VALIDATION STUDY OF THE LS/CMI ASSESSMENT TOOL IN NEBRASKA

Prepared for Nebraska State Probation Administration

Richard L. Wiener
Krystia Reed
Hazel Delgado
Alisha Caldwell

Law/Psychology Program
University of Nebraska/Lincoln

July 2014

Executive Summary

The Problem

In January, 2013 the Nebraska Office of Probation Administration (OPA) initiated a contract with the Law and Psychology Program at UNL (LPUNL) to evaluate the validity of the Level of Service/Case Management Inventory (LS/CMI) (Andrews, Bonta, & Wormith, 2004) risk assessment measure as the OPA currently uses the instrument in the state of Nebraska. LPUNL began with a review of the existing research literature supporting the LS/CMI as it appears in the User's Manual and found support for the instrument's reliability and validity as a predictor of recidivism. However we noted that the general literature shows widely varying estimates of recidivism rates for probationers, in part because researchers use a variety of measures of recidivism.

The Research Literature

The report moved on to review the existing literature that examines the power of the Level of Service Inventory (LSI) scales including the LS/CMI to predict general and violent recidivism. Researchers have conducted eight meta-analyses (a quantitative review of a large number of studies that analyzes and summarizes the effects (statistical estimates known as effect sizes) and characteristics of instruments and variables in a way that tests the overall relationship between a set of predictors (e.g., the scales on the LSI family of instruments) across a number of setting and sample characteristics. The most recent meta-analysis (Olver, Stockdale, & Wormith, 2014) found the effect size or predictive power of the LSI scales in the United States was

significant but small and much less than in Canada where it was significant and moderate. The reader should be careful to not over interpret this finding. The fact that there was a statistically significant effect size in the U.S. (r = .22) means that overall the LSI scales are useful for assessing and assigning risk among U.S. offenders.

The Database

The report goes on to describe the sample of probationers in the 5 ½ year database (January 2007 to June 2013). The typical probationer in the sample was a single 33 year old, male with White European background. The most frequent offenses for those on probation at the time of the LS/CMI were in order: Misdemeanor 1, Misdemeanor W, and Felony 4, which together accounted for 68% of the sample. The most frequent offenses for those with jail sentences at the time of the LS/CMI were in order: Misdemeanor 1, Felony 4 and Misdemeanor W, which together accounted for 74% of the sample.

Recidivism as a Measure of Risk

The strategy for validating the LS/CMI involves using the risk levels that the instrument measures to predict recidivism outcomes. To the extent to which lower risk levels predict lower levels of recidivism and higher risk levels predict higher recidivism, the instrument is a valid predictor of risk. The report describes the findings examining the relationship between the risk level of the instrument and rates of recidivism defined 6 different ways.

Failure Defined as any Subsequent Probations or Jail Sentences

Analyses showed that increases in risk level were associated with a greater probability of failure but that the low and high risk levels did a better job of distinguishing risk in the form of recidivism than did the middle levels (See Figure 8). The effect size in the Nebraska sample (r = .21) was the nearly the same as found in the Olver et al. (2014) meta-analysis (r = .22) for all

samples aggregated across the United States. This one analysis lends strong support to the validity of the LS/CMI as the OPA applies it in Nebraska. The results of the analysis (See Table 4) show significant effects in predicting failure for the age of the probationer (i.e., those who failed were slightly older than those who did not fail), for sex of the probationer (i.e. the likelihood of an additional probation or jail sentence for men was higher than it was for women – See Figures 9 and 10), and the moderating effect of minority status on the predictive power of the LS/CMI. Although the predictive power for general recidivism for the LS/CMI appears to be slightly better for non-minorities in Nebraska, the difference is small and significant mainly due to the large sample size in the analysis (See Figures 11 and 12). For practical purposes the LS/CMI predicts recidivism about as well with non-minorities and minorities in Nebraska with effect sizes for each group similar to the overall predictive power in the Olver et al (2014) meta-analysis for the U.S.

In an exploratory analysis with all eight criminogenic scales that the LS/CMI measures (Criminal history, Education and Employment, Family and Marital Issues, Leisure and Recreational Issues, Companions, Alcohol and/or Drug Problems, Procriminal Attitude and Orientation, and Anitsocial Pattern) the statistical model of these scales produced a higher effect size (r = .30) as compared to the overall level of risk. The strongest predictors in the Nebraska sample were Criminal History, Substance Abuse, Procriminal Attitudes and Antisocial Personality Pattern. Factors that underperformed included Education and Employment, Leisure and Recreation, Companions, and Family and Marital Issues (See Figures 13 and 14). Additional research to determine the ways in which Nebraska Probation Officers deviate from the procedures in the LS/CMI manual could be helpful in improving the predictive power of the LS/CMI in Nebraska.

Alternative Measures of Recidivism

The report examines five additional measures of recidivism to explore the relationship between LS/CMI levels of risk and other forms of probation success and failure. ***First***, for failure defined as either 2 or more probations or an additional jail sentence the overall probability of failure was .54 and the graph of the relationship did show increases in failure with increases in risk level (See Figure 15). However the scale flattened out above the medium low level of risk and the overall effect size was considerably lower (r = .15). ***Second***, we calculated a proxy outcome measure for the Nebraska Supreme Court's definition of recidivism, a conviction for a Class I or II misdemeanor, a Class W misdemeanor, or a Class IV felony or above, provided that the conviction occurs within three years of a successful release. Our proxy measure scored a failure if a probationer's most recent charge classification fit into this category (See Figure 16). (Note, if there was no charge, this was a success.) At the lowest level of LS/CMI risk the probability of failure with this definition was .43 but with the highest level of risk rose to .90. Again, the LS/CMI is better able to predict outcomes at the very low and very high ends of the scale with the medium low through the medium high factors not showing consistent significant differences. The effect size for this outcome measure (r = .18) is smaller but comparable to those obtained in the meta-analysis of U.S. samples. The ***third*** exploratory outcome measure defined recidivism as any subsequent jail sentence and produced the highest effect size of all the outcome measures (r = .22) in the sample (See Figure 17). The probability of failure at the lowest risk level was .02 and at the highest level of risk it was .33. There is a positive linear function with increases in risk resulting in greater likelihood of a subsequent jail sentence. The

fourth exploratory outcome measure was the number of probations subsequent to the index LS/CMI. Figure 18 shows that as risk increased on the LS/CMI so did the mean number of additional probations, which topped out at about an average of 2 more in the highest risk category. The effect size was again smaller but comparable to the meta-analysis of U.S. samples (r = .18). The ***fifth*** and final exploratory measure, the number of jail sentences subsequent to the index LS/CMI showed that as risk level increases so did the estimated mean number of jail sentences with more predictive power at the higher and lower ends of the risk levels (r = .20) (See Figure 19). The results show that the LS/CMI is more effective at predicting future failures in terms of number of subsequent jail sentences than number of subsequent probations.

Gender and Minority Analyses

This section of the report examined whether the LS/CMI scoring was different for male and female probationers. The analysis featured differences in the probability that an individual chosen at random in any risk level was a male (or female). Figure 20 shows that beyond the very low risk level where the probability of being a male was significantly lower than any other risk level, there were no differences in the percent of men in any of the other categories. The effect size for this relationship was very small (r = .03). Thus, while there are proportionally fewer men in the very low risk category as compared to the other risk levels, the different is very small and only significant because of the very large sample size. At the same time Figure 21, which examines gender differences in scoring of each of the eight criminogenic factors on the LS/CMI shows inconsistent results. Men show higher risk on Criminal History, Alcohol and Drug Problems, Procriminal Attitudes and Orientation and Antisocial Pattern but women show higher risk on Education and Employment, Family and Marital Issues, and Companions. The effect sizes are very small except for family and marital issues, which might be an area to focus on for

interventions with women probationers in Nebraska. Overall, there are no consistent or strong sex differences in the Nebraska sample.

Minority differences tell a somewhat different story. Figure 22 shows that the probability of being a minority for a probationer in the two higher risk groups was significantly higher than in the lower risk groups. In fact, the odds of being a minority in the very high LS/CMI risk level were 1.58 times greater than someone in the very low risk group and the odds of being a minority in the high risk level were 1.223 times greater than someone in the very low risk group. Furthermore, Figure 23 shows that minority probationers score higher in risk on all eight LS/CMI criminogenic factors. There are two possible explanations for this finding: 1) minority probationers actually do have higher risk than non-minority status probationers or 2) probation officers score minority offenders higher than they score non-minority offenders even when the risk is comparable. It is not possible to determine the answer to this question without conducting an experiment that holds constant the level of criminogenic factors for a set of offenders but vary the minority status of the offenders.

Relationship between the NAPS and the LS/CMI

One final question concerning the LS/CMI is whether it adds information beyond the NAPS, which probation officers collect for all County Court offenders and some District Court offenders. First, we examined the relationships between the NAPS risk level, the LSCMI risk level and recidivism defined as a subsequent probation or jail sentence. Figure 24 displays the probabilities of failure for the NAPS and LS/CMI risk levels showing that increases in risk level associated with either measure increases is associated with increases in the probability of failure. Furthermore, both the NAPS risk and the LSCMI added significantly to the prediction model even after controlling for the other measure's contribution to the prediction. Finally, Figure 25

shows increases in LSCMI risk are associated with increases in the NAPS risk with an effect size of r = .21. However, the large percentage of observations in the off diagonal cells shows that the two instruments provide unique information. Thus, administering the LSCMI after the NAPS improves the measurement of risk in the Nebraska sample.

Additional Analyses, Next Steps, and Conclusions

Overall, the analyses show overall support for the LS/CMI risk level categorization but with varying degrees of effect sizes depending upon the risk measure. There are a number of additional analyses that the LPUNL team could conduct (some requiring more data) to assist in improving the effect sizes and predictive power of the LS/CMI.

- Given the flat nature of the LS/CMI curves in the middle of the scale and our anecdotal information suggesting that there is some subjectivity in the way in which officers administer the instrument, reducing the inconsistencies in applying the instrument may go a long way towards increasing its predictive validity. We suggest validity training on the LS/CMI across the system as the first step followed by a reexamination of the data. LPUNL will work closely with OPA to set up the training and evaluation in a way that allows us to measure the success of the training on increasing fidelity of the LS/CMI administration.
- Following validity training and subsequent evaluation of increases in predictive validity, we recommend analyses of the internal consistency of each of the LS/CMI scales coupled with an analysis using the individual scale levels to predict the outcome measures using ROC (Receiver Operating) statistics. This will allow us to determine which of the scales are most and least predictive of risk. These analyses will allow the LPUNL team to determine if revisions to scale

cutoffs will help improve the predictive validity of the LS/CMI as it is used in Nebraska. These analyses will be most useful following additional validity training on the LS/CMI. Additional analyses may also produce a weighting scheme using the existing scores that may produce higher effect sizes in the Nebraska environment.

- LPUNL recommends an experimental analysis presenting offenders with varying minority status backgrounds to probation officers (holding constant criminogenic factor evidence) to determine if there is any bias in how the officers apply the LS/CMI to minorities and non-minorities in Nebraska. Conducting such an experiment will reveal ways to decrease any observed bias.

Concluding Comments

Our final conclusions based upon the analyses reported here are that 1) Administration of the LSC/MI in Nebraska predicts recidivism as well as anywhere else in the United States. 2) The relationship between the risk levels on the LS/CMI and recidivism follow a pattern that one would expect given the current view of rehabilitation in the criminal justice system. 3) Use of the LSC/MI in Nebraska has been successful but future work at improving the fidelity of the measure, examining weighting schemes, and reducing bias might increase the predictive power of the instrument.

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Figures and Tables

Statement of the Problem

In January, 2013 the Nebraska Office of Probation Administration (OPA) initiated a contract with the Law and Psychology Program at UNL (LPUNL) to evaluate the validity of the Level of Service/Case Management Inventory (LS/CMI) (Andrews, Bonta, & Wormith, 2004) risk assessment measure as the OPA currently uses the instrument in the state of Nebraska. LPUNL began with a review of the existing research literature supporting the LS/CMI as it appears in the User's Manual. The LS/CMI categorizes individuals into 7 risk levels: very low, low, medium low, medium, medium high, high, and very high. The Manual identifies three main studies (Andrews & Bonta, 1995; Rettinger, 1998; Rowe, 1999) that use recidivism as a measure to test the validity of the 7 level categorization system. The LPUNL took the same approach in studying the use of the LS/CMI in Nebraska, asking the question, "How well do the LS/CMI categories predict risk of future offenses subsequent to a probationer's first violation?"

The LPUNL analyses were based upon data that the OPA collected from January, 2007 through July, 2013 allowing our team to create a 5 1/2 year window. Our analyses are different from those that appear in the LS/CMI Manual (LSM) in two significant ways: First, the recidivism time frame LPUNL used is longer than those reported in the LSM. While our study examines a 5 ½ year window, the LSM studies focused on recidivism within 1 year of release. Although one of the studies that the LSM reports (Rowe, 1999) used a slightly larger window by following inmates for two years after their release from prison, it did not include data from probationers. Second, the LSM studies defined risk differently than the LPUNL study. For example, Andrews and Bonita (1995) separated recidivism into three categories: any recidivism, re-offense and return to prison, and violent re-offense, while Rettinger (1998) distinguished between general recidivism and violent recidivism. None of these studies examined seriousness

of charge as one source of recidivism, which is part of the main definition of risk that the LPUNL has used.[1]

Overall, the results in the LSM describes the LS/CMI as a reliable and valid instrument. For example, Rowe (1999), who classified people who the state had charged with another offense two years after the first as failures, found that 48.5% of the sample reoffended and were therefore failures for purposes of that investigation. The LSM reports the internal consistency (i.e. the extent to which all the items measure the same concept) of the scales (Cronbach's alpha) to lie between .87 and .91 for the overall scale but it varies between .24 and .87 for the individual scales. (Note: Alphas above .70 are acceptable.) Test-retest (i.e., the instrument produces the same scores over time) and inter-rater reliability (i.e., agreement between independent raters) assessed with correlations (*r)* varied greatly from .16 to .91 depending upon the study cited. The validity evidence, i.e., associations between recidivism after 1 year of release for probationers and inmates, displayed a correlation in the moderate to large range (r = .44) for any type of recidivism during the year after release. The correlations between recidivism and LS/CMI risk levels for the Nebraska data over the 5.5 year window were lower than those reported in the LS/CMI manual but equivalent to those reported in the United States as evidenced in a recent exhaustive meta-analysis (Olver, Stockcdale, & Wormith, 2014).

Analysis of Risk among Probationers

A general review of the risk assessment literature includes little *published* research addressing recidivism among probationers in the United States. Most published studies that do exist limit their analyses to single wave snapshots of probation records in a single state (Clarke,

[1] We describe the measures of risk below in the analysis section of this report.

