the LSI-R for Washington State and also examines whether the risk classification can be improved.

Methodology

Examining the predictive validity of the LSI-R requires a sample of offenders that has been classified by the LSI-R and has been in the community for a sufficient follow-up time to assess re-offenses. Adequately measuring recidivism for adult offenders in Washington State requires a 24-month follow-up period for re-offending and another 12-month period to allow for re-offenses to be formally adjudicated.[5] Thus, to examine the validity of the LSI-R requires selecting a representative sample of offenders placed in the community and then waiting three years to measure any recidivism. The "community placement" could have followed a prison stay or could have occurred after a sentence to a community supervision sanction (e.g., probation).

Three types of recidivism are analyzed: misdemeanor and felony recidivism, felony recidivism, and violent felony recidivism. Because of the seriousness of felonies, the primary interest of this report is in felony and, especially, violent felony recidivism.

Because DOC implemented the LSI-R in 1999, a sample of offenders placed in the community between January 1, 1999, and June 30, 2000, has LSI-R scores and has been at-risk in the community for three years. We included all cases where the date of LSI-R administration was within 90 days of the date of community placement.[6]

Three measures are used to test the strength of the association between the LSI-R and recidivism.

The first measure is the *correlation coefficient*; this score can range from -1.0 to +1.0. The coefficient is 0 when there is no association and +1.0 or -1.0 when there is a perfect association.[7] Although the correlation coefficient is a very common measure of association, it has a flaw when used with dichotomous variables such as recidivism (dichotomous meaning yes or no). The size of the correlation coefficient changes with the recidivism base rate, even when the strength of the association remains the same. For example, violent felony recidivism has a lower base rate than felony recidivism, and therefore the correlations between risk levels and violent felony recidivism will be lower than for felony recidivism. Correlation coefficients are presented so that comparisons can be made with other assessment studies.

Second, to overcome the weakness of correlation coefficients for dichotomous data, we measure the strength of the association between the risk level and recidivism by calculating what is called the *area under the receiver operator characteristic* (AUC) which ranges from .50 to 1.00. This statistic does not change in size when the recidivism base rate changes. This statistic is .50 when there is no

[4] Prior research associated with the LSI-R is discussed in D. A. Andrews and J. L. Bonta, *The Level of Service Inventory-Revised, Manual* (North Tonawanda, NY: Multi-Health Systems, Inc., 1995). No research was conducted with Washington State offenders.

[5] Robert Barnoski, *Standards for Improving Research Effectiveness in Adult and Juvenile Justice* (Olympia: Washington State Institute for Public Policy, December 1997).

[6] Because DOC was just starting to use the LSI-R with this population, this sample's data may not be as accurate as data for subsequent samples.

[7] No association means that the recidivism rates randomly vary from one LSI-R score to the next. A perfect association means 100 percent of the group with a score above a certain value recidivated, and 0 percent below that value did not recidivate.

association and 1.00 when there is perfect association. An AUC of .70 or above indicates a strong association, while measures between .60 and .70 indicate a moderate association.[8]

A third measure is the *odds ratio* obtained from multivariate analyses.[9] The odds ratio indicates how much each LSI-R variable contributes to predicting recidivism, over and above what the other LSI-R variables contribute. The odds ratio indicates how the odds of recidivating change with a one-point increase in the independent variable. Odds ratios above 1.0 indicate an increase in recidivism likelihood with an increase in the variable's score, while ratios below 1.0 indicate a decrease in recidivism likelihood for an increase in score.

The choice of measures varies, depending on the question being examined:

- ✓ When comparing associations within one type of recidivism, correlation coefficients can be used because the recidivism base rate remains the same.
- ✓ When comparing the strength of association across the three types of recidivism, the AUC is reported to account for the different base rates of recidivism.
- ✓ The odds ratio is shown to illustrate how much a particular variable adds to prediction in addition to the other variables.

II. Re-Offending Rates

This section presents the 24-month recidivism rates for the 22,533 offenders in our study sample. It begins with the general results for the LSI-R scores, then describes the results for LSI-R domain scores, and finally examines the association between each LSI-R item and recidivism.

Exhibit 1 shows a fairly steady increase in recidivism for groups of offenders with increased LSI-R scores. Equations fit to these data indicate that a one-point increase in the LSI-R score results in a 1.5 percentage point increase in the misdemeanor and felony recidivism rate, a 1.1 percentage point increase for felony recidivism, and a 0.3 percentage point increase for violent felony recidivism.

This result reveals no large distinct changes in recidivism rates from one score to the next. This is a significant finding because it means there are no naturally occurring "cut-off scores" to create low- and high-risk categories.

Exhibit 1
24-Month Recidivism Rates by LSI-R Score

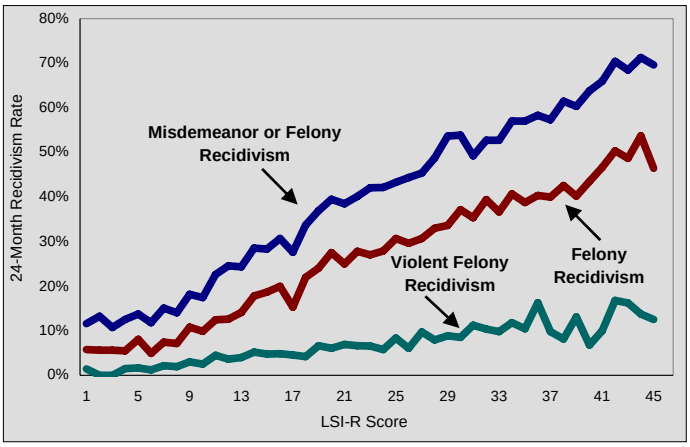


Exhibit 2 presents the two measures of association between the LSI-R score and the three types of recidivism shown in Exhibit 1. Based on the relatively low correlation coefficients, it would appear that the LSI-R is not strongly associated with violent felony recidivism. However, the AUC indicates that the strength of association is nearly the same for all three types of recidivism. The AUCs indicate that the LSI-R is moderately associated with recidivism since each AUC is above .60 but below .70.

Exhibit 2
Measures of Association Between LSI-R Score and 24-Month Recidivism

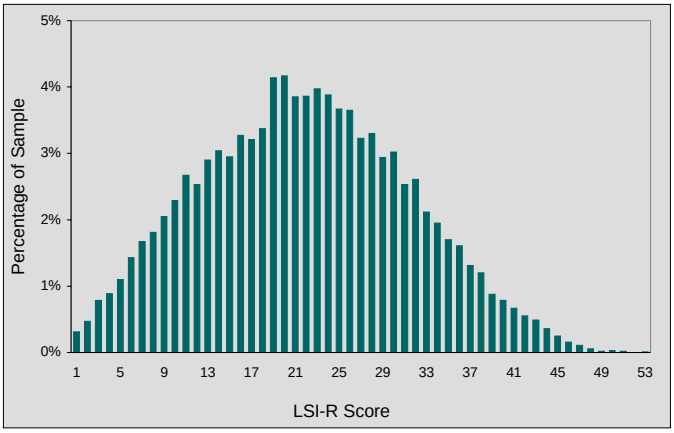
Type of Recidivism	Correlation Coefficient	AUC
Misdemeanor and Felony	.29	0.67
Felony	.25	0.66
Violent Felony	.12	0.64

[8] Vernon L. Quinsey, Grant T. Harris, Marnie E. Rice, and Catherine A. Cormier, *Violent Offenders: Appraising and Managing Risk* (Washington D.C.: American Psychological Association, 1998); P. R. Jones, *Risk Prediction in Criminal Justice,* in A. T. Harland, ed., "Choosing Correctional Options That Work" (Thousand Oaks, CA: Sage, 1996), 33-68.