Lin, & Wallace, 1988; McGaha, Fichter, Hirschburg, 1987; Petersilia, Turner, Kahan, & Peterson, 1985). Making the literature even more difficult to interpret are the often incomparable indicators of risk that researchers report. For example, Maltz (as cited in Benedict & Huff-Corzine, 1997) identified nine dimensions that researchers sometimes report as indicators of risk of recidivism: arrests, reconvictions, incarcerations, parole or probation violations, parole or probation suspensions, parole or probation revocations, offenses, absconding, and new probations. In part because researchers rely on so many different indicators of risk of failure, published studies of recidivism among probationers show disparate failure rates, ranging anywhere from 22% (Vito, 1987) to 65% (Petersilia et al., 1985). For example, while a study in Iowa in 2005 showed a re-arrest rate of 43% for male and 27 % for female probationers during the first fiscal quarter of 2001 (Stageberg & Wilson, 2005)[2], Petersilia's (1985) study of recidivism rates in several counties in California revealed a 65% recidivism rate during a three year window. Supporting the California findings, Texas statistics similarly showed a 64.5% re-arrest rate for individuals who were under adjudicated probation supervision from 2005 until 2008 (Legislative Budget Board, January 2013). Complicating the findings even more, the Sentencing Project Research and Advocacy Forum's (2010) summary of studies conducted from 1995 to 2009 show that the unpublished rates of recidivism for probationers vary even more dramatically. An unpublished Idaho study reported that 74% of its probationers recidivated within 5 years of finishing probation, which includes a higher rate for the first 30 months (82%), but levels off to 12% after three years (Sentencing Project: Research and Advocacy Forum, 2010). At the same time, data from New York state (Division of Criminal Justice Services, 2009)

[2] Note that the Iowa statistics are likely a low estimate because statutory restrictions in Iowa require expunging arrests that do not lead to convictions from current records. It is difficult to determine how serious this limitation is because the arrest records only represent a one quarter window.

indicated a recidivism rate for probationers of only 25.7% in 3 years but that study defined recidivism as a felony re-arrest and does not consider misdemeanors.

The lessons to be learned from the probation recidivism literature are three: First, although there is little agreement on the best way to measure probationer risk, most jurisdictions settle on some measure of recidivism as a core indicator. Second, definitions of recidivism and time frames for measuring recidivism vary greatly from study to study and from jurisdiction to jurisdiction. Third, it is critical that comparisons within jurisdictions over time or within jurisdictions between different types of programs use a set of agreed upon indicators defined similarly across data collection waves and that that these indicators are comparable across programs within a jurisdiction. In this report, we analyze 6 recidivism indicators that Nebraska Office of Probation Administration (OPA) might consider adopting. All are measures of general recidivism that are comparable to outcome measures that we found in the existing research literature on the Level of Service (LS) scales. We next turn to the published research on the LS scales to offer a baseline of comparison for our work with the LS/CMI in Nebraska.

Prior Research on the Level of Service Scales

The Level of Service Inventory (LSI) is a measure of offender (i.e., inmates, probationers and paroles) risk of recidivism, which is tied to criminogenic needs, case management recommendations and level of required supervision. The inventory is a commonly used set of scales with over 1 million administrations (internationally) in 2010 alone (Andrews, Bonta, & Wormith, 2011). Each scale includes a series of binary items that together measure one of the "Big Four" predictors of criminal behavior (i.e., criminal history, anti-social attitudes, antisocial associates, and antisocial personality) or one of the remaining four scales that make up the "Centeral Eight" criminogenic factors (i.e., education/employment, family/marital status, leisure

recreation, and substance abuse). In the last 30 years, there have been 6 different published versions of the LS scales, which were originally developed in Canada but used with youth and adults not only in that country, but also in the United States and in a number of countries outside North America (Olver, Stockdale, & Wormith, 2014). Including the most recent study completed in 2014 (Olver, et al.), researchers have conducted eight meta-analytic studies of the LSI scales with youth and adults (Gendreau, Groggin, & Smith, 2002; Olver, Stockdale, & Wormith, 2009; 2014; Schwalbe, 2007; 2008; Singh, Grann, & Fazel, 2011; Smith, Cullen, & Latessa, 2009; Yang, Wong, & Coid, 2010).

A meta-analysis is a quantitative review of a large number of studies that analyzes and summarizes the effects (statistical estimates known as effect sizes) and characteristics of instruments and variables in a way that tests the overall relationship between a set of predictors (e.g., the scales on the LSI family of instruments) across a number of setting and sample characteristics. The results of meta-analyses are usually presented as effect sizes, one for each study, which indicates the strength of the relationship between predictor variables (here, the LSI scales) and an outcome measure (here, recidivism). The *r*, or correlation statistic is the usual measure of effect sizes that researchers report in any single study or groups of aggregated studies that comprise a single meta-analysis. The *r* value can range from negative 1.00 to positive 1.00. Positive numbers indicate that the predictors are positively correlated with the outcomes, that is, as the predictors (here, LSI risk factors) increase so does the outcome (here, recidivism coded present vs. absent). Negative numbers indicate that as predictors increase (again, LSI risk factors) outcomes decrease (again, recidivism). Small positive effect sizes range from and r = .10 to r = .30, medium from r > .30 to r =.50, and large, r > .50.

In the most recent meta-analysis of the LSI scales, Olver et al. (2014) found and coded effect sizes from 128 studies with 151 independent samples (N = 137,931 offenders) that examined the power of the LSI to predict recidivism among offenders. The studies came from Canada (k = 53), the United States (k=55) and outside North American (k = 20; Australia, United Kingdom, Singapore, Germany, Japan, New Zealand, and Pakistan). Overall, the effect size using a fixed model (one that does not adjust for the differences in sample sizes) produced an r = .30 across countries for general recidivism (a moderate predictor) and r = .21 for violent recidivism. However, and most importantly for the purposes of this report, the effect size varied significantly and substantially by country and region. For general recidivism, the effect size in Canada, where the instrument originated was .43 (moderate) and it was .29 outside North American, also moderate, but significantly lower ($p < .05$). In the United States, the effect size, r = 22, was considerably and significantly lower than in either Canada ($p < .05$) or countries outside North American ($p < .05$). (Olver et al., 2014). The effect sizes for violent recidivism were in Canada (r = .27), outside North America (r = .20) and in the United States (r = .12). All effect sizes were statistically significant ($p < .05$) or statistically greater than 0**. Thus, the effect size or predictive power of the LSI scales in the United States was significant but small and much less than in Canada where it was significant and moderate. The reader should be careful to not over interpret this finding. The fact that there was a statistically significant effect size in the U.S. means that overall the LSI scales are useful for assessing and assigning risk among U.S. offenders.**

The effect sizes for general recidivism in the Olver et al. (2014) meta-analysis did show small but statistically significant overall gender differences with $r_{(women)}$ = .32 across regions and $r_{(men)}$ = .30 ($p < .05$). The effect sizes for general recidivism suggest that the scales do a slightly

better job of predicting risk for women than they do for men. Much more importantly, the effect sizes showed large and statistically significant differences for ethnicity worldwide with $r_{(minorities)}$ = .23 (small predictive power) and $r_{(nonminority)}$ = . 32 (medium predictive power). The effect size disparities for ethnicity show that the instrument is more predictive for the nonminority than for the minority offenders.

Olver et al. (2014) speculate that differences in effect sizes in the United States and Canada were the result of 1) very large caseloads in the U.S. (as compared to Canada) lowering the quality of U.S. assessments using the LSI scales, 2) the absence of a national database in the U.S. making it difficult to accurately follow-up offenders in the U.S. as compared to Canada where a national database is in place, 3) more familiarity in Canada (where the instrument originated) with the LSI instrument use and training than in the United States resulting in more divergence from assessment rules in the United States than in Canada. Overall, the meta-analysis shows that the LSI scales are sound predictors of risk of recidivism in U.S. studies but not as strong as in Canadian studies. These meta-analytic effect sizes offer a baseline for examining the use of the LS/CMI in Nebraska. Next, we turn to our analysis of the Nebraska database.

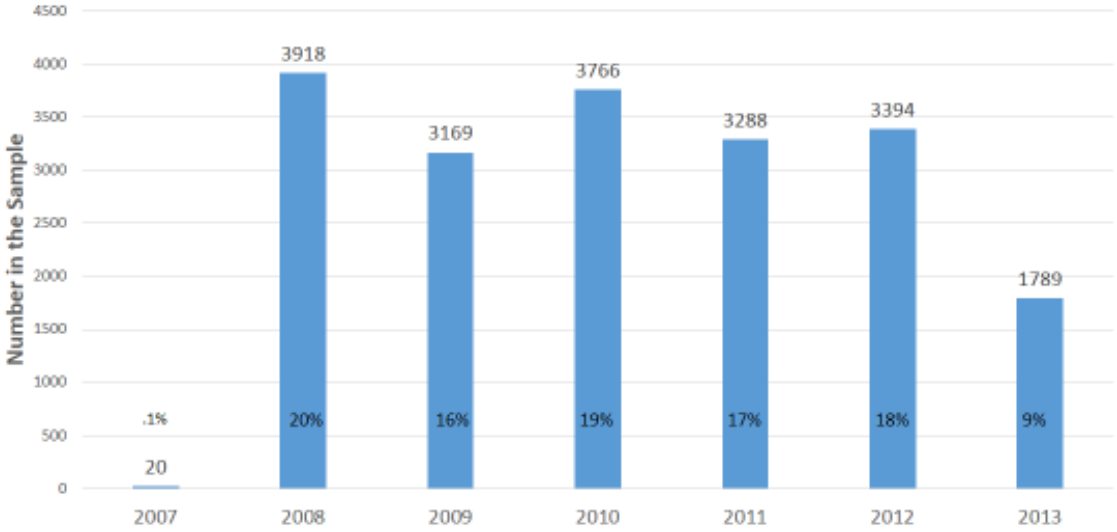
LS/CMI: Nebraska Data Analyses

Data Set

Year of Completion of the First LS/CMI for the Sample. The final data set that we used to conduct the LS/CMI analyses included 19,344 probationers and/or individuals with jail sentences whose index LS/CMI (i.e., the first one without our time frame) was on or after January 1, 2007. Figure 1 displays the years for the first LS/CMI in the sample. It shows that the time window for the data set is 5.5 years (i.e., the first data was collected in January 2007 and the

last was in June 2013). All analyses reported below adjust for the number of days from the time the first LS/CMI was completed until the end of the sampling period and weighs the recidivism rates accordingly. Thus, we statistically accounted for the fact that people who were first assessed at the beginning of the time frame had more time to reoffend than people who were first assessed at the end of the time frame. Future analyses could either continue in this manner or divide the sample into 5 year-long windows (i.e., 2008, 2009, 2010, 2011, and 2012) and/or three year-long windows (i.e., 2008, 2009, and 2010).

Figure 1: Years in the sample.



Demographic Breakdown

The demographic breakdown of these individuals is depicted below in five graphs (Figures 2 through 7). (Note: Sample sizes vary as a result of missing data fields in the original data set that OPA provided.) The typical probationer in our sample was a single 33 year old, male with White European background.

Figure 2: Sex of the individuals in the sample.

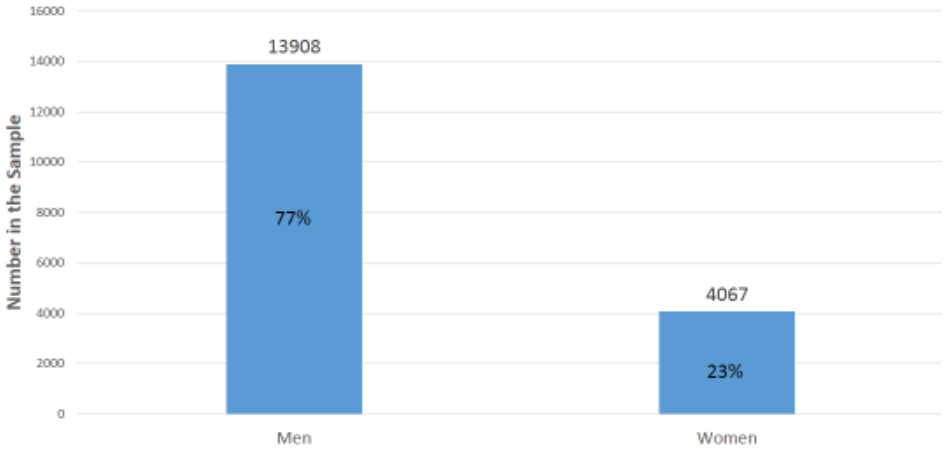


Figure 3: Race of the individuals in the sample.

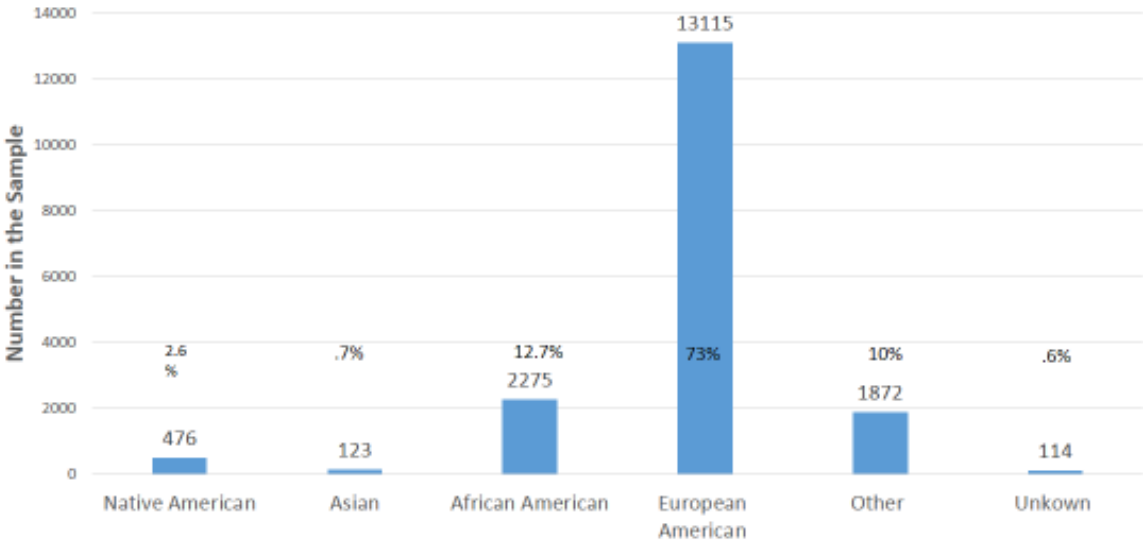


Figure 4: Ethnicity of the individuals in the sample.

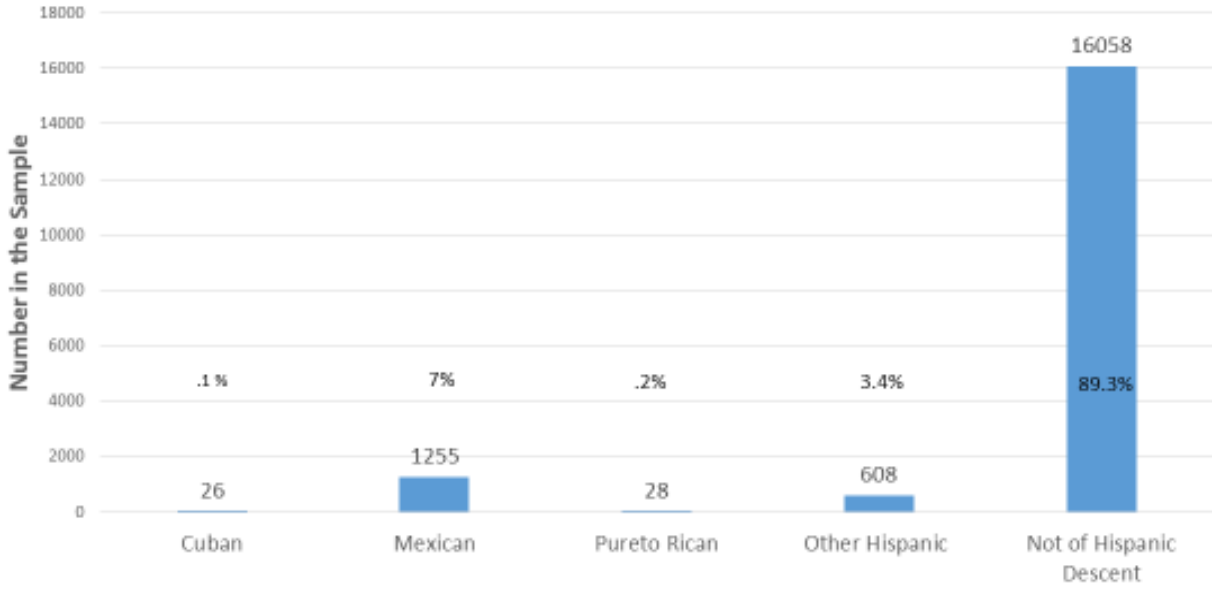


Figure 5: Minority and non-minority status.

Included in the Nonminority status are White Europeans without any Hispanic descent and included in the Minority status are probationers who self-identify as not being White Europeans or who self-identify as having Hispanic descent.

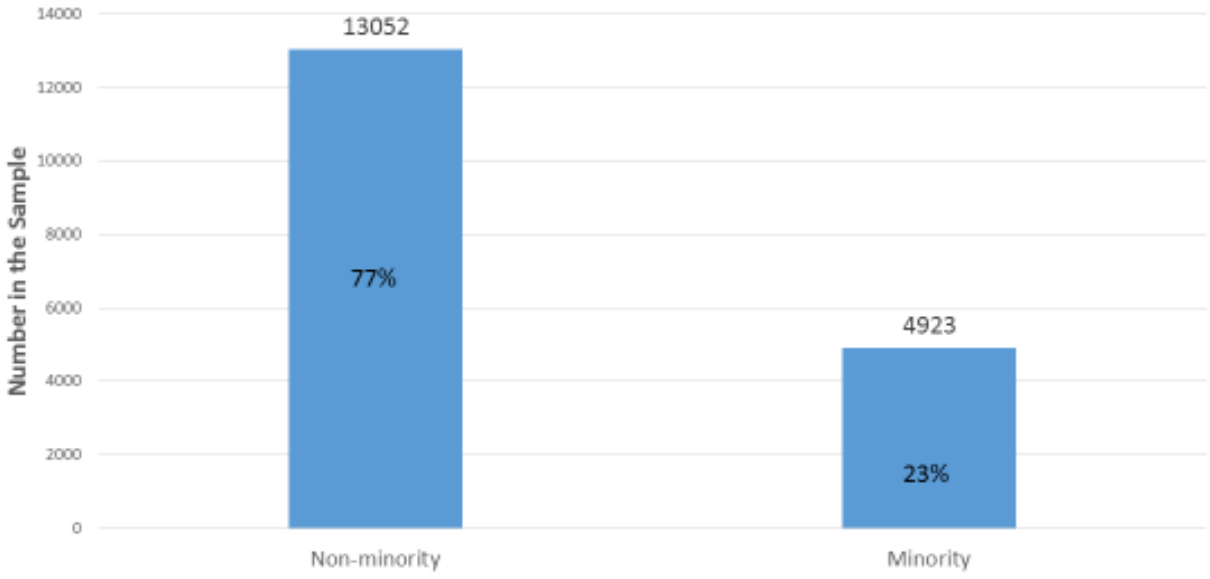


Figure 6: Marital status of the individuals in the sample.

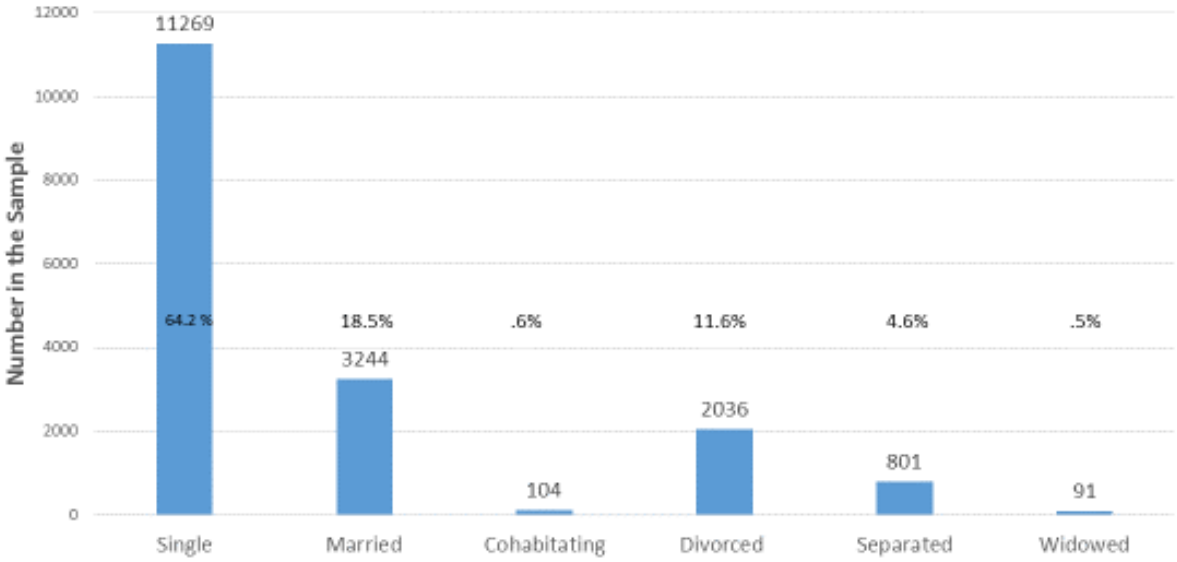
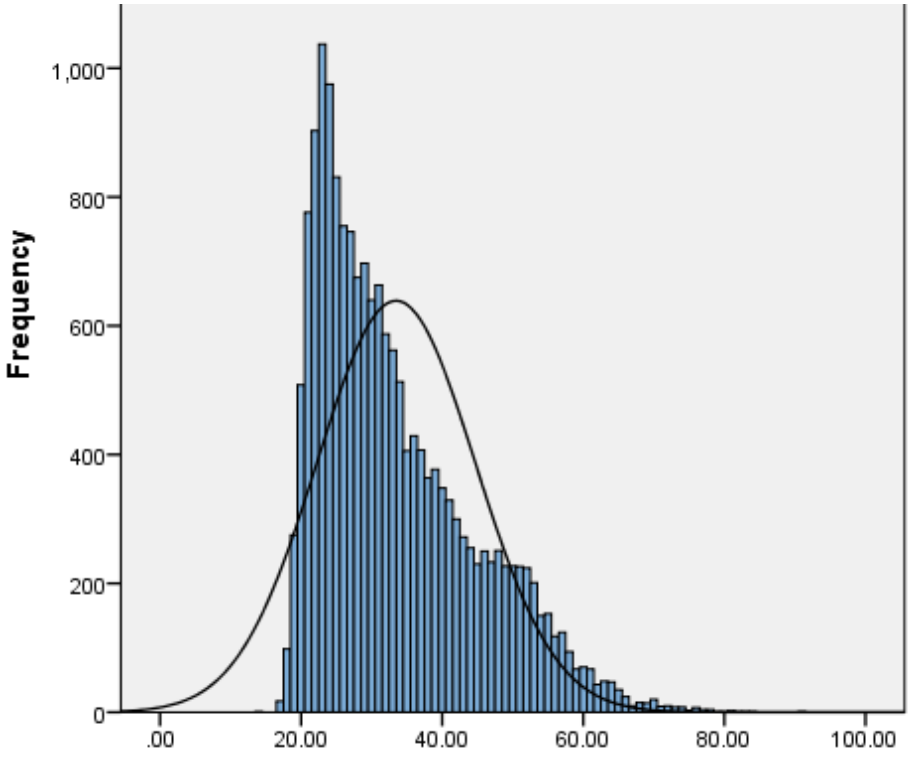


Figure 7: Age of the individuals in the sample.

Figure 7 describes the age of the individuals in the sample at the time of the first LS/CMI. The mean age is 33.46 years old, the median is 31 years but the mode is 23 years reflected in the positive skew in the figure. The standard deviation is 11.22.



Charges Associated with the Index LS/CMI

The next two tables describe the type and number of index crimes associated with the first LS/CMI for individuals in the sample.

Charges when the First Offense Resulted in Probation. Table 1 displays the number and percent of the total probationers for each type of index offense associated with the first LS/CMI score in the data file. The most frequent offenses were in order Misdemeanor 1, Misdemeanor W, and Felony 4, which together accounted for 68% of the sample.

Table 1

Distribution of Charge Classification for those with Probation for the First Offense

Classification of Charge	Number of Probationers	Percentage of Probationers
Felony 1A	1	.0
Felony 1B	14	.1
Felony 1C	6	.0
Felony 1 D	45	.3
Felony 2	325	1.9
Felony 3	1602	9.2
Felony 3A	673	3.9
Felony 4	3000	17.2
Infraction	72	.4
General Misdemeanor	12	.1
Misdemeanor 1	4824	27.7
Misdemeanor 2	1051	6.0
Misdemeanor 3	1727	9.9
Misdemeanor 3A	3	.0
Misdemeanor 4	9	.1
Misdemeanor 5	5	.0
Misdemeanor W	4043	23.2%
Total	17,433	100.0

Charges when the First Offense Resulted in Jail. Table 2 displays the distribution of types of index offenses associated with the first LS/CMI score for those whose first offense resulted in a jail sentence. The most frequent offenses were in order of Misdemeanor 1, Felony 4 and Misdemeanor W, which together accounted for 74% of the sample.

Table 2

Distribution of Charge Classification for those with a Jail Sentence for the First Offense

Classification of Charge	Number of Probationers	Percentage of Probationers
Felony 1B	1	.1
Felony 1 D	1	.1
Felony 2	6	.6
Felony 3	30	2.9
Felony 3A	16	1.5
Felony 4	176	16.8
Infraction	5	.5
General Misdemeanor	1	.1
Misdemeanor 1	457	43.7
Misdemeanor 2	93	8.9
Misdemeanor 3	114	10.9
Misdemeanor 3A	1	.1
Misdemeanor 4	1	.1
Misdemeanor W	143	13.7
Total	1045	100.0

Recidivism as a Measure of Risk

Overall Strategy

The strategy for validating the LS/CMI involved using the risk levels that the instrument measures to predict recidivism outcomes. To the extent to which lower risk levels predict lower levels of recidivism and higher risk levels predict higher recidivism, the instrument is a valid predictor of risk. Below we report the findings examining the relationship between the risk level of the instrument and rates of recidivism defined 6 different ways. For those outcomes that form dichotomous variables (e.g., subsequent failure – yes vs. no, any subsequent probations – yes vs.

no, or any subsequent jail sentences – yes vs. no) we used logistic regression to predict the categorical variable. We included the number of days from the individuals first offense to the end of the window (July 1, 2013) as a control factor adjusting for length of time in the system. Therefore, all probabilities of failure are adjusted for the time that the individuals were in the system. All analyses of recidivism used only new case numbers and not subsequent LS/CMI scores that might have been based upon the original index offense. In this manner recidivism is always a measure of subsequent involvement in the criminal justice system occurring independent of the index offense and not simply a new assessment based upon a revision of the original LS/CMI and that index offense.

For those outcomes that form scaled variables (e.g., the number of probations subsequent to the index offense and the number of jail sentences subsequent to the index offense) we used ordinary least squares regression in the form of a general linear model in which we included the number of days from the individuals' first offense to the end of the window (July 1, 2013) as a control factor. Again, this allowed an adjustment for length of time in the system. All mean scores and significance levels are adjusted for the time that the individuals were in the system.

First, for the outcome variable, ***failure defined as any subsequent probations or jail sentences***, the main general risk variable, we present the overall LS/CMI as a predictor followed by a graph illustrating the findings with an interpretation of the results and a summary table for the analysis. Next, we present an analysis adding the effects of gender, minority status, and age. Included in that analysis is a test of gender and minority status as moderators of the predictive validity of the LS/CMI. In other words, we asked whether the LS/CMI risk levels predicted recidivism better for men, women, minorities or nonminorities. Finally, we present an analysis of the contributions of each of the 8 crimongenic factors for this definition of failure. For each

of the additional risk factors, we present the overall LS/CMI as a predictor followed by a graph illustrating the findings, an interpretation of the results and a summary of the analysis.

Outcome Measure 1: Failure Defined as any Subsequent Probations or Jail Sentences

Our most easily interpreted outcome measure classified as a failure any individual with a subsequent probation or jail sentence in the 5.5 year window in the data file following the individual's index offense. Using this definition there were 1067 (5.5% of the total sample) of individuals whose first LS/CMI related arrest resulted in a jail sentence. Of those none (0%) showed no further probation or jail sentence in the data file. While 519 went back to jail (2.7% of the total sample), 525 did not but were subsequently on probation (2.7% of the total sample with 23 missing data points). Of the 18,277 (94.5% of the total sample) whose first LS/CMI resulted in probation, 4,104 (21% of the total sample) displayed no subsequent jail or probation sentences, 2,873 (14.8% of the total sample) showed a subsequent jail sentence and 14,176 (73% of the full sample) showed at least one additional probation. As shown in Appendix I, with this most conservative measure of recidivism in which an individual can have no further involvement with the criminal justice system, the rate of failure was about 79% and the rate of success, 21.2%. Appendix I displays this information in a Table format that may make it easier to understand.

Summary findings for LS/CMI Predictions for Subsequent Probations or Jail Sentences

The analyses to follow showed that increases in risk level were associated with a greater probability of failure but that the low and high risk levels did a better job of distinguishing risk in the form of recidivism than did the middle levels (See Figure 8). The effect size in the Nebraska sample (r = .21) was the nearly the

same as found in the Olver et al. (2014) meta-analysis (r = .22) for all samples aggregated across the United States. This one analysis lends strong support to the validity of the LS/CMI as the OPA applies it in Nebraska. The results of the analysis (See Table 4) show significant effects in predicting failure for the age of the probationer (i.e., those who failed were slightly older than those who did not fail), for sex of the probationer (i.e., the likelihood of an additional probation or jail sentence for men was higher than it was for women – See Figures 9 and 10), and the moderating effect of minority status on the predictive power of the LS/CMI. Although the predictive power for general recidivism for the LS/CMI appears to be slightly better for non-minorities in Nebraska, the difference is small and significant mainly due to the large sample size in the analysis (See Figures 11 and 12). For practical purposes the LS/CMI predicts recidivism about as well with non-minorities and minorities in Nebraska with effect sizes for each group similar to the overall predictive power in the Olver et al. (2014) meta-analysis for the U.S.