[9] The specific multivariate technique is logistic regression, which is appropriate for modeling the relationship between a dichotomous dependent variable, such as recidivism, and a set of independent variables.

Exhibit 3 presents the percentage distribution of LSI-R scores for the study sample. The distribution is a classic bell-shaped curve. The highest percentage for a single score is 4.2 percent for the score of 20. Approximately 50 percent of the LSI-R scores are within 6 points of the average score of 22 points (16 to 26 points).

Exhibit 3
LSI-R Score Distribution



In Exhibit 4, the scores are divided into deciles, where each decile contains approximately 10 percent of the sample. For example, the LSI-R score range of 20 to 22 involves three scores (20, 21, and 22) and includes 2,677 offenders who represent 12 percent of the entire sample. The deciles in the middle of the distribution are narrower than those on the ends because offenders are clustered around the mean. The distribution is slightly skewed, with proportionally fewer offenders having extremely high scores.

Exhibit 4
LSI-R Deciles: Score Ranges Containing Approximately 10 Percent of the Sample

LSI-R Score Range	Number of Values in Range	Number of Offenders	Percentage of Sample	Cumulative Percentage
0 to 9	10	2,403	10.7%	11%
10 to 13	4	2,341	10.4%	21%
14 to 16	3	2,086	9.3%	30%
17 to 19	3	2,415	10.7%	41%
20 to 22	3	2,677	11.9%	53%
23 to 24	2	1,769	7.9%	61%
25 to 27	3	2,377	10.5%	72%
28 to 30	3	2,087	9.3%	81%
31 to 34	4	2,077	9.2%	90%
35 to 54	20	2,301	10.2%	100%
Total		22,533	**100%**	

LSI-R Domains

As stated earlier, the 54 LSI-R items are organized into 10 domains. A domain score is calculated by summing scores for items within the domain. Exhibit 5 presents measures of association between these domain scores and recidivism. A domain may show a strong correlation with recidivism, but because the domain is correlated with other domains, it may make a weak contribution (odds ratio close to 1.00) once the other domains are taken into account. Odds ratios above 1.00 indicate an increase in recidivism likelihood with an increased score, while those below 1.00 indicate a decrease in recidivism likelihood with an increased score.

Exhibit 5
Measures of Association Between Domain Scores and Recidivism

	Felony Recidivism			Violent Felony Recidivism		
LSI-R Domain	Correlation	AUC	Odds Ratio	Correlation	AUC	Odds Ratio
Total LSI-R	0.25	0.66		0.12	0.66	
Criminal History	0.26	0.67	1.24**	0.14	0.66	1.22**
Education/ Employment	0.19	0.62	1.08**	0.10	0.61	1.08**
Financial	0.06	0.54	0.92**	0.02	0.52	0.84**
Family/Marital	0.10	0.56	0.98	0.06	0.57	1.04
Accommodation	0.13	0.57	1.07**	0.06	0.56	1.04
Leisure/ Recreation	0.13	0.58	1.09**	0.06	0.57	1.08*
Companions	0.18	0.62	1.13**	0.07	0.58	1.03
Alcohol/Drug	0.14	0.59	1.02**	0.04	0.55	0.97*
Emotional/ Personal	0.01	0.51	0.92**	0.01	0.51	0.97
Attitudes/ Orientation	0.12	0.57	1.00	0.08	0.58	1.07**

* Significant at the .05 probability level.
** Significant at the .01 probability level.

The findings for the association of the LSI-R domains and recidivism in Exhibit 5 are as follows:

- The *criminal history domain* has the strongest association with *both types of felony recidivism*, having the largest correlations and AUCs. In fact, the correlations of criminal history with felony recidivism and violent felony recidivism are slightly higher than the correlations of the total LSI-R score with these two types of recidivism. That is, criminal history by itself is as closely related to recidivism as the total LSI-R score. This indicates that most of the LSI-R's

predictive power comes from the criminal history domain.

For felony recidivism:

- The odds ratio of 1.24 for the criminal history domain indicates there is a 24 percent increase in the odds of recidivating for a one-point increase in criminal history.
- Two other domains have moderately strong associations with felony recidivism based on the AUC: education/employment and companions.
- Three domains, financial, family/marital, and emotional/personal, have positive correlations with felony recidivism yet have odds ratios less than 1.00. This indicates that, on its own, each domain is positively correlated with felony recidivism, but when combined with the other domains, the risk for felony recidivism decreases with increasing scores for these domains.
- The attitudes/orientation domain is not a statistically significant predictor of felony recidivism based on the odds ratio in the multivariate analysis.

For violent felony recidivism:

- Two domains have moderately strong associations according to the AUC: Criminal History and Education/Employment.
- Based on the odds ratio in the multivariate analysis, four domains are not statistically significant predictors of violent felony recidivism: Family/Marital, Accommodation, Companions, and Emotional/Personal.

Conclusions Concerning LSI-R Domains

Exhibit 5 reveals that some domains, in particular criminal history, are more closely associated with recidivism than others. Based on the odds ratios from multivariate analyses, some domains are not statistically significant predictors of recidivism once the more potent predictor domains are taken into account.

LSI-R Items

The last step in examining the fit between LSI-R scores and recidivism is to look at the association between *each item* and recidivism, just as we looked at the association between *each domain* and recidivism.

Appendix A presents the correlation coefficients and odds ratios for each item. For the sake of brevity, the AUCs are not included (they do not alter the findings). In addition, the domain score correlation coefficients and odds ratios from Exhibit 5 are included to compare the predictive power of each item within a domain to the predictive power of the entire domain.

For felony recidivism, 28 of the 54 items have statistically significant odds ratios, and for violent felony recidivism, 13 items are statistically significant. This means that the prediction of violent felony recidivism involves different items than the prediction of felony recidivism.

To help readers explore the contents of Appendix A, we will describe findings associated with a key domain—criminal history. The criminal history domain has a .26 correlation with felony recidivism, which is higher than the correlation of any single item within the domain. The item with the next highest correlation is charges/violations on community supervision (.21). Therefore, adding the other items into the domain score increases the domain correlation by .05.

Items 1, 2, and 3 in the criminal history domain are correlated with each other because all three measure prior adult convictions. They are presented as three separate items on the LSI-R to facilitate manual scoring.[10] These items could be replaced by a single prior adult conviction item where a score of 0 represents no prior adult convictions, a score of 1 represents one conviction, 2 represents two convictions, and 3 represents three or more convictions. This single item would be statistically significant with a correlation of .20 with felony recidivism.

The only criminal history item that is not significantly related to felony recidivism is record of assault/violence; this item, however, is strongly related to violent felony recidivism. The other items significantly related to violent felony recidivism are arrested under age 16, ever punished for prison misconduct, and charges/violations on community supervision.

The prison misconduct item is an example of an item that embodies two concepts: having been in prison and misconduct in prison. It is not possible to tell if one or both concepts are significantly

[10] There are other groups of items that represent a single concept to facilitate manual scoring, such as completing less than regular grade 10 and completing less than regular grade 12.

associated with recidivism. If an item for prior prison was added to the prediction equation, the misconduct concept could be tested for statistical significance.

The findings related to the financial domain demonstrate that an overall domain score may have a lower correlation than any single item in the domain. The financial domain has a correlation of .06 with felony recidivism. The financial problems item has a correlation of .11 and the reliance on social assistance has a correlation of -.01. When the two items are added to create the domain score, the resulting sum is less correlated with recidivism.

Conclusions Concerning LSI-R Items

Appendix A reveals that some items in the LSI-R are better predictors of recidivism than others for Washington State offenders, particularly when the items are examined using multivariate analyses. That is, it is possible to find a *subset of items* that predict recidivism as well as, if not better than, the entire set of LSI-R items.

In addition, these results indicate that the weight each item receives in scoring might be changed to reflect the item's influence in predicting recidivism.