In an exploratory analysis with all eight criminogenic scales that the LS/CMI measures (Criminal history, Education and Employment, Family and Marital Issues, Leisure and Recreational Issues, Companions, Alcohol and/or Drug Problems, Procriminal Attitude and Orientation, and Anitsocial Pattern) the statistical model of these scales produced a higher effect size (r = .30) as compared to the overall level of risk. The strongest predictors in the Nebraska

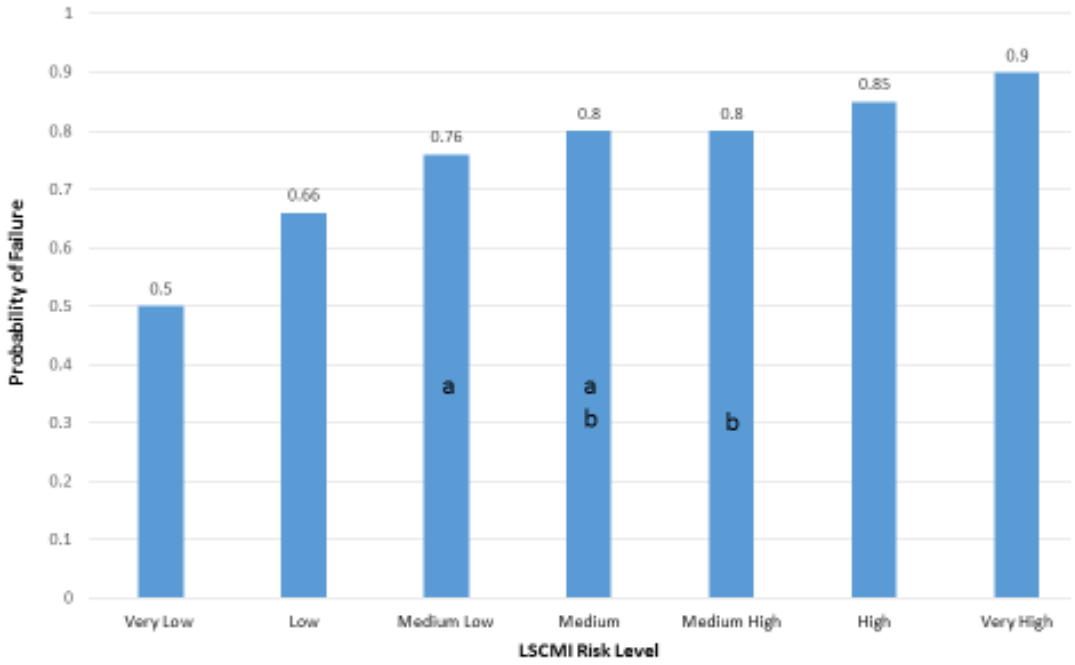
sample were Criminal History, Substance Abuse, Procriminal Attitudes and Antisocial Personality Pattern. Factors that underperformed included Education and Employment, Leisure and Recreation, Companions, and Family and Marital Issues (See Figures 13 and 14). Additional research to determine the ways in which Nebraska probation officers are deviating from the procedures in the LS/CMI manual could be helpful in improving the predictive power of the LS/CMI in Nebraska. The sections below detail these findings and support these conclusions.

LS/CMI Risk Level Analyses

LS/CMI risk level figure and interpretation. Figure 8 displays the results of an analysis of the probability of subsequent probation or jail as a function of the LS/CMI risk level for the individuals in our data file using a logistic regression model controlling for the number of days in the system. Thus, the probability of further involvement with the OPA for those in the low risk group is .50 while the probability of either another probation or jail sentence for those in the very high risk group is .90. As the figure shows, increases in risk level are associated with a greater probability of failure as one would expect if the LS/CMI is a valid predictor of risk. Figure 8 also shows that the low and high risk levels do a better job of distinguishing risk in the form of recidivism than do the middle levels (medium low, medium, and medium high), which are not significantly different from each other for the most part. The size of the LS/CMI effect for this outcome variable can be measured in two ways. First, the Nagelkerke R^2 = .073, comes directly from the logistic regression and shows a small but significant effect. Second, a chi square change translation resulted in an *r* value of .21 which is the nearly the same effect size as

found in the Olver et al (2014) meta-analysis (r = .22) for all samples aggregated across the United States.[3] The two r values are not significantly different. Following the graph is a summary table for the logistic regression analysis.

Figure 8: Probability of subsequent probation or jail by risk level.



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

LS/CMI risk level summary table. Table 3 summarizes the results of the logistic regression that produced Figure 8 and the accompanying interpretation. It shows significant effects (indicated with an asterisk) on the outcome factor (any subsequent jail or probation after

[3] We used the following formula to translate the $\chi 2$ associated with the LS/CMI levels of risk after controlling for time into an r value:
$r = \sqrt{(\chi 2 / (\chi 2 = N))}$

the index LS/CMI) for days since the index LS/CMI and the predictive power of the overall LS/CMI. (Note: The effect of the constant is not meaningful for substantive interpretation but is included for the sake of completeness.) The Beta values in the first column indicate size of the relationship and the sign (positive or negative) of the Beta value tells whether the relationship is direct or indirect. Thus, the effect of time since the index LS/CMI was significant but very small and positive. That is with increases in time since the index LS/CMI there were some significant increases in failure but the effect was not very strong. This is because most of the sample remained in the 5.5 year window for a long period of time and because most failures occurred early on in the probation process.

There are only six levels of the LS/CMI risk because the first level, very low risk served as a reference to which we compared the other levels. Thus, those probationers scoring at the very high level of risk were very likely to fail (Beta = 2.211) as compared to those in the lowest level of risk. Finally, the Odds Ratio in the last column indicates the odds of increasing failure based on the factor in column 1. The greater the odds ratio deviates from 1.00, the stronger the effect. For example, the odds of failure for those in LS/CMI very high risk were 9.127 times those in the very low risk level and 6.027 times for those in the LS/CMI high risk group but only 2.009 times for those in the *low* risk level (i.e., greater risk than the *very low* risk level). Table 3 is another way of looking at the information in Figure 8. It contains no new information but provides the statistics behind Figure 8 supporting our interpretations.

Table 3

Logistic Regression Analysis: Predicting Subsequent Jail or Probation by LS/CMI Risk Level (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	50.091*	1	1.00
LS/CMI Overall			884.840*	6	
LS/CMI (Low)	.698	.082	72.350*	1	2.009
LS/CMI (Medium Low)	1.215	.081	225.363*	1	3.369
LS/CMI (Medium)	1.313	.161	66.357*	1	3.718
LS/CMI (Medium)	1.424	.083	290.763*	1	4.153
LS/CMI (High)	1.796	.080	507.122*	1	6.027
LS/CMI (Very High)	2.211	.106	433.133*	1	9.127
Constant	-.258	.080	10.312*	1	.77

Note: Model χ^2 (7) = 925.846, $p < .001$; Nagelkerke $R^2 = .073$; * $p < .001$.

LS/CMI risk level with age, sex and minority status. Next, we added the probationers' age, sex and minority status to the analysis depicted in Table 3 along with tests of moderation for sex and minority status. The statistical interactions of sex with LS/CMI risk level and minority status with LS/CMI risk level tell us whether or not the LS/CMI performs differently for men and women and whether it performs differently for non-minorities and minorities. Table 4 lists the results of the statistical analysis. It does not include the individual LS/CMI risk levels or days since the index LS/CMI because we reported those in Table 3. We display Table 4 to show the effects of age, gender, minority status and the interactions of gender and minority status with LS/CMI risk level. A significant interaction for gender means that the LS/CMI performs differently with men and women on predicting failure and a significant interaction for minority

status means that the LS/CMI performs differently with minorities and non-minorities in predicting failure. The lack of a significant interaction means that the LS/CMI performs the same across gender groups or minority status groups in Nebraska.

Table 4

Logistic Regression Analysis: Predicting Subsequent Jail or Probation by LS/CMI Risk Level with Age, Gender and Minority Status (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
LS/CMI Overall			239.594**	6	
Age of Probationer	.010	.002	31.228**	1	1.010
Sex of Probationer	.772	.172	20.025**	1	2.163
Minority Status	.290	.176	2.710 ns	1	1.336
LS/CMI Overall by Sex			4.060ns	6	
LS/CMI Overall by Minority Status			12.809*	6	
Constant	-1.249	.172	52.966**	1	.267

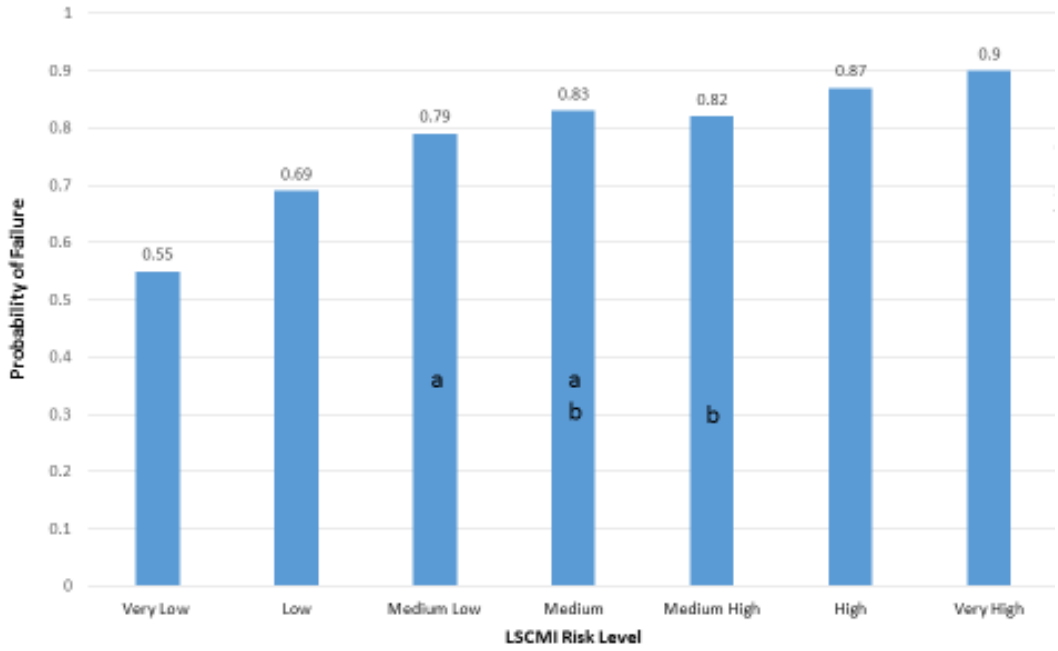
Note: Model χ^2 (22) = 991.724, $p < .001$; Nagelkerke $R^2 = .084$; ns not significant, *$p < .05$, ** $p < .001$.

The results of the analysis reported in Table 4 show significant effects in predicting failure for the LS/CMI overall risk, for age of the probationer, for sex of the probationer, and the interaction of the LS/CMI risk level with minority Status. There is a significant but very small age effect that was only significant because of the very large sample size for this analysis (N = 17,880). However, it does show that those who failed (Mean Age = 33 years and 6 months) were slightly older than those who did not fail (Mean Age = 33 years and 2 months). The analysis also displays a significant effect for sex of the probationer with a follow-up test showing that overall the likelihood of an additional probation or jail sentence for men (81%) was significantly higher than it was for women (72%), χ^2 (22) =144.441, $p < .001$. More importantly the interaction of the overall LS/CMI risk level and sex of the probationer was not significant

demonstrating that although men are more likely to show recidivism than women, the LS/CMI overall risk level predicts the likelihood of recidivism equally well for men and women. However, the analysis does show a significant interaction for overall LS/CMI risk level and minority status, which means that the instrument predicts recidivism somewhat differently for minorities than for non-minorities. We take this up in detail below but first we analyze the effects of the LS/CMI separately for men and women even though the predictive performance of the instrument is not statistically different in men and women because gender is an important factor to consider for probation failure in Nebraska.

LS/CMI performance with men and women. Figure 9 displays the relationship between the LS/CMI overall risk level and probability of failure (a subsequent probation or jail sentence after the index LS/CMI) for men only. The LS/CMI effect size measured with the Nagelkerke R^2 was equal to .062. Using the chi square translation, r = .19, the effect size was similar to the one found in the Olver et al. (2014) meta-analysis (r = .22) for the United States. Thus, the LS/CMI in Nebraska performs about the same for men as it does for all samples in the rest of the country.

Figure 9: Probability of subsequent probation or jail by risk level for men (N = 13,840).

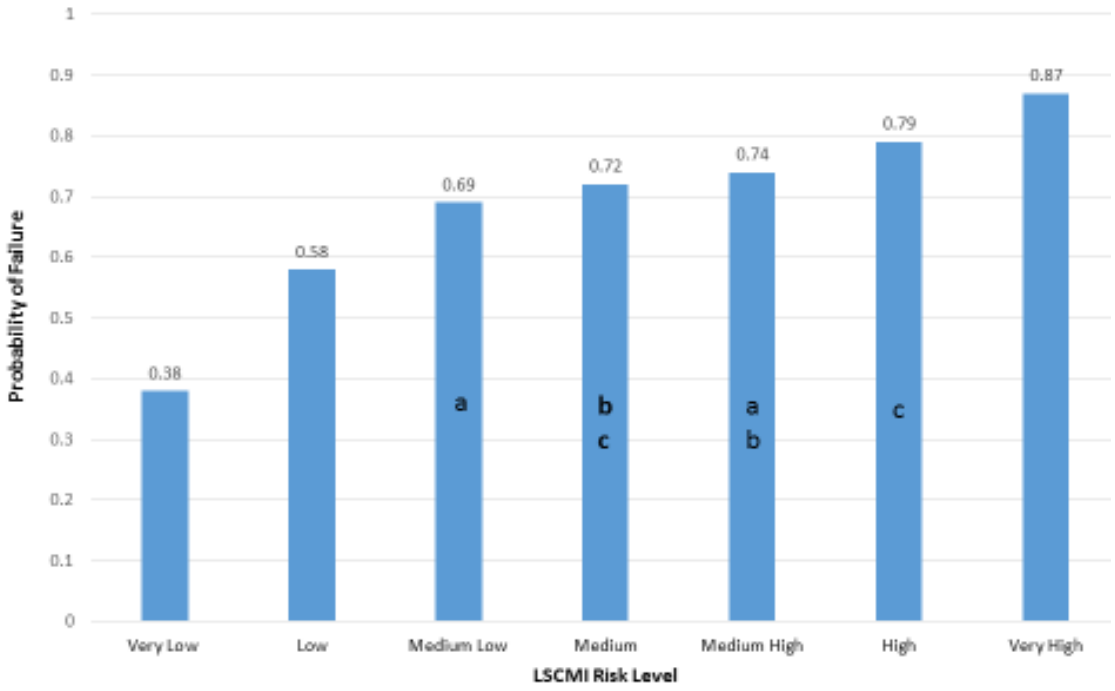


Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Figure 10 displays the relationship between the LS/CMI overall risk level and probability of failure (a subsequent probation or jail sentence after the index LS/CMI) for women. Here, the effect size measured with the Nagelkerke R^2 was equal to .062. The chi square translation resulted in r = .24, which is again similar to the effect size as found in the Olver et al. (2014) meta-analysis (r = .22) for the United States. It is important to remember that these differences for men and women in predictive power of the LS/CMI is not significant as documented by the lack of a significant interaction in the logistic regression analysis (see Table 4). Furthermore, a comparison of Figure 9 and Figure 10 show that while men were more likely to register another probation or jail sentence than were women, the nature of the relationship between the overall LS/CMI risk and recidivism (the shapes of the curves including the lack of sensitivity in the

midpoint of the graphs) is very similar for men and for women, which supports the lack a moderating effect for sex of the probationers in Nebraska.

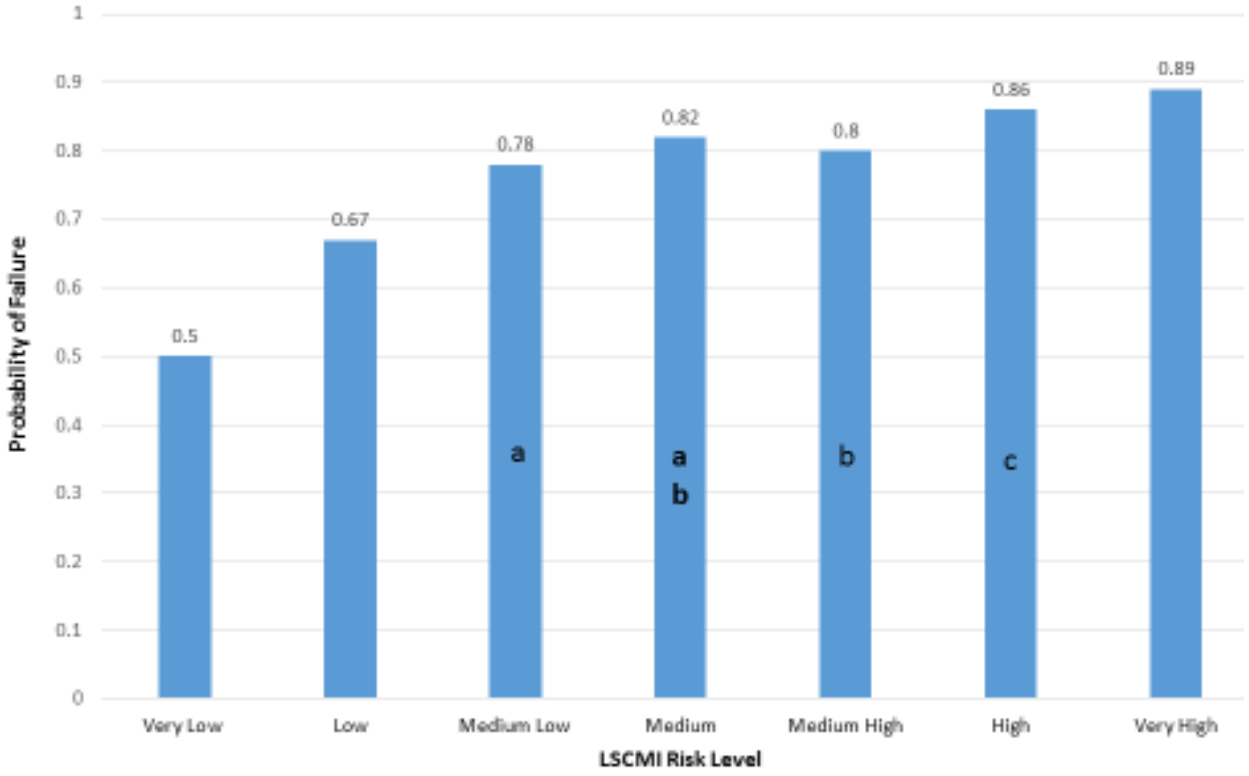
Figure 10: Probability of subsequent probation or jail by risk level for women (N=4,040).



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

LS/CMI performance with minorities and non-minorities. Figure 11 displays the relationship between the LS/CMI overall risk level and probability of failure (a subsequent probation or jail sentence after the index LS/CMI) for non-minorities (Whites without Hispanic descent) only. The size of the LS/CMI effect size measured with the Nagelkerke R^2 was equal to .071. Furthermore, the chi square translation resulted in r = .21, which is again similar to effect size found in the Olver et al. (2014) meta-analysis (r = .22) for the United States. Thus, the LS/CMI in Nebraska performs about the same for non-minorities as it does in the rest for all samples in the rest of the country.

Figure 11: Probability of subsequent probation or jail by risk level for non-minorities.

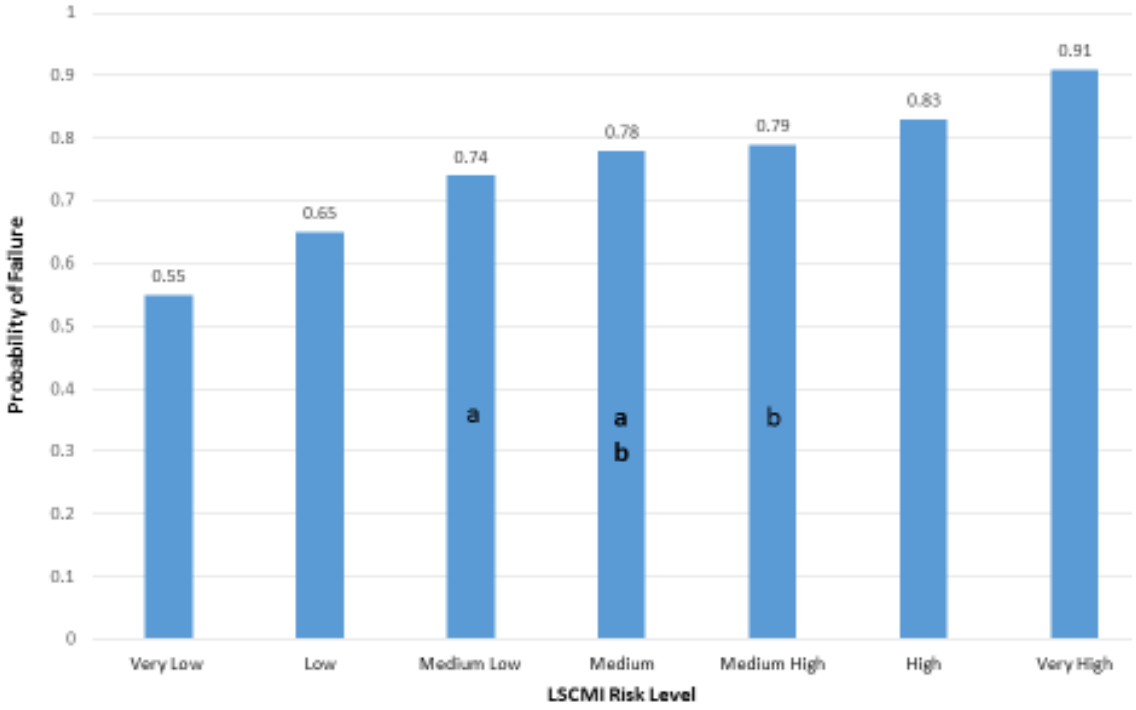


Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Figure 12 displays the relationship between the LS/CMI overall risk level and probability of failure (a subsequent probation or jail sentence after the index LS/CMI) for minorities (Non-Whites or Whites with Hispanic descent). The size of the LS/CMI effect size measured with the Nagelkerke R^2 was equal to .07 and effect size translation corresponding to the model chi square was r = .20, similar to the same effect size found in the Olver et al. (2014) meta-analysis (r = .22). Thus, the LS/CMI in Nebraska performs about the same for Minorities as it does in the rest of the country. However, the performance is significantly different between non-minorities (p < .05) and minorities in Nebraska as indicated by the significant interaction in Table 4. Figures 11 and 12 do show a similar relationship between the LS/CMI risk level and failures as defined by

subsequent probations or jail time but the effect size is slightly higher for the LS/CMI among non-minorities than minorities. Although the predictive power for general recidivism for the LS/CMI appears to be slightly better for non-minorities in Nebraska, the difference is small and significant mainly due to the large sample size in the analysis. For practical purposes the LS/CMI predicts recidivism about as well with non-minorities and minorities in Nebraska with effect sizes for both groups similar to the overall predictive power in the Olver et al. (2014) meta-analysis for the U.S.

Figure 12: Probability of subsequent probation or jail for minorities (N = 4,890).



Columns that share letters are not significantly different from each other.

LS/CMI Scales predicting Failure (Any Subsequent Probations or Jail Sentences).

We conducted several exploratory analyses to determine which of the LS/CMI risk level scales predicted recidivism best with the Nebraska sample, again using effect sizes to compare the

results to those obtained in the national meta-analysis (Olver et al., 2014). In the first exploratory analysis we included all eight scales, each of which included the following anchors: 1 = very low risk, 2 = low risk, 3 = medium risk, 4 = high risk, and 5 = very high risk. The factors that we included in the analyses were: Criminal history, Education and Employment, Family and Marital Issues, Leisure and Recreational Issues, Companions, Alcohol and/or Drug Problems, Procriminal Attitude and Orientation, and Anitsocial Pattern. Table 5 displays the results of the logistic regression analysis. The LS/CMI effect size measured with the Nagelkerke R^2 was equal to .147 and using the chi square translation, r = .30, which exceeds the effect size in the Olver et al (2014) meta-analysis for the U.S. but is still less than the .40 effect size found in Canada.

Table 5

Logistic Regression Analysis: Predicting Subsequent Jail or Probation by Eight LS/CMI Risk Factors

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	14.530*	1	1.00
Criminal History	.714	.024	866.252**	1	2.041
Education and Employment	-.072	.018	15.162**	1	.931
Family and Marital Issues	-.013	.017	.578^{ns}	1	.987
Leisure and Recreational Issues	-.008	.018	.217^{ns}	1	.992
Companions	.024	.015	2.610^{ns}	1	1.024
Alcohol and/or Drug Problems	.235	.016	228.038**	1	1.264
Procriminal Attitude and Orientation	.098	.019	26.888**	1	1.103
Antisocial Pattern	-.074	.025	8.430*	1	.929
Constant	-1.954	.085	532.993**	1	7.054

Note: Model χ^2 (9) = 1908.092, p < .001; Nagelkerke R^2 = .147; ^{ns} not significant, *p < .01, ** p < .001.

Figure 13 presents the results of Table 5 in graphic format, showing the relative increase associated with each of the LS/CMI factors in predicting recidivism accurately when controlling for the other factors. The reader should note that several of the factors are weighted negatively and predict in the opposite direction than the LS/CMI anticipates when all the factors are added to the prediction model so that the effect of each factor is controlled with regard to the other factors. This is, in part, the result of the dependent relationships between the 8 criminogenic factors that the LS/CMI measures, which results in redundant information, so that controlling for those factors results in some negative relationships. Two of these factors do not add significantly to the other factors (Family/Marital Issues and Leisure/Recreational Issues) and the other two make very modest contributions to the model (Education/Employment and Anti-Social Pattern) as depicted in Figure 13. Nonetheless, some of the gain in predictive accuracy in this model compared to the overall LS/CMI risk level findings result from using the correct signs in the prediction model and signals that future efforts at improving the assessment of these factors and reducing redundancy among the measures would go a long way towards improving the overall LS/CMI power to predict recidivism in Nebraska.

Figure 13: Percent increases in accurate failure predictions for each of the LS/CMI risk factors (N=19,228).

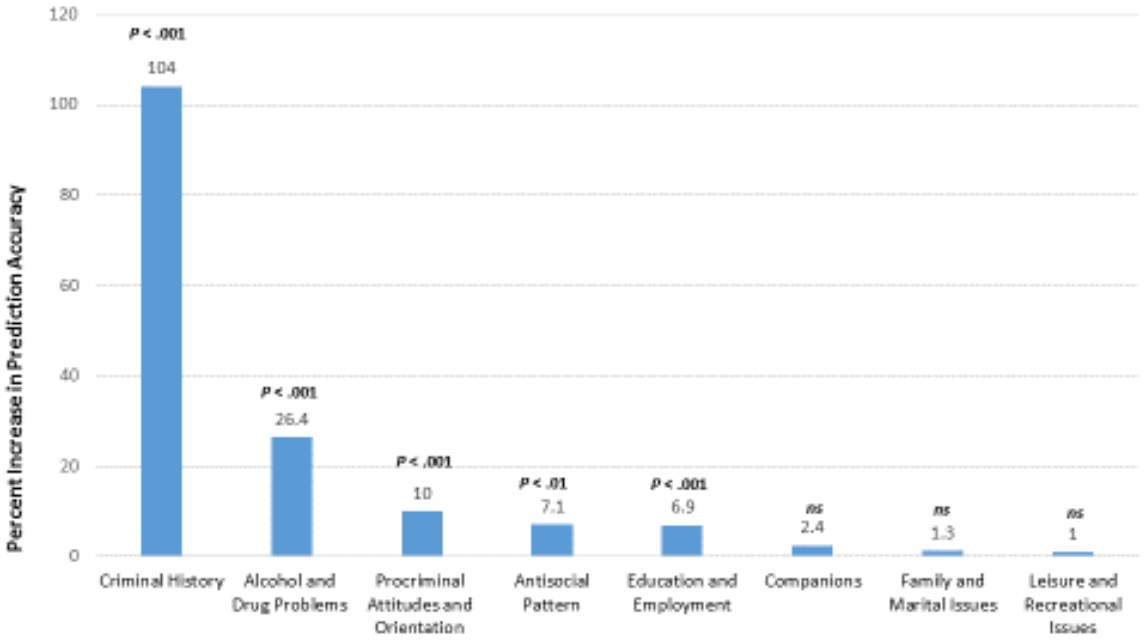
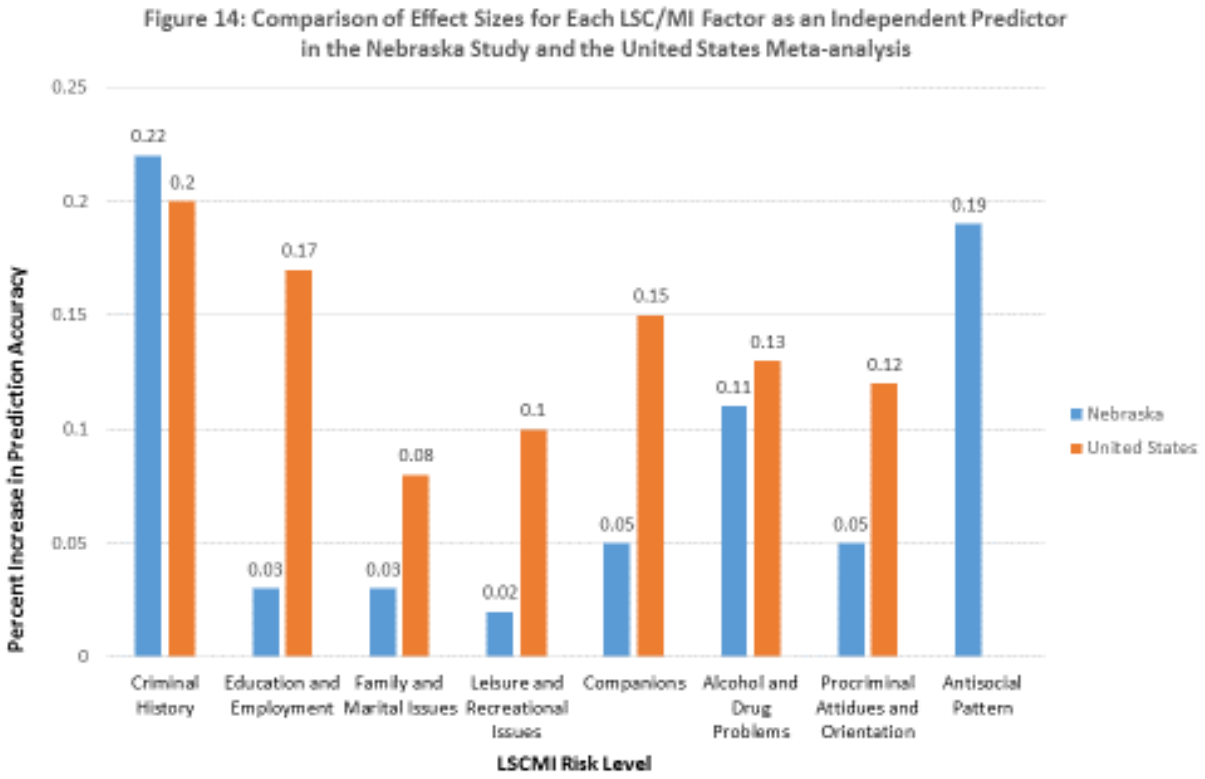


Table 5 and Figure 13 examine the effect sizes through Odds Ratios (OR) for each of the LS/CMI criminogenic factors measured in the Nebraska sample so that each OR controlling for all the other factors in the prediction model. However, the Olver et al. (2014) meta-analysis presents effect sizes in *r* values for all the criminogenic factors (except antisocial personality) without controlling for the other factors. To come up with a comparable analysis, we examined the relationships between each of the LS/CMI factors with failure separately without combining their contributions in complete model. Figure 14 presents the results, after translating the individual OR measures in the Nebraska sample and into *r* values to compare them to the Olver et al. (2014) figures.[4] (Note: the Olver et al. meta-analysis did not include an effect size for antisocial pattern.) The Figure shows that while the predictive power in the meta-analysis relied

[4] The translation is a two-step process, first translating the OR into Cohen's d: [d = ln(*OR*)/1.81] and then translating Cohn's d into a r value: [$r = \sqrt{((d^2)/(4 + d^2))}$.

on five factors with individual *r* values greater than .10, the Nebraska study displayed only 3 such factors. The predictive power of the LS/CMI in Nebraska could likely improve by increasing the reliability and validity of its measures of Education and Employment, Leisure and Recreational Issues, Companions, and Procriminal Attitudes and Orientation. Additional research to determine the ways in which Nebraska Probation Officers are deviating from the procedures in the LS/CMI manual could be helpful in improving the predictive power of the LS/CMI in Nebraska.