Finally, predicting violent felony recidivism involves different items than predicting felony recidivism and may require a different equation than the one used for felony recidivism.

Different Subgroups of Offenders

Thus far, the association between recidivism and the LSI-R has been examined for the entire sample. The previously published research on the LSI-R's validity separates males from females and prison inmates from community supervision offenders. Since this implies there are group differences, it is of interest to examine how the LSI-R works for these subgroups in Washington State.

Exhibit 6 presents the 24-month felony recidivism rates for male and female offenders. The LSI-R scores are represented by deciles. For example, at the 50th decile, the male felony recidivism rate is 29 percent compared with the female rate of 18 percent, an 11 percentage point difference. If the LSI-R had the same association with recidivism for each gender, the recidivism rate for males at each decile would equal the rate for females.

Exhibit 6

Males vs. Females
24-Month Felony Recidivism Rates

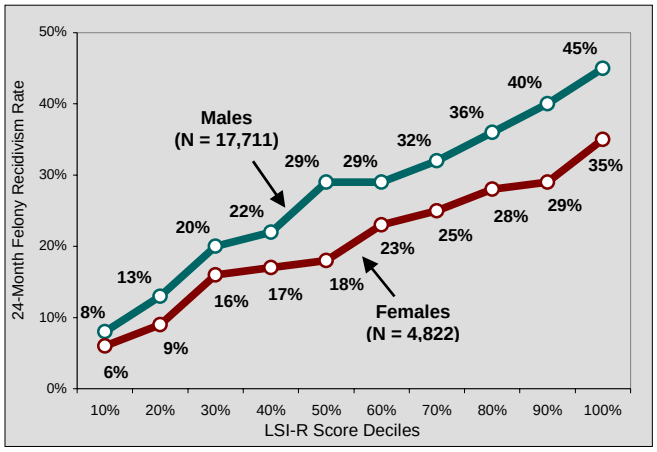
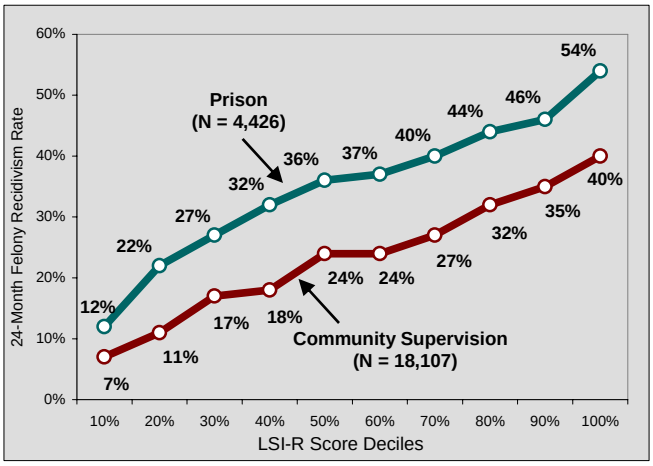


Exhibit 7 shows that offenders sentenced to prison (versus community supervision) have consistently higher felony recidivism rates for the same LSI-R scores. At the 50th decile, offenders released from prison have a 36 percent felony recidivism rate compared with 24 percent for those sentenced to community supervision.

Exhibit 7

Prison vs. Community Supervision
24-Month Felony Recidivism Rates



Conclusion Concerning Subgroups

The felony recidivism rates for the same LSI-R scores differ depending on the offender's gender and whether these were prison releases. To adjust for this, separate classifications for each subgroup could be developed, or a revised scoring equation could include these data as additional risk variables.

Conclusion Concerning the Validity of the LSI-R
The findings in this section of the report indicate that the LSI-R has a *moderately strong association with re-offending*. A more detailed examination reveals that *some domains* and *some items* are *more predictive than others*. In addition, the LSI-R works but *works differently* for various groups of offenders. The next section explores potential enhancements to the DOC risk for re-offense classification.

III. Enhancements to the Risk for Re-Offense Classification

Two approaches could be used to enhance the predictive capability of the LSI-R for DOC:

- *Maintain* the LSI-R as it is and add predictive items to *supplement* the LSI-R score (LSI-R Score Plus New Items), or
- *Exclude non-predictive items* from the LSI-R and add predictive items to *supplement* the LSI-R items (Selected LSI-R and New Items).

In addition, separate prediction equations for felony recidivism and violent felony recidivism are warranted since, as shown in Section II, the items strongly associated with violent felony recidivism are different from those for felony recidivism.

Exhibit 8 compares measures of association for the existing LSI-R with the two approaches for felony and violent felony recidivism. This exhibit reveals the following:

- The LSI-R does not have as strong an association with recidivism as the two proposals that supplement the LSI-R.
- The LSI-R Score Plus New Items and the Selected LSI-R and New Items solutions have equally strong associations with felony and violent felony recidivism.
- The felony recidivism equations predict felony recidivism best, and the violent felony recidivism equations predict violent felony recidivism best.

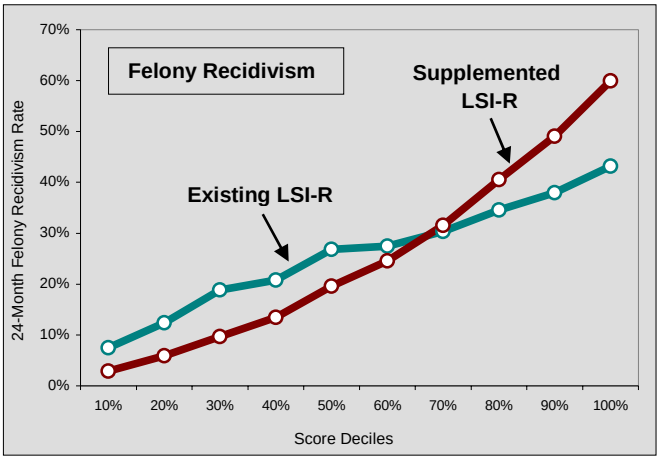
These findings show no clear advantage for one approach over the other but support having separate equations for felony recidivism and violent felony recidivism. Therefore, the recommendation is to maintain the use of the LSI-R as is and supplement it with additional items (LSI-R Score Plus New Items). This choice, a supplemented LSI-R, keeps open the option of re-analyzing the LSI-R after DOC gains more experience with its use.

Exhibit 8
Measures of Association for Prediction Approaches

	Felony Recidivism		Violent Felony Recidivism	
Approach	**Correlation**	**AUC**	**Correlation**	**AUC**
Existing LSI-R	0.25	0.66	0.12	0.66
LSI-R Score Plus New Items				
Felony Recidivism Equation	**0.42**	**0.77**	0.15	0.68
Violent Felony Equation	0.24	0.66	**0.27**	**0.77**
Selected LSI-R and New Items				
Felony Recidivism Equation	**0.42**	**0.78**	0.16	0.70
Violent Felony Equation	0.26	0.67	**0.27**	**0.77**

Exhibit 9 graphically illustrates the differences in the predictive capability between the LSI-R and the supplemented LSI-R. At lower deciles, the supplemented LSI-R has lower recidivism rates than the existing LSI-R, while at higher deciles the supplemented LSI-R has higher recidivism rates. That is, the supplemented LSI-R does a better job of identifying groups with low recidivism rates and those with high rates.