Figure 14: Comparison of effect sizes for each LS/CMI factor as an independent predictor in the Nebraska study and the United States meta-analysis.



Alternative Measures of Recidivism

Summary of Findings for Alternative Measures of Recidivism

This report examined 5 additional measures of recidivism to explore the relationship between LS/CMI levels of risk and other forms of probation success and failure. First, for failure defined as either 2 or more probations or an additional jail sentence the overall probability of failure was .54 and the graph of the relationship did show increases in failure with increases in risk level (See Figure 15). However the scale flattened out above the medium low level of risk and the overall effect size was considerably lower (r = .15). Second, we calculated a proxy outcome measure for the Nebraska Supreme Court's definition of recidivism, a conviction for a Class I or II misdemeanor, a Class W misdemeanor, or a Class IV felony or above, provided that the conviction occurs within three years of a successful release. Our proxy measure scored a failure if a probationer's most recent charge classification fit into this category (See Figure 16). (Note, if there was no charge, this was a success.) At the lowest level of LS/CMI risk the probability of failure with this definition was .43 but with the highest level of risk rose to .90. Again, the LS/CMI is better able to predict outcomes at the very low and very high ends of the scale with the medium low through the medium high factors not showing consistent significant differences. The effect size for this outcome measure (r = .18) is smaller but comparable to those obtained in the

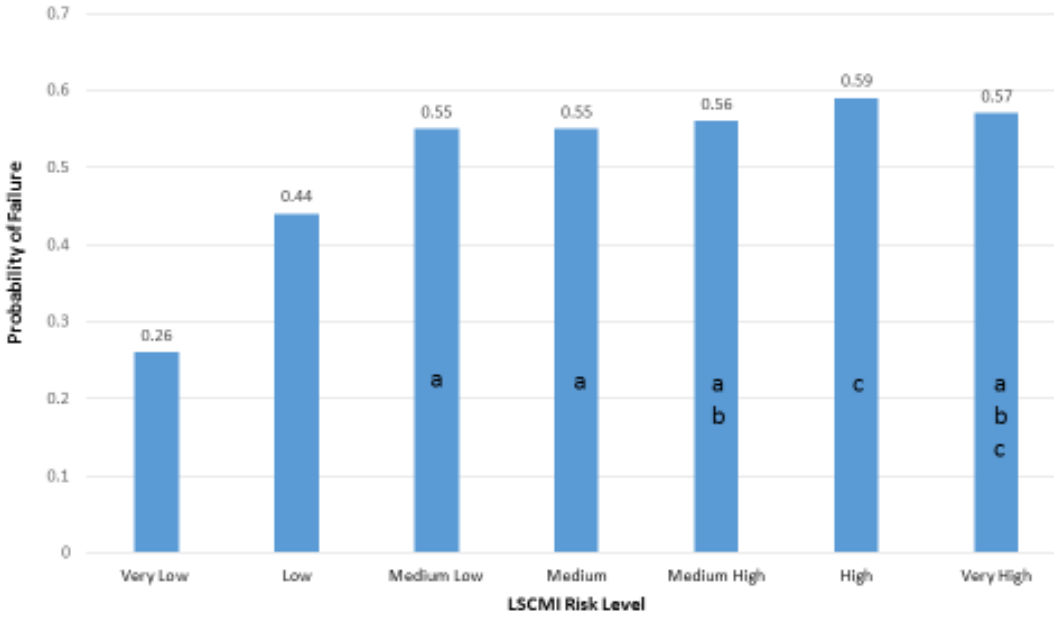
meta-analysis of U.S. samples. The third exploratory outcome measure defined recidivism as any subsequent jail sentence and produced the highest effect size of all the outcome measures (r = .22) in our sample (See Figure 17). The probability of failure at the lowest risk level was .02 and at the highest level of risk it was .33. There is a positive linear function with increases in risk resulting in greater likelihood of a subsequent jail sentence. The fourth exploratory outcome measure was the number of probations subsequent to the index LS/CMI. Figure 18 shows that as risk increased on the LS/CMI so did the mean number of additional probations, which topped out at about an average of 2 more in the highest risk category. The effect size was again smaller but comparable to the meta-analysis of U.S. samples (r = .18). The fifth and final exploratory measure, the number of jail sentences subsequent to the index LS/CMI showed that as risk level increases so did the estimated mean number of jail sentences with more predictive power at the higher and lower ends of the risk levels (r = .20) (See Figure 19). The results show that the LS/CMI is more effective at predicting future failures in terms of number of subsequent jail sentences than number of subsequent probations.

Failure Defined as two or more jail sentences or one subsequent probation

It is likely that an offender may make a subsequent mistake in judgment and as a result end up on probation a second time but then desist any further law breaking behavior. Therefore, an alternative and more lenient definition of failure includes those with either 2 or more probations or an additional jail sentence. In the Nebraska sample the overall probability of a

failure defined in this more lenient manner was equal to .54. Figure 15 displays this failure index as a function of the LS/CMI risk level after controlling for number of days in the system using a logistic regression model. Thus, the probability of two or more probations or a subsequent jail sentence is only .26 for those in the low risk group, while the probability of this level of failure for those in the very high risk group is .57. Again, increases in risk level are associated with a greater probability of failure but the function is flatter after going beyond the very low and low risk groups than it was with a more conservative definition of failure. In Figure 15 risk levels higher than the medium low LS/CMI level were, for the most part, not significantly different from each other. The size of the LS/CMI effect for this outcome variable was small (Nagelkerke R^2 = .035, predicting only 57% of the risk of failure correctly) but it was significant ($p < .001$) in part because of the large number of individuals in the sample. The effect size transformed into an r statistic was .15, considerably lower than the general recidivism effect size found in the Olver et al. (2014) meta-analysis for the United States samples.

Figure 15: Probability of failure (2 or more additional probation or jail sentences) based on risk level.



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Table 6 summarizes the results of the logistic regression that produced Figure 15 and the accompanying interpretation. It shows significant effects (asterisks) on the outcome factor for days since the administration of the index LS/CMI and the predictive power of the overall LS/CMI. The Beta values in the first column indicate size of the relationship and the sign (positive or negative) of the Beta value tells whether the relationship is positive or negative. Thus, the effect of time since the index LS/CMI was administered was significant and positive but very small. There are only six levels of the LS/CMI risk because the first level, very low risk served as a reference to which we compared the other levels. Thus, those probationers scoring at the very high level of risk were very likely to fail (Beta = 1.352) as compared to those in the lowest level of risk. Finally, the Odds Ratio in the last column indicates the odds of increasing failure based on the factor in column 1. The greater the odds ratio deviates from 1.00, the

stronger the effect. Again, the odds of failing for anyone in LS/CMI very high risk group were 3.865 times greater than someone in the very low risk group. Also note that the odds of failure in the high group compared to the very low group is greater (4.234) than for the very high group, which corresponds to the lower likelihood of failure for the very high group as compared to the high group in Figure 15. Table 6 is another way of looking at the information in Figure 15. It contains no new information but provides the statistics behind Figure 15 and supports our interpretations of the data.

Table 6

Logistic Regression Analysis: Predicting Subsequent Jail or Two or More Probations by LS/CMI Risk Level (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	77.415*	1	1.00
LS/CMI Overall			432.544*	6	
LS/CMI (Low)	.805	.089	81.191*	1	2.237
LS/CMI (Medium Low)	1.244	.087	204.797*	1	3.469
LS/CMI (Medium)	1.128	.141	63.957*	1	3.091
LS/CMI (Medium High)	1.321	.088	225.606*	1	3.746
LS/CMI (High)	1.443	.085	290.595*	1	4.234
LS/CMI (Very High)	1.352	.094	207.409*	1	3.865
Constant	-1.285	.086	222.009*	1	1.070

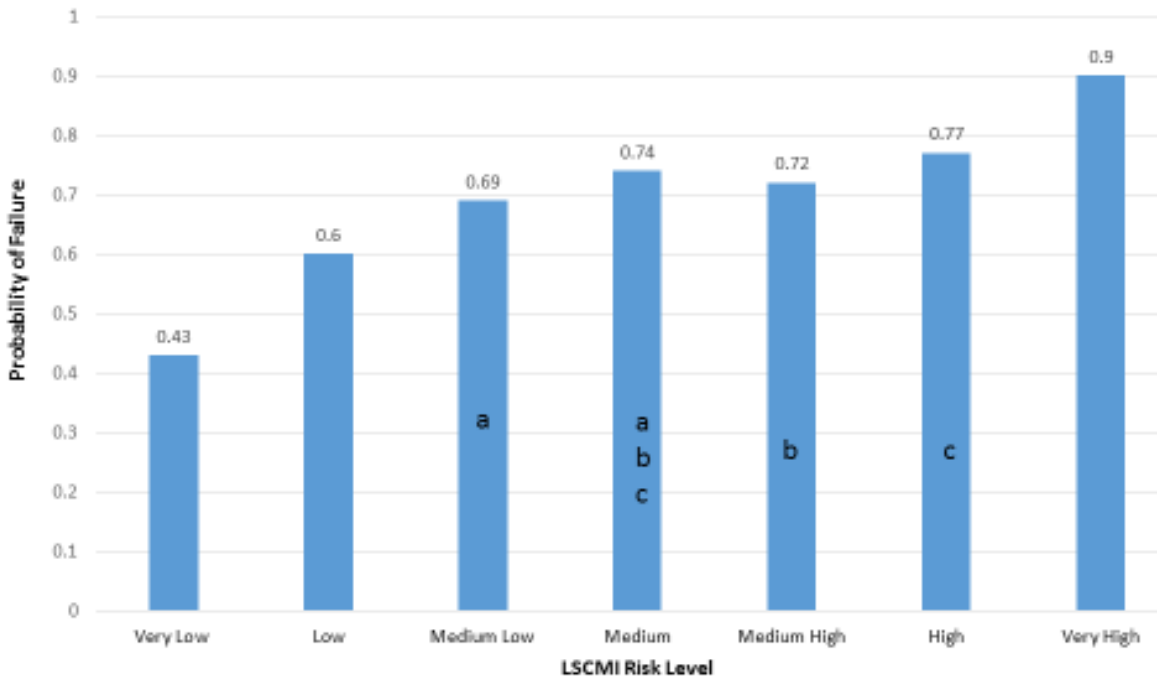
Note: Model χ^2 (7) = 513.951, $p < .001$; Nagelkerke $R^2 = .035$; * $p < .001$.

Failure defined by the Nebraska Supreme Court

The Nebraska Supreme Court has determined that recidivism should be defined as a conviction for a Class I or II misdemeanor, a Class W misdemeanor, or a Class IV felony or

above, provided that the conviction occurs within three years of a successful release. Our data set did not yet contain variables that allow us to compute that exact definition in three year windows; however, we were able to compute a proxy to the Supreme Court's definition in which we classified anyone in our data set as a failure if their most recent charge classification fit into the category described above. We assigned those without additional probations or jail sentences as successes, along with those whose most recent offenses level of seriousness fell below the Supreme Court's standard. Figure 16 shows the results of this analysis using logistic regression. At the lowest level of LS/CMI risk the probability of failure with this definition is .43 but with the highest level of risk is rises to .90. Again, the LS/CMI is better able to predict outcomes at the very low and very high ends of the scale with the medium low through the medium high factors not showing consistent significant differences. The size of the LS/CMI effect for this outcome variable was again small (Nagelkerke R^2 = .049, predicting 71% of the risk of failure correctly) but it was both significant (p < .001) and meaningful given the large number of individuals in the sample. The effect size transformed into an r statistic was .18, comparable but slightly lower to the general recidivism effect size found in the Olver et al. (2014) meta-analysis for the United States samples.

Figure 16: Probability of failure (Nebraska definition of recidivism) by risk level.



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Table 7 summarizes the results of the logistic regression that produced Figure 16 and the accompanying interpretation. It is set up in exactly the same way as the other logistic regression summary tables in this report. Again, the effect of time since the administration of the index LS/CMI was significant and positive but very small. Those probationers scoring at the very high level of risk were likely to fail (Beta = 1.685) as compared to those in the lowest level of risk. The odds of failing for any individual in LS/CMI very high risk group were 5.392 times greater than someone in the very low risk group.

Table 7

Logistic Regression Analysis: Predicting Failure – Most Recent Offense and Nebraska Definition of Recidivism by LS/CMI Risk Level (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	25.663*	1	1.000
LS/CMI Overall			587.419*	6	
LS/CMI (Low)	.702	.084	69.571*	1	2.019
LS/CMI (Medium Low)	1.123	.082	185.436*	1	3.075
LS/CMI (Medium)	1.279	.158	65.654*	1	3.592
LS/CMI (Medium High)	1.250	.084	219.674*	1	3.489
LS/CMI (High)	1.540	.081	364.864*	1	4.664
LS/CMI (Very High)	1.685	.097	300.873*	1	5.392
Constant	-.470	.082	33.192*	1	.625

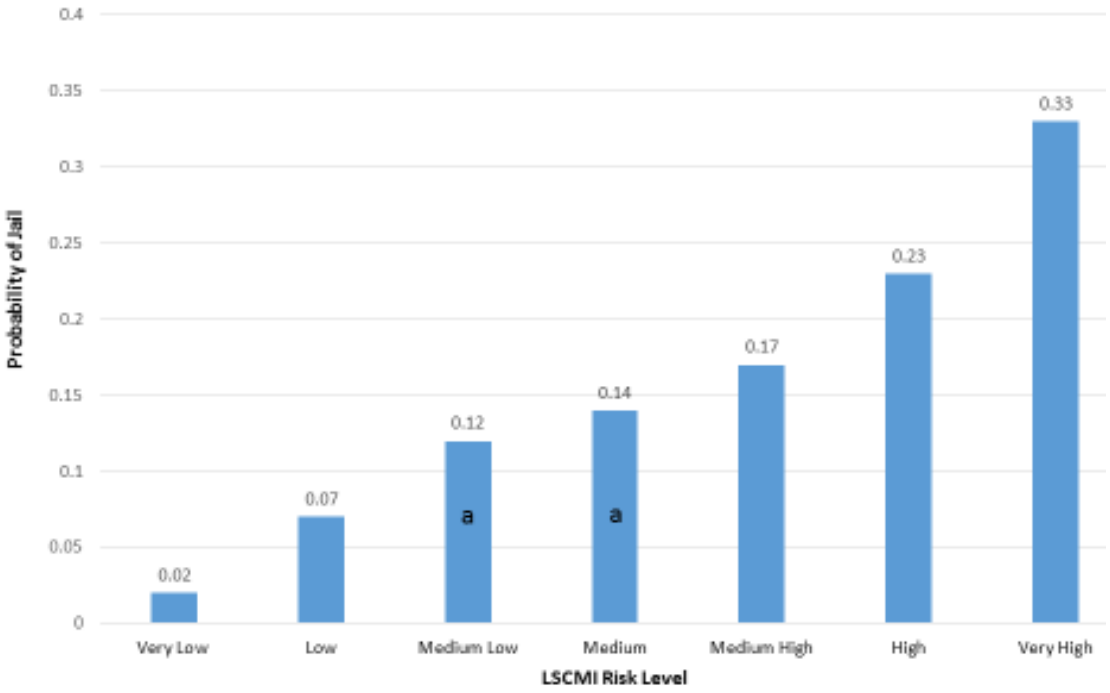
Note: Model χ^2 (7) = 605.002, $p < .001$; Nagelkerke $R^2 = .049$; * $p < .001$.