Exhibit 9
Comparison of LSI-R and Supplemented LSI-R for Felony and Violent Felony Recidivism



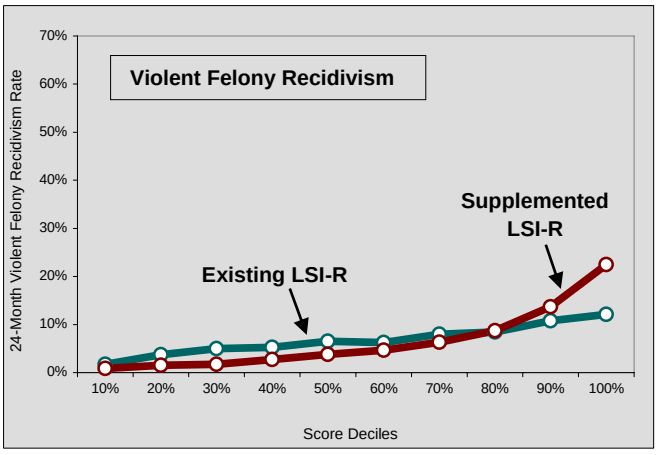
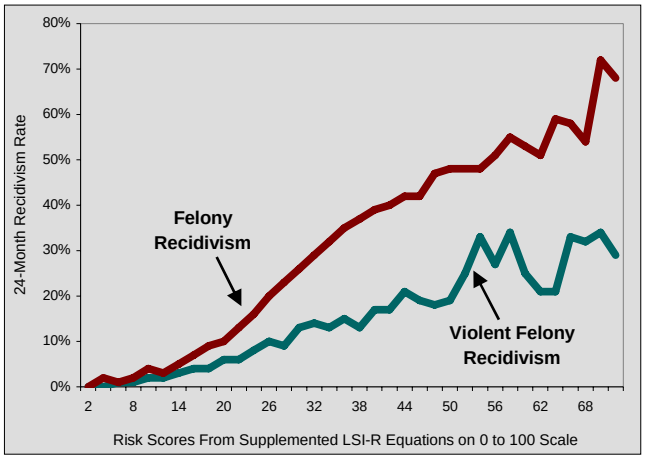


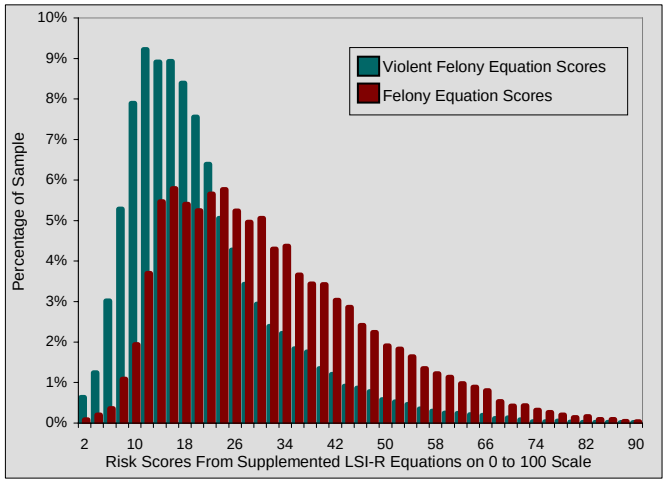
Exhibit 10 graphically displays the recidivism rates for scores from the supplemented LSI-R for felony and violent felony recidivism. The scores from each equation have been transformed to a common scale that varies from 0 to 100 points. Rather than a straight line relationship, the recidivism rates stay lower for the lower scores, start to increase more rapidly at about 22 points, and then the increase tapers off somewhat at about 40 points. These results indicate slightly more distinct changes in felony recidivism as the scores increase. However, there still are no obvious abrupt changes in recidivism to definitively establish risk level cut-off scores. Recidivism rates most likely vary more at higher scores because, as Exhibit 11 demonstrates, there are few offenders with scores at the high end of the score range.

Exhibit 10
24-Month Recidivism Rates for the Supplemented LSI-R Risk Equations



The percentage distribution of scores for both the felony and violent felony risk equations are shown in Exhibit 11. As in Exhibit 10, both sets of scores are standardized to range from 0 to 100 points. Both sets of scores are skewed, having more scores in the lower portion of the range. The distribution of violent felony scores is more tightly clustered at the low end than is the case with the felony scores. This pattern is consistent with a small portion of the sample recidivating with a violent felony, so most of the sample should have low scores. The felony recidivism rate is higher, so there should be fewer offenders with lower scores and more offenders with higher scores, which is the case.

Exhibit 11
Percentage Distribution of Scores for the Supplemented LSI-R Risk Equations

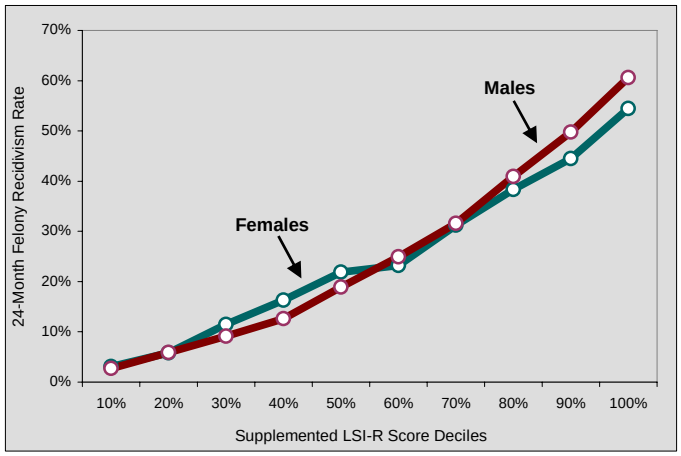


Different Subgroups of Offenders

The next question is whether the supplemented LSI-R adequately accounts for the gender and type of sentence differences observed with the LSI-R. In Exhibits 12 and 13, the felony recidivism rates for the supplemented LSI-R are displayed by gender and then type of sentence. At each decile, the recidivism rate for males is nearly the same as that for females, and the same holds true for type of sentence. That is, the supplemented LSI-R adequately rectifies the gender and type of sentence differences observed using the LSI-R alone.

DOC management requested that the Institute determine how the supplemented LSI-R works in relation to offender ethnicity. Exhibit 14 illustrates that a gap of about 5 percentage points in felony recidivism remains between whites and non-whites, a statistically significant difference.[11]

Exhibit 12
Felony Recidivism Rates by Gender: Supplemented LSI-R Felony Recidivism Equation



[11]The same analysis reveals a 10 percentage point difference between whites and non-whites for the LSI-R.

Exhibit 13
Felony Recidivism Rates by Sentence Type: Supplemented LSI-R Felony Recidivism Equation

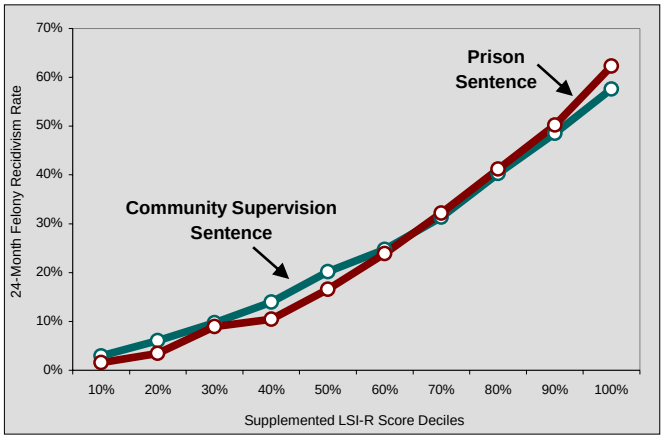
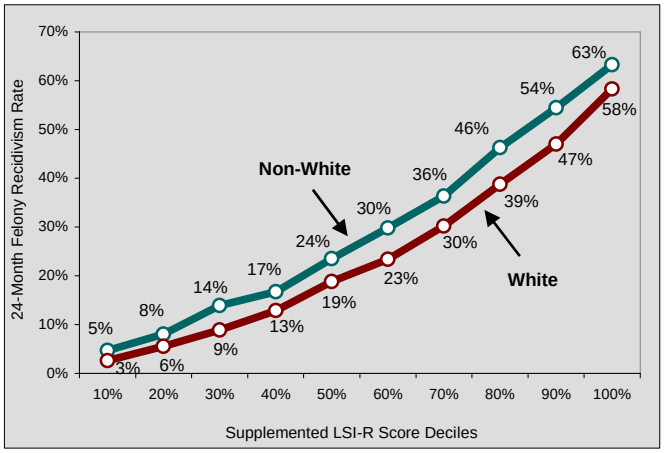


Exhibit 14
Felony Recidivism Rates by Ethnicity: Supplemented LSI-R Felony Recidivism Equation



The next section describes how the supplemented LSI-R scoring for felony and violent felony recidivism can be combined into a single risk classification.

IV. Proposed Risk Classification

Forming a single risk for re-offense classification based on the supplemented LSI-R for felony and violent felony prediction involves three steps:

- Selecting cut-off scores to create low-, moderate-, and high-risk groups for each set of scores;
- Examining the recidivism rates for all combinations of the resulting risk groups; and
- Combining these groups into a single classification.

As with the LSI-R, the recidivism rates for the supplemented LSI-R increase uniformly with increasing risk scores, and there is no abrupt change in recidivism rates from one score to the next. As a result, there are no obvious "cut-off scores" defining risk categories.

One method for choosing cut-off scores is to have an equal percentage of the total sample in each risk group. That is, for three risk groups, each group would contain one-third of the sample. An alternative is to establish definitions for each risk level, with low risk defined as a 10 percent recidivism rate and high risk as a 50 percent rate. However, these intuitively appealing definitions need to be adjusted for recidivism base rates that are much lower or higher. For example, the base rate for violent felony recidivism is already 6.7 percent.

A third choice is to establish high- and low-risk groups that have recidivism rates distinctly different from those of the entire sample. The moderate-risk group, being neither low nor high risk, should have a recidivism rate about equal to the rate for the entire sample. For example, the low-risk group could have a rate that is one-third the rate of the entire sample, and the high-risk group's rate could be three times the rate of the entire sample. This third approach is used to create distinctly low- and high-risk groups.

Exhibit 15 displays the cut-off scores, recidivism rates, and percentage of the sample for each risk group for the felony and violent felony prediction equations. The low-risk felony recidivism group has a 7.7 percent felony recidivism rate, while the high risk felony recidivism group has a 49.9 percent rate. The low-risk violent felony recidivism group has a 1.9 percent violent felony recidivism rate and the high-risk violent felony group a 20.0 percent rate. As intended, the recidivism rates for the three risk groups are all distinctly different.

Exhibit 15
Cut-Off Scores Based on Supplemented LSI-R

Felony Equation			
Risk Level	**Cut-Off Scores**	**Felony Recidivism**	**Percent of Sample**
Low	0 to 325	7.7%	39%
Moderate	326 to 484	25.0%	31%
High	485 to 1304	49.9%	30%
All Levels		25.7%	100%
Violent Felony Equation			
Risk Level	**Cut-Off Scores**	**Violent Felony Recidivism**	**Percent of Sample**
Low	0 to 100	1.9%	43%
Moderate	101 to 184	6.8%	42%
High	185 to 600	20.0%	15%
All Levels		6.7%	100%

Exhibit 16 displays the percentage of the sample and recidivism rates for each combination of the felony risk and violent felony risk groups. The first bar on the left represents offenders at high risk for violent felony recidivism and high risk for felony recidivism. This group accounts for 11 percent of the sample, has a 21 percent violent felony recidivism rate, and a 52 percent felony recidivism rate. The felony rate includes violent felonies, so the difference between these rates is the non-violent felony recidivism rate.

The second bar represents offenders at high risk for violent felony recidivism but moderate risk for felony recidivism. This group, which includes only three percent of the sample, has a 20 percent violent recidivism rate but only a 31 percent felony rate. Since violent felony recidivism is costly to society, the individuals from the first two bars are combined to form a high-risk for violent felony recidivism category.

The next groups that stand out in Exhibit 16 are those with high felony but not violent felony recidivism rates. This high-risk for felony recidivism group includes those with a high felony but either moderate or low violent felony risk level.

The low-risk group is easily identified as those with a low-risk level for both felony and violent felony recidivism.

Finally, the moderate felony recidivism risk level group consists of the remaining groups.

Exhibit 16
Recidivism Rates of
Combined Felony and Violent Felony Risk Levels

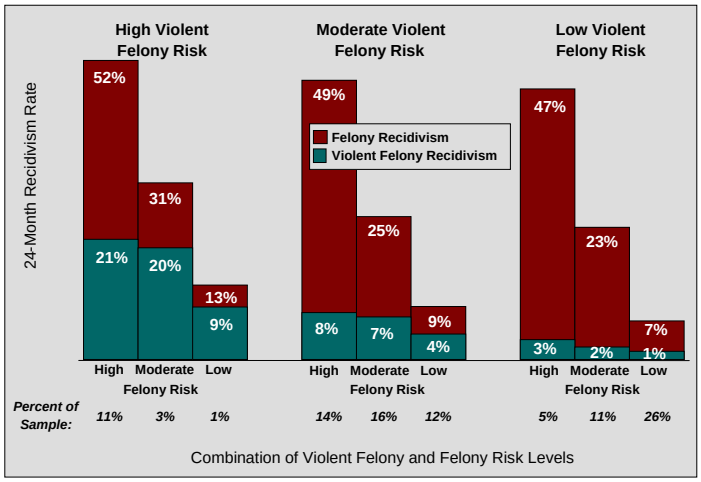


Exhibit 17 shows the recidivism rates and percentage of the sample for each category in the recommended risk classification. Thirty-eight percent of the sample is classified as low risk, having 8 percent and 2 percent felony and violent felony recidivism rates, respectively. The high violent felony risk group accounts for 14 percent of the sample and has a 21 percent violent felony recidivism rate, while the high felony risk group has a 49 percent felony recidivism rate and represents 19 percent of the sample.

Exhibit 17
Proposed Risk Classification

Risk Group	Percentage of Sample	Felony Recidivism Rate	Violent Felony Recidivism Rate
Low	38%	8%	2%
Moderate	29%	24%	5%
High Felony	19%	49%	7%
High Violent Felony	14%	47%	21%
Total	100%	26%	7%

Conclusions Concerning the Recommended Classification

A classification can be constructed for Washington State combining the existing LSI-R instrument with supplemental items that improves the prediction of both felony and violent felony recidivism. The implementation of this risk classification is feasible because the supplemental information is readily available, and the DOC computer system can be modified to calculate the risk classification. If DOC chooses to implement this classification, it is recommended that the Institute and DOC work together to ensure appropriate definitions are followed and the classification is accurately automated.

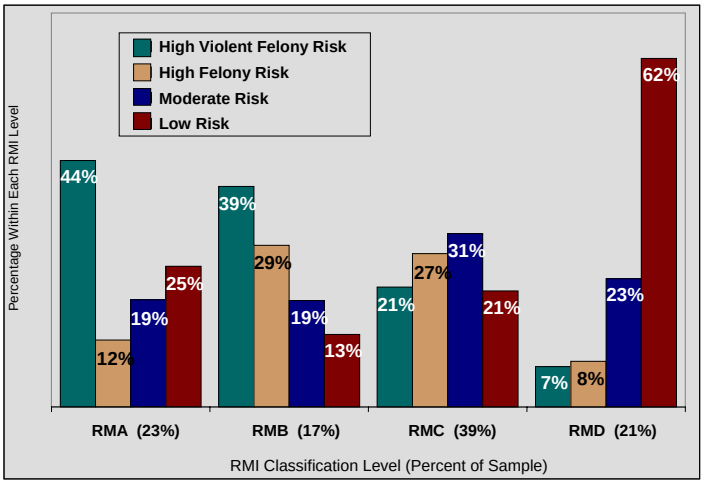
V. The RMI and Proposed Risk Classification

As mentioned in the background section, DOC's RMI classification combines the LSI-R and harm-done measures to form four levels: RMA and RMB for higher-risk/harm-done offenders and RMC and RMD for lower-risk/harm-done offenders.