Failure defined by a Subsequent Jail Sentence

Figure 17 displays the results of an analysis of the probability of any subsequent jail sentence after controlling for number of days in the system using a logistic regression model. In the current data set we are unable to distinguish between jail terms associated with probation and those that the courts invoked independent of probation sentences so that this measure includes all jail sentences subsequent to the index probation. The probability of a subsequent jail sentence is only .02 for those in the low risk group, while the probability of this level of failure for those in

the very high risk group is .33. Here, increases in risk level are associated with a dramatic and near linear increase in the probability of failure. Almost all the risk levels in Figure 17 distinguish between low and higher probabilities of a subsequent jail sentence (except medium low and medium risk levels), perhaps providing the strongest validity results for the LS/CMI. The size of the LS/CMI effect for this outcome variable was moderately strong (Nagelkarke R^2 = .095), predicting 82% of the risk of future jail correctly and significantly ($p < .001$). The effect size transformed into an *r* statistic was .22, again comparable to the general recidivism effect size found in the Olver et al. (2014) meta-analysis for the United States samples and the highest effect size reported in these recidivism data using the overall LS/CMI risk level.

Figure 17: Probability of jail time subsequent to the index offense by risk level.



Columns that share letters are not significantly different from each other ($p>.05$). All other columns are significantly different from each other.

Table 8 summarizes the results of the logistic regression that produced Figure 17 and the accompanying interpretation. Again, the effect of time since administration of the index LS/CMI showed a small but significant positive effect. As illustrated in Figure 17, those probationers scoring at the very high level of risk were very likely to face subsequent jail time (Beta = 3.464) as compared to those in the lowest level of risk. The odds of failing for any individual in the LS/CMI very high risk group were 31.932 times greater than someone in the very low risk group and the odds for someone in the high risk group were 20.850 times the odds of someone in the very low risk group.

Table 8

Logistic Regression Analysis: Predicting the Probability of Jail Time Subsequent to the Index Offense by LS/CMI Risk Level (Reference Group = Very Low Risk)

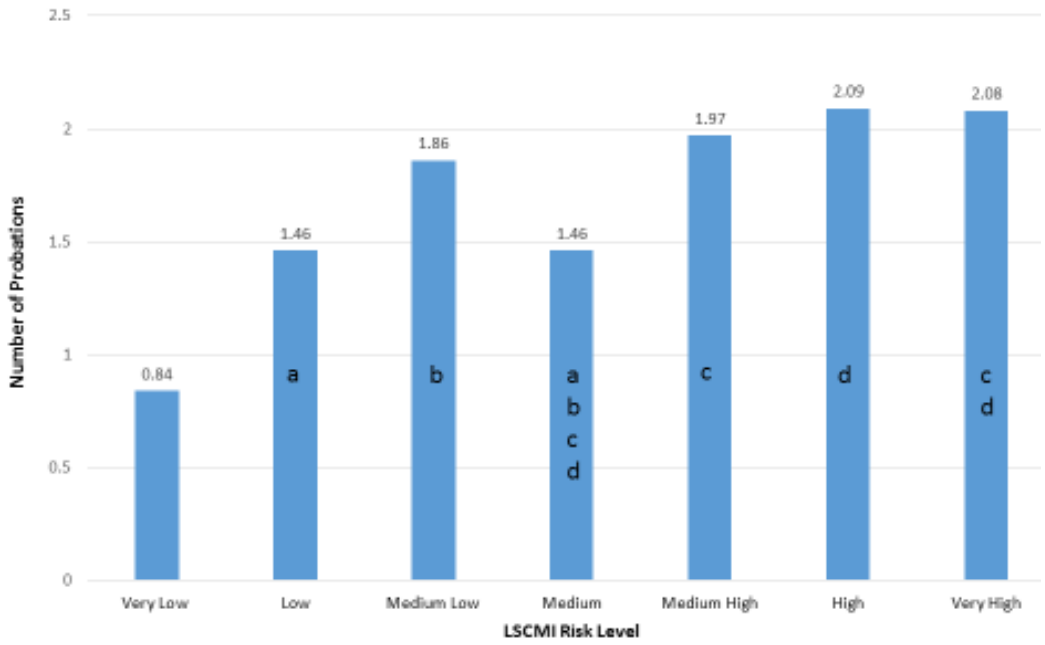
Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	218.056*	1	1.000
LS/CMI Overall			751.532*	6	
LS/CMI (Low)	1.561	.290	29.010*	1	4.761
LS/CMI (Medium Low)	2.247	.284	62.520*	1	9.457
LS/CMI (Medium)	2.163	.325	44.328*	1	8.697
LS/CMI (Medium High)	2.638	.284	86.420*	1	13.984
LS/CMI (High)	3.037	.282	116.373*	1	20.850
LS/CMI (Very High)	3.464	.285	148.092*	1	31.932
Constant	-4.732	.284	278.539*	1	.009

Note: Model χ^2 (7) =1141.630, $p < .001$; Nagelkerke $R^2 = .095$; * $p < .001$.

Number of Subsequent Probations

For those recidivism outcomes that form scaled and continuous variables (e.g., the number of probations subsequent to the index LSC/MI and the number of jail sentences subsequent to the index LS/CMI) rather than dichotomous scales (i.e., failure vs. success) we used ordinary least squares regression in the form of a general linear model, which included the number of days from the individual's first LS/CMI to the end of the window (July 1, 2013) as a control factor adjusting the LS/CMI risk level for the length of time in the system. Figure 18 shows the adjusted mean number of subsequent probations, which generally displays increases in the mean number of probations as a function of increases in the risk levels. Note that the mean number of additional probations at the very low level is less than 1 and greater than 2 at the high and very high levels. However, the scale again shows signs of breaking down at the middle levels of risk where the medium level of risk is associated with a significantly lower mean number of probations as compared to the next lower level of risk. In general, the means in the high risk level all are very close to 2 additional probations showing little discrimination among the medium, high, and very high levels of risk. The size of the LS/CMI effect for this outcome variable was not large, explaining only 3.4% of the variance ($eta^2 = .034$) after controlling for number of days in the system but was still significant, ($p < .001$). For ordinary least squares models the *r* value measure of effect size is simply the square root of the eta^2 value, which makes the *r* equal to .18. Not surprisingly this *r* value is smaller than the general recidivism effect size found in the Olver et al. (2014) meta-analysis for the United States samples because it does not consider additional jail sentences.

Figure 18: Mean number of subsequent probations by risk level.



Columns that share letters are not significantly different from each other.

Table 9 summarizes the results of the general linear model that produced Figure 18 and the accompanying interpretation. Table 9 is an Analysis of Variance Table which displays across the top row, the source of variance, sums of squares, degrees of freedom, means square (sums of squares divided by degrees of freedom), observed *F* value (mean square for each effect dived by the mean square error), and finally an effect size measure (partial eta squared). In the source column are days since the index LS/CMI, the effect of the LSCMI/ overall risk level (7 levels), the error (within cell variability), and the constant for the model. Significant F-values display asterisks. Again, the effect of time since the index LS/CMI showed a small but significant positive effect ($r = .01$) and after controlling for the amount of time in the system the LS/CMI overall risk level predicted number of subsequent probations significantly ($p < .001$). We conducted follow-up tests between LS/CMI risk levels (using a Bonferroni adjustment, $p < .05$)

to determine which means in Figure 18 were significantly different from each other but do not report the results in Table 9 because they appear with shared letters in Figure 18.

Table 9

General Linear Model (Ordinary Least Squares Analysis): Predicting the Number of Probations Subsequent to the Index Offense by LS/CMI Risk Level (Deviation Coding)

Source	Sum of Squares	d.f.	Mean Square	F value	Partial Eta Squared
Days since LS/CMI (control)	408.437	1	406.437	153.770*	.008
LS/CMI Overall	1805.182	6	300.864	113.270*	.034
Within cell error	51096.406	19237	2.656		
Constant	2066.406	7	295.201	111.139*	.115

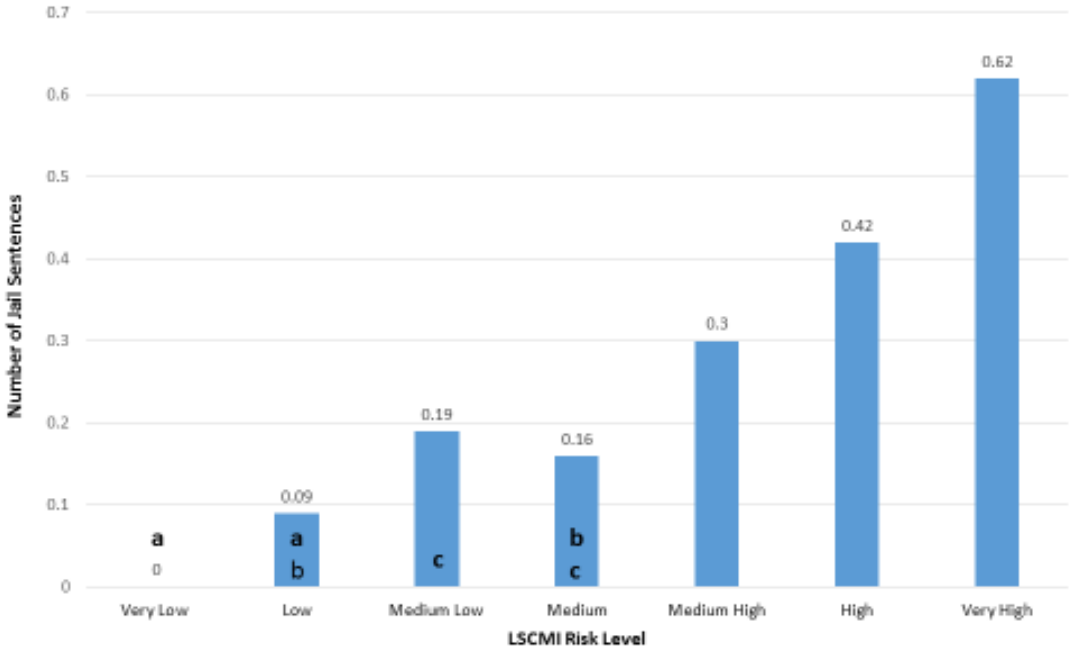
Note: Model F (7, 19237) = 111.139, $p < .001$; $R^2 = .039$; * $p < .001$.

Number of Subsequent Jail Sentences

The same analysis conducted for number of subsequent jail sentences as for the number of subsequent probations examined the effect of LS/CMI risk level on recidivism controlling for the number of days in the system produced stronger effects and evidence for predictive validity. As seen in Figure 19, as risk level increases so does the estimated mean number of jail sentences with more predictive power at the higher and lower ends of the risk levels. The size of the LS/CMI effect for this outcome variable was larger than many of the others, explaining 4.2% of the variance ($eta^2 = .042$) after controlling for number of days in the system and was significant, ($p < .001$). Again, the r value measure of effect size is simply the square root of the eta^2 value, which makes the r equal to .20, which is in the range of the general recidivism effect size found in the Olver et al. (2014) meta-analysis for the United States samples. The results show that the

LS/CMI is more effective at predicting future failures in terms of number of subsequent jail sentences than number of subsequent probations.

Figure 19: Mean number of subsequent jail sentences by risk level.



Columns that share letters are not significantly different from each other.

Table 10 summarizes the results of the general linear model that produced Figure 19 and the accompanying interpretation. Table 10 is an Analysis of Variance Table set up exactly as Table 9 directly above. Again, the effect of time since the index LS/CMI showed a small but significant positive effect (r = .01) and after controlling for the amount of time in the system the LS/CMI overall risk level predicted number of subsequent jail sentences significantly ($p < .001$). Again, we conducted follow-up tests between LS/CMI risk levels (using a Bonferroni adjustment, $p < .05$) to determine which means in Figure 19 were significantly different from each other and the results of those analyses appear in Figure 19 (see shared letters note).

Table 10

General Linear Model (Ordinary Least Squares Analysis): Predicting the Number of Jail Sentences Subsequent to the Index Offense by LS/CMI Risk Level (Deviation Coding)

Source	Sum of Squares	d.f.	Mean Square	F value	Partial Eta Squared
Days since LS/CMI (control)	135.468	1	135.468	230.446*	.012
LS/CMI Overall	500.287	6	83.381	141.841*	.042
Within cell error	11273.804	19178	.588		
Constant	33.763	1	33.763	57.435*	..42

Notes: Model F (7, 19178) = 146.716, $p < .001$; $R^2 = .051$; * $p < .001$.

Gender and Minority Status Differences on the LS/CMI Factors

Summary of Findings for Alternative Measures of Recidivism

This section of the report examined whether the LS/CMI scoring was different for male and female probationers. The analysis featured differences in the probability that an individual chosen at random in any risk level was a male (or female). Figure 20 shows that beyond the very low risk level where the probability of being a male was significantly lower than any other risk level, there were no differences in the percent of men in any of the other categories. The effect size for this relationship was very small (r = .03). Thus, while there are proportionally fewer men in the very low risk category as compared to the other risk levels, the

difference is very small and only significant because of the very large sample size. At the same time Figure 21, which examines gender differences in scoring of each of the eight criminogenic factors on the LS/CMI shows inconsistent results. Men show higher risk on criminal history, alcohol and drug problems, procriminal attitudes and orientation and antisocial pattern but women show higher risk on education and employment, family and marital issues, and companions. The effect sizes are very small except for family and marital issues, which might be an area to focus on for interventions with women probationers in Nebraska. Overall, there are no consistent or strong sex differences in the Nebraska sample.