Exhibit 18 shows the percentage of low, moderate, high felony, and high violent felony risk offenders within each RMI level. For offenders in the RMA level, 44 percent are high violent felony risk while only 12 percent are high felony risk. That is, a large portion of the higher-risk offenders who have done harm in the past have a high likelihood of doing harm in the future. However, another 44 percent in the RMA are classed as posing a moderate (19 percent) or low (25 percent) risk for future offending.

Thirty-nine percent of the RMBs are high violent felony risk and another 29 percent are high felony risk. The remaining 32 percent of RMBs are moderate or low risk. In the RMD level, 62 percent of offenders are low risk and 8 and 7 percent are high felony and high violent felony risk, respectively.

Exhibit 18
Distribution of the Proposed Risk Classifications Within Each RMI Group



Conclusions Concerning the Recommended Risk Classification and the RMI

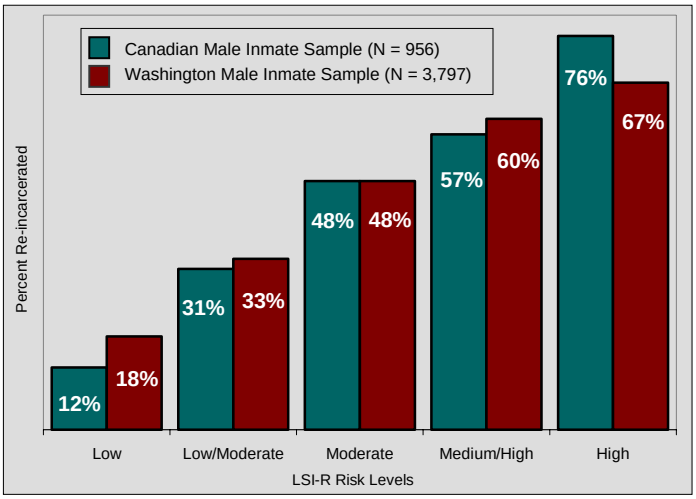
The recommended risk classification and the RMI fit together fairly well in that the RMI's higher-risk levels (RMA and RMB) have a high portion of offenders predicted to be a high violent felony risk, and most of the lower-risk RMDs have a low predicted risk level. The RMCs are a mixture of predicted risk levels. These findings have implications for the RMI, primarily because the proposed risk classification predicts the likelihood for future harm done (violent felony recidivism). If DOC chooses to implement the proposed risk classification, it will need to reexamine the RMI classification, as well.

VI. Re-incarceration Rates

In this last section, we shift interest from re-offending to comparing re-incarceration rates previously published for the LSI-R[12] with similar data for Washington State. The published materials for the LSI-R include the ColorPlot Profile Form, which displays data for a sample of 956 male Canadian inmates. The LSI-R scores are divided into five categories: Low Risk (0 to 13), Low/Moderate Risk (14 to 23), Moderate Risk (24 to 33), Medium/High Risk (34 to 40), and High Risk (41 to 54). The outcome measure is defined as re-incarceration, in jail or in prison, within one year following release.

Exhibit 19 compares the male Canadian inmate re-incarceration data with data for male prison inmates in our study sample. Overall, the Washington State re-incarceration rates are remarkably close to the published Canadian rates. For example, the Canadian inmates with a low/moderate LSI-R score had a 31 percent re-incarceration rate compared with 33 percent for Washington State inmates. The two groups differ in the low-risk and high-risk categories. Washington State's low-risk inmates have a higher return rate (18 percent vs. 12 percent), and Washington's high-risk inmates have a lower return rate (67 percent vs. 76 percent).

Exhibit 19
Male Offender Re-incarceration Rates Within One Year of Release From Prison: Canadian vs. Washington State Samples

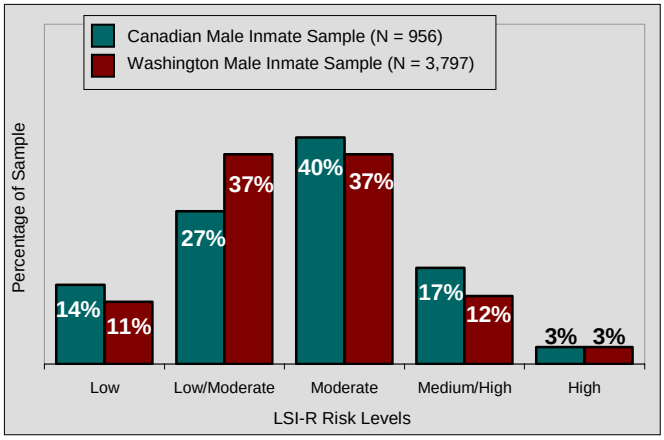


[12]Multi-Health Systems, Inc. holds copyrights to the LSI-R.

Exhibit 20 displays the percentage distribution of LSI-R scores for the Canadian and Washington State sample of male inmates.

The percentage distribution is fairly similar for both samples. For example, 40 percent of the 956 Canadians are moderate risk compared with 37 percent of the Washington sample.

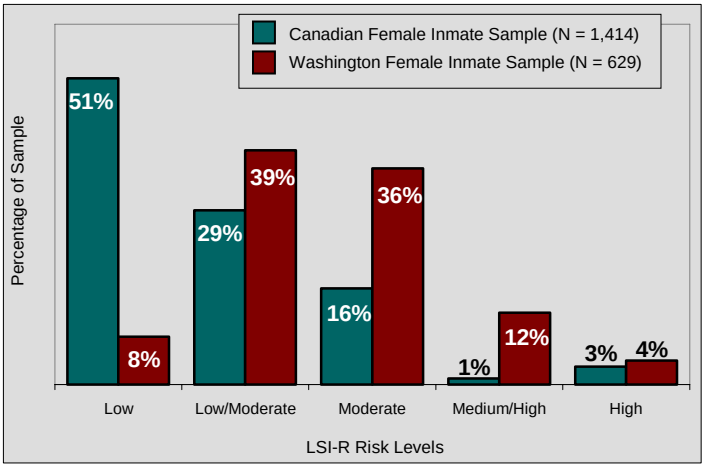
Exhibit 20
Male Inmate LSI-R Scores:
Canadian vs. Washington State Samples



The correlation coefficient between the LSI-R and re-incarceration for male inmates is 0.27. The AUC of 0.66 indicates a moderately strong association. The association is not stronger because 74 percent of the Washington State sample is in the low/moderate and moderate categories (37 percent plus 37 percent). These two categories do not strongly discriminate between inmates who are re-incarcerated and those not re-incarcerated.

The ColorPlot Profile Form also provides distribution of LSI-R scores for 1,414 Canadian female inmates. Re-incarcerations rates are not provided. Exhibit 21 compares the Canadian data with data from a sample of 629 Washington State female inmates. The Canadian sample has a much higher percentage of female inmates in the low-risk category (51 percent) than the Washington State female inmate sample (8 percent). That is, the Canadian female sample has a much lower-risk profile than the Washington State sample.

Exhibit 21
Female Inmate LSI-R Scores:
Canadian vs. Washington State Samples



Conclusions Concerning Re-incarceration Rates

Exhibits 20 and 21 demonstrate that the "advertised" validity of the LSI-R, based on re-incarcerations, holds up well for Washington State male inmates. However, Washington's female inmates have a much higher risk profile than the Canadian sample.

VII. Summary of Findings

Analyses of the LSI-R

This study found that the LSI-R has a moderately strong association with re-offending. The LSI-R scores exhibit no large distinct changes in recidivism rates from one LSI-R score to the next. This means there are no naturally occurring "cut-off scores" that define obvious risk categories.

A more detailed examination reveals that some domains and some items are more predictive than others. In addition, the LSI-R works but works differently for various groups of offenders.

Recommended Risk Classification

A classification can be constructed for Washington State combining the existing LSI-R instrument with supplemental items that improves the prediction of both felony and violent felony recidivism. The implementation of this risk classification is feasible because the supplemental information is readily available and the DOC computer system can be modified to calculate the risk classification.

If it is decided to implement this revised classification, it is important that the Institute and DOC work together to ensure appropriate definitions are followed and the classification is accurately automated.

Recommended Risk Classification and the RMI
The recommended risk classification and the RMI fit together fairly well in that the RMI's higher-risk levels (RMA and RMB) have a high portion of offenders predicted to be a high violent felony risk, and most of the lower-risk RMDs have a low predicted risk level. The RMCs are a mixture of predicted risk levels. These findings have implications for the RMI, primarily because the proposed risk classification predicts the likelihood for future harm done (violent felony recidivism). If it is decided to implement the proposed risk classification, DOC will need to reexamine the RMI classification, as well.

Re-incarceration Rates
The "advertised" validity of the LSI-R based on re-incarcerations for a sample of Canadian offenders holds up well for Washington State male inmates. However, the Washington female inmates have a much higher risk profile than the Canadian sample.

For more information, contact Robert Barnoski (360) 586-2744, barney@wsipp.wa.gov, or Steve Aos (360) 586-2740, saos@wsipp.wa.gov.

ACKNOWLEDGEMENTS

The authors wish to thank John Miller and Laura Harmon from the Institute for maintaining the Institute's criminal justice databases and ensuring that the study data set was properly constructed. We also wish to thank Doug Hasselbach, Kevin Mauss, and Anne Fiala from the Department of Corrections for providing valuable insight.

APPENDIX A: MEASURES OF ASSOCIATION BETWEEN ITEMS AND RECIDIVISM

LSI-R Item	Felony Recidivism		Violent Felony Recidivism	
	Correlation	Odds Ratio	Correlation	Odds Ratio
Criminal History Domain	0.26	1.24	0.14	1.22
1.	0.15	**1.22****	0.06	**1.01**
2.	0.19	**1.08**	0.07	**1.16**
3.	0.20	**1.36****	0.08	**0.98**
4.	0.07	**1.12***	0.02	**1.02**
5.	0.14	**1.25****	0.10	**1.43****
6.	0.13	**1.14***	0.06	**1.15**
7.	0.11	**1.31****	0.03	**0.95**
8.	0.19	**1.47****	0.09	**1.26****
9.	0.21	**1.38****	0.09	**1.35****
10.	0.06	**0.96**	0.12	**2.23****
Education/Employment Domain	0.19	1.08	0.10	1.08
11.	0.12	**1.18****	0.06	**1.32****
12.	0.16	**1.22****	0.06	**1.03**
13.	0.11	**1.11***	0.06	**1.14**
14.	0.02	**0.82****	0.00	**0.78****
15.	0.07	**0.99**	0.03	**0.89**
16.	0.12	**1.11***	0.05	**1.04**
17.	0.12	**1.14****	0.09	**1.42****
18.	0.12	**1.00**	0.06	**1.05**
19.	0.12	**1.01**	0.06	**1.06**
20.	0.11	**1.03**	0.06	**0.92**
Financial Domain	0.06	0.92	0.02	0.84
21.	0.11	**1.06***	0.05	**1.00**
22.	-0.01	**0.79****	-0.02	**0.78****
Family Domain	0.10	0.98	0.06	1.04
23.	0.04	**1.03**	0.05	**1.19****
24.	0.04	**0.95**	0.03	**1.02**
25.	0.06	**0.96**	0.03	**0.93**
26.	0.08	**0.99**	0.03	**0.95**
Accommodation Domain	0.13	1.07	0.06	1.04
27.	0.07	**1.08**	0.03	**0.94**
28.	0.09	**1.02**	0.04	**1.06**
29.	0.09	**1.09***	0.04	**1.09**
Leisure/Recreation Domain	0.13	1.09	0.06	1.08
30.	0.10	**1.06**	0.04	**0.95**
31.	0.12	**1.03**	0.07	**1.09**
Companions Domain	0.18	1.13	0.07	1.03
32.	0.01	**0.90**	0.01	**0.95**
33.	0.16	**1.35****	0.05	**1.01**
34.	0.16	**1.06**	0.06	**1.03**
35.	0.11	**1.11**	0.06	**1.38***
36.	0.11	**1.04**	0.05	**0.87**
Alcohol/Drug Problem Domain	0.14	1.02	0.04	0.97
37.	0.02	**0.88****	0.04	**0.92**
38.	0.17	**1.38****	0.03	**1.13**
39.	0.02	**0.88****	0.05	**1.11***
40.	0.14	**1.12****	0.02	**0.90***
41.	0.10	**1.00**	0.03	**1.05**
42.	0.10	**1.00**	0.03	**1.02**
43.	0.12	**1.13****	0.03	**0.98**
44.	0.05	**0.94**	0.00	**0.83***
45.	0.08	**0.90***	0.02	**0.91**
Emotional/Personal Domain	0.01	0.92	0.01	0.97
46.	0.00	**0.92***	0.01	**1.01**
47.	0.01	**1.10**	0.01	**1.06**
48.	0.04	**0.92***	0.02	**0.93**
49.	-0.02	**0.95**	-0.01	**0.86**
50.	0.00	**0.93**	0.01	**0.99**
Attitude/Orientation Domain	0.12	1.00	0.08	1.07
51.	0.09	**1.00**	0.07	**1.06**
52.	0.11	**1.00**	0.07	**1.02**
53.	0.04	**0.89****	0.04	**0.89**
54.	0.11	**1.14****	0.07	**1.15**

*Odds Ratio significant at the .05 probability level. **Odds Ratio significant at the .01 probability level.

APPENDIX B: PROPOSED RECIDIVISM MODELS: LSI-R SCORE PLUS NEW ITEMS

LOGISTIC REGRESSION RESULTS FOR 24-MONTH FELONY RECIDIVISM

Parameter	Odds	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi Square
Intercept		-3.88	0.09	2022.06	0.0001
LSI-R Score	1.03	0.03	0.00	161.56	0.0001
Prior Felonies in Juvenile Court	1.22	0.20	0.02	135.00	0.0001
Age at Community Placement	1.59	0.46	0.05	102.65	0.0001
Male Gender	1.36	0.31	0.04	47.49	0.0001
Prison Sentence	1.70	0.53	0.05	134.95	0.0001
Current Felony Property Offenses	1.25	0.23	0.04	28.04	0.0001
Current Felony Drug Offenses	1.27	0.24	0.05	21.98	0.0001
Current Misdemeanor Drug Offenses	1.65	0.50	0.09	30.95	0.0001
Current Misdemeanor Alcohol Offenses	2.17	0.77	0.04	417.49	0.0001
Prior Adult Felony Adjudications	1.24	0.21	0.01	261.33	0.0001
Prior Adult Felony Sex Adjudications	0.74	-0.30	0.11	7.63	0.0057
Prior Adult Felony Weapon Adjudications	1.48	0.39	0.08	26.72	0.0001
Prior Adult Felony Drug Adjudications	1.10	0.09	0.02	14.41	0.0001
Prior Adult Felony Child Sex Adjudications	0.67	-0.39	0.16	6.19	0.0128
Prior Adult Misdemeanor Adjudications	1.11	0.10	0.01	110.95	0.0001
Prior Adult Against-Person Misdemeanor Adjudications	1.44	0.36	0.03	141.97	0.0001
Prior Adult Property Misdemeanor Adjudications	1.16	0.15	0.04	15.90	0.0001
Current Misdemeanor Alcohol Offenses	1.06	0.06	0.03	3.91	0.0479

FELONY RECIDIVISM SCORING BASED ON ORDINARY LEAST SQUARES REGRESSION

Item Weight	LSI-R Plus Items (0 to 1304)	Items Score	Response	Felony Recidivism	Percent of Sample
+3	LSI-R Score				
+42	Prior Felonies in Juvenile Court	0	None	23%	83%
		1	One	35%	8%
		2	Two	40%	4%
		3	Three	48%	2%
		4	Four	50%	1%
		5	Five or More	55%	1%
+64	Age at Community Placement	0	Over 49	13%	4%
		1	20 to 49	26%	86%
		2	18 to 19	30%	9%
		4	Under 18	42%	1%
+43	Male Gender	0	Female	20%	21%
		1	Male	27%	79%
+84	Prison Sentence	0	No	23%	80%
		1	Yes	38%	20%
+32	Current Felony Property Offenses	0	None	25%	66%
		1	One or More	27%	34%
+26	Current Felony Drug Offenses	0	None	23%	66%
		1	One or More	31%	34%
+87	Current Misdemeanor Drug Offenses	0	None	25%	97%
		1	One or More	32%	3%
+126	Current Misdemeanor Alcohol Offenses	0	None	21%	70%
		1	One or More	36%	30%
+42	Prior Adult Felony Adjudications	0	None	12%	6%
		1	One	16%	48%
		2	Two	27%	20%
		3	Three	36%	11%
		4	Four	46%	6%
		5	Five	47%	4%
		6	Six	53%	3%
		7	Seven	58%	1%
		8	Eight or More	62%	2%

Item Weight	LSI-R Plus Items (0 to 1304)	Items Score	Response	Felony Recidivism	Percent of Sample
-52	Prior Adult Felony Sex Adjudications	0	None	26%	94%
		1	One	16%	6%
		2	Two or More	12%	1%
+69	Prior Adult Felony Weapon Adjudications	0	None	25%	96%
		1	One or More	41%	4%
+20	Prior Adult Felony Drug Adjudications	0	None	20%	58%
		1	One	27%	27%
		2	Two	38%	9%
		3	Three	49%	4%
		4	Four or More	53%	3%
-19	Prior Adult Felony Child Sex Adjudications	0	None	26%	96%
		1	One or More	11%	4%
+19	Prior Adult Misdemeanor Adjudications	0	None	16%	43%
		1	One	24%	21%
		2	Two	32%	12%
		3	Three	37%	7%
		4	Four	38%	5%
		5	Five	40%	3%
		6	Six or More	49%	8%
+77	Prior Adult Against-Person Misdemeanor Adjudications	0	None	23%	89%
		1	One	44%	8%
		2	Two	55%	2%
		3	Three	58%	1%
		4	Four or More	59%	0%
+29	Prior Adult Property Misdemeanor Adjudications	0	None	24%	89%
		1	One	37%	8%
		2	Two or More	43%	3%
+10	Prior Adult Alcohol Misdemeanor Adjudications	0	None	23%	79%
		1	One	34%	15%
		2	Two or More	44%	5%

LOGISTIC REGRESSION RESULTS FOR 24-MONTH VIOLENT FELONY RECIDIVISM

Parameter	Parameter Estimate	Odds Ratio	Standard Error	Wald Chi-Square	Pr > Chi Square
Intercept	-5.64		0.16	1317.60	0.0001
LSI-R Score	0.03	1.03	0.00	77.95	0.0001
Male Gender	0.96	2.62	0.11	77.63	0.0001
Age at Community Placement	0.30	1.35	0.03	115.74	0.0001
Prior Felonies in Juvenile Court	0.09	1.09	0.04	4.93	0.0264
Prior Commitments to JRA	0.14	1.15	0.08	3.19	0.074
Prison Sentence	0.29	1.34	0.07	15.61	0.0001
Current Felony Domestic Violence Assault Offenses	0.64	1.91	0.12	31.13	0.0001
Current Felony Drug Offenses	-0.15	0.86	0.07	4.77	0.0289
Current Misdemeanor Against-Person Offenses	0.29	1.33	0.10	9.10	0.0026
Current Misdemeanor Alcohol Offenses	0.40	1.49	0.06	40.93	0.0001
Prior Adult Felony Against-Person Adjudications	0.37	1.44	0.04	99.23	0.0001
Prior Adult Felony Weapon Adjudications	0.30	1.35	0.11	7.99	0.0047
Prior Adult Felony Child Sex Adjudications	-0.48	0.62	0.16	9.31	0.0023
Prior Adult Misdemeanor Against-Person Adjudications	0.27	1.31	0.04	37.44	0.0001
Prior Adult Misdemeanor Assault Adjudications	0.17	1.19	0.02	69.65	0.0001

VIOLENT FELONY RECIDIVISM SCORING BASED ON ORDINARY LEAST SQUARES REGRESSION

Item Weight	LSI-R Plus Items (0 to 1304)	Item Score	Response	Violent Felony	Percent of Sample
+26	Gender	0	Female	2.0%	21%
		1	Male	8.0%	79%
+15	Age at Community Placement	0	Over 49	2.6%	4%
		1	40 to 49	4.0%	17%
		2	30 to 39	6.4%	32%
		3	22 to 29	7.3%	27%
		4	19 to 21	9.2%	15%
		5	Under 19	12.5%	4%
+10	Prior Felonies in Juvenile Court	0	None	5.5%	83%
		1	One	10.7%	8%
		2	Two	13.5%	4%
		3	Three	15.8%	2%
		4	Four or More	17.5%	2%
+25	Prior Commitments to JRA	0	None	6.1%	94%
		1	One	16.3%	3%
		2	Two or More	19.0%	3%
+13	Prison Sentence	0	No	6.3%	80%
		1	Yes	8.5%	20%
+95	Current Felony Domestic Violence Assault Offenses	0	None	6.2%	97%
		1	One or More	24.9%	3%
-6	Current Felony Drug Offenses	0	None	7.7%	66%
		1	One or More	4.7%	34%
+15	Current Misdemeanor Against-Person Offenses	0	None	6.4%	93%
		1	One of More	10.4%	7%
+22	Current Misdemeanor Alcohol Offenses	0	None	5.7%	70%
		1	One or More	9.1%	30%
+34	Prior Adult Felony Against-Person Adjudications	0	None	4.4%	64%
		1	One	8.6%	29%
		2	Two	16.6%	6%
		3	Three	22.1%	1%
		4	Four	31.3%	0%
		5	Five or More	41.4%	0%
+24	Prior Adult Felony Weapon Adjudications	0	None	6.4%	96%
		1	One or More	14.2%	4%
-32	Prior Adult Felony Child Sex Adjudications	0	None	6.8%	96%
		1	One or More	5.0%	4%
+27	Prior Adult Misdemeanor Against-Person Adjudications	0	None	5.8%	89%
		1	One	13.0%	8%
		2	Two	17.8%	2%
		3	Three or More	18.5%	1%
+17	Prior Adult Misdemeanor Assault Adjudications	0	None	4.8%	72%
		1	One	8.6%	16%
		2	Two	12.2%	6%
		3	Three	14.9%	3%
		4	Four	16.7%	2%
		5	Five	22.4%	1%
		6	Six or More	26.9%	1%

Document Number: 03-12-1202

Washington State
Institute for Public Policy

The Washington Legislature created the Washington State Institute for Public Policy in 1983. A Board of Directors—representing the legislature, the governor, and public universities—governs the Institute and guides the development of all activities. The Institute's mission is to carry out practical research, at legislative direction, on issues of importance to Washington State.