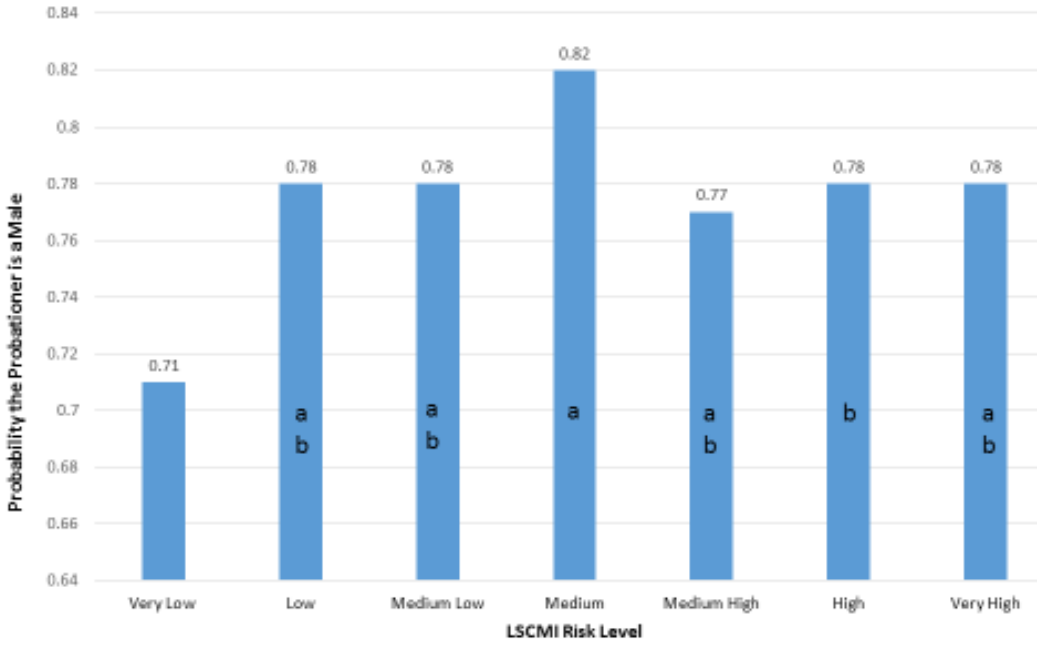
Minority differences tell a somewhat different story. Figure 22 shows that the probability of being a minority for a probationer in the two higher risk groups was significantly higher than in the lower risk groups. In fact, the odds of being a minority in the very high LS/CMI risk level were 1.58 times greater than someone in the very low risk group and the odds of being a minority in the high risk level were 1.223 times greater than someone in the very low risk group. Furthermore, Figure 23 shows that minority probationers score higher in risk on all eight LS/CMI criminogenic factors. There are two possible explanations for this finding: 1) minority probationers actually do have higher risk than non-minority status probationers or 2) probation officers score minority offenders higher than they score non-minority offenders even when the risk is comparable. It is not

possible to determine the answer to this question without conducting an experiment that holds constant the level of criminogenic factors for a set of offenders but vary the minority status of the offenders.

Gender Differences

Above, we have examined the moderating role of sex of the probationers on the predictive power of the LS/CMI. In this section we asked whether the LS/CMI scoring was different for male and female probationers. First, we conducted a logistic regression analysis to determine whether the percentage of male probationers was greater in the higher than lower risk levels. Figure 20 displays the percentage of men in each of the 7 risk levels of LS/CMI. In the overall sample for this analysis there were 13840 men, (probability that a probationer was a male was .77) and 4040 women, (probability that a probationer was a woman was .23). Figure 20 shows that beyond the very low risk level where the probability of being a male was significantly lower than any other risk level, there were no differences in percent of men in any of the other categories. Thus, the likelihood is slightly greater that an individual chosen at random in the very low risk category is a woman than in any of the other categories. The size of the LS/CMI effect for this outcome variable was small (Nagelkarke $R^2 = .002$, ($p < .01$). The effect size transformed into an *r* statistic was .03. Thus, while there are proportionally fewer men in the very low risk category as compared to the other risk levels, the different is very small and only significant because of the very large sample size.

Figure 20: Probability of male probationers in each risk level.



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Table 11 summarizes the results of the logistic regression that produced Figure 20 and the accompanying interpretation. Those probationers scoring at any level of risk other than the very low level were more likely to be a male. For example the odds of being a male for any individual in the LS/CMI very high risk group (Beta = .284) were 1.329 times greater than someone in the very low risk group. Again, these effects are very low in magnitude.

Table 11

Logistic Regression Analysis: Predicting the Probability of Being a Male by LS/CMI Risk Level (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
LS/CMI Overall			21.659*	6	
LS/CMI (Low)	.336	.103	10.594*	1	1.399
LS/CMI (Medium Low)	.345	.097	12.751*	1	1.412
LS/CMI (Medium)	.357	.093	14.818*	1	1.430
LS/CMI (Medium High)	.629	.177	12.650*	1	1.876
LS/CMI (High)	.353	.094	14.128*	1	1.424
LS/CMI (Very High)	.284	.089	10.190*	1	1.329
Constant	.914	.084	119.349	1	2.495

Note: Model χ^2 (6) = 21.279, $p < .001$; Nagelkerke $R^2 = .002$; * $p < .001$.

Figure 21 shows the mean risk levels on each of the eight criminogenic factors that LS/CMI measures for men and for women. The figure indicates significantly different risk levels in color bars and non-significant differences in grey bars. All significant differences are at the $p < .001$ level except for companions and antisocial pattern ($p < .05$). While men show higher risk on criminal history, alcohol and drug problems, procriminal attitudes and orientation and antisocial pattern, women show higher risk on education and employment, family and marital issues, and companions but the effect sizes are very small. The highest *r* value is .17 for family and marital issues and the next highest is for criminal history ($r = .10$). The LS/CMI in Nebraska produces similar risk levels for men and women with the possible exception of Family and Marital Issues.

Figure 21: Risk levels for men and women in each of the eight criminogenic factors and on overall risk on the LS/CMI.

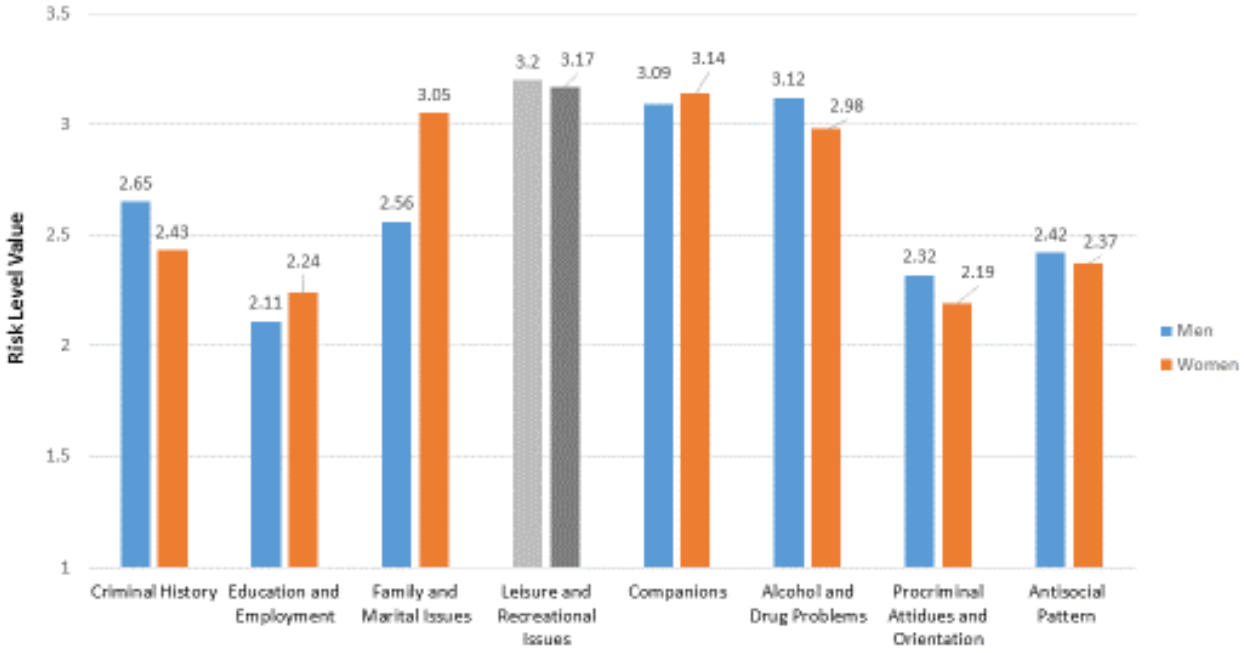


Table 12 summarizes the results of the Multivariate Analysis of Variance that produced Figure 20 and the accompanying interpretation. Table 12 is an Analysis of Variance Table set up similar to Table 9 and 19 above. The overall multivariate model is significant, Wilk's Lambda = .945, F (9, 17850) = 129.718.396, $p < .001$, $eta^2 = .055$ as are all sex differences except for leisure and recreation. The means for each risk factor along with tests of significance appear in Figure 21. Table 12 adds no information that is not portrayed graphically in Figure 21 but shows the exact values for each of the statistics except for the means of factors shown in Figure 21.

Table 12

Multivariate Analysis of Variance: Effects of Sex of Probationer on the Eight LS/CMI Criminogenic Factors

Source	Sum of Squares (d.f = 1)	Mean Square Effect	Mean Square Error (d.f. = 17858)	F-value	Eta Square
Criminal Hist.	149.838	149.838	.801	187.114**	.010
Education	53.843	53.843	1.470	36.631**	.002
Family	741.589	741.589	1.427	519.694**	.028
Leisure	3.547	3.547	1.231	2.882ns	.000
Companions	10.003	10.003	2.267	4.413*	.000
Substances	60.553	60.553	1.681	36.026**	.002
Procriminal	54.945	54.945	1.678	32.744**	.002
Antisocial	8.385	8.385	1.423	5.892*	.000

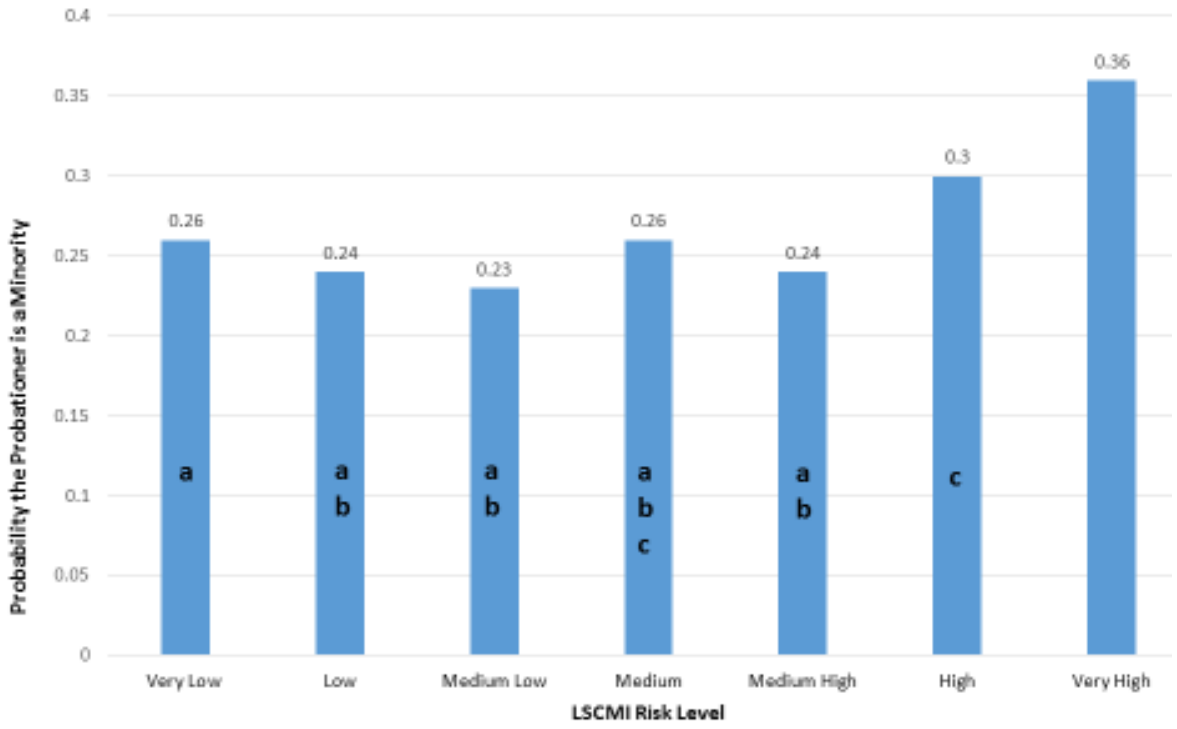
Note: ns not significant, * $p < .05$, ** $p < .001$.

Minority Status Differences

In the above sections we also examined the moderating role of minority status of the probationers on the predictive power of the LS/CMI but here we asked whether the LS/CMI scoring was different for minority and non-minority status probationers. First, we conducted a logistic regression analysis to ask whether the percentage of minority probationers was greater in the higher than lower risk levels. Figure 22 displays the percentage of minorities (non-white or white and Hispanic) in each of the 7 risk levels of LS/CMI. In the overall sample for this analysis there were 4890 minorities, (probability that a probationer was of minority status was .27) and 12,990 non-minorities, (probability that a probationer was a nonminority was .73.) Figure 22 shows that the probability of being a minority for a probationer in the two higher risk groups was significantly higher than in the lower risk groups. Although the size of the LS/CMI effect for this outcome variable was small (Nagelkarke $R^2 = .002$, $p < .01$). The effect size transformed

into an *r* statistic was .09. Thus, proportionally more minorities are in the higher risk categories as compared to the other levels but the effect size is small

Figure 22: Probability of minority status in each risk level.



Columns that share letters are not significantly different from each other (p>.05). All other columns are significantly different from each other.

Table 13 summarizes the results of the logistic regression that produced Figure 22 and the accompanying interpretation. Those probationers scoring at the two highest risk levels are more likely to be minority than non-minority status. For example the odds of being a minority in the very high LS/CMI risk level (Beta =. 456) were 1.578 times greater than someone in the very low risk group and the odds of being a minority in the high risk level (Beta =. 201) were 1.223 times greater than someone in the very low risk group.

Table 13

Logistic Regression Analysis: Predicting the Probability of Being a Minority by LS/CMI Risk Level (Reference Group = Very Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
LS/CMI Overall			141.346**	6	
LS/CMI (Low)	-.099	.098	1.029ns	1	.906
LS/CMI (Medium Low)	-.156	.094	2.717ns	1	.856
LS/CMI (Medium)	-.014	.160	.007ns	1	.986
LS/CMI (Medium High)	-.106	.095	1.239ns	1	.899
LS/CMI (High)	.201	.090	4.953*	1	1.223
LS/CMI (Very High)	.456	.101	20.562**	1	1.578
Constant	-1.029	.086	143.606**	1	.357

Note: Model χ^2 (6) = 140.208, $p < .001$; Nagelkerke $R^2 = .001$; ns not significant, * $p < .05$, ** $p < .001$.

Figure 23 shows the mean risk levels on each of the 8 criminogenic factors that LS/CMI measures for non-minorities and minorities. The figure indicates significantly different risk levels in color bars and non-significant differences in grey bars. All significant differences are at the $p < .001$ level and show small but consistently higher risk scores for minority probationers as compared to non-minority probationers. The effect size for risk showed an $r = .17$ for education and employment. Although the effects are not large, they consistently show that minority probationers score higher in risk on all eight LS/CMI criminogenic factors. Figure 23 also finds that the probability of minority status was consistently higher in the two highest risk groups. There are two possible explanations for this finding 1) minority probationers actually do have higher risk than non-minority status probationers in part because they come into more contact with the criminal justice system or 2) probation officers score minority offenders higher than

they score nonminority offenders even when the risk levels are comparable. It is not possible to determine the answer to this question without collecting further data that holds constant the level of criminogenic factors for a set of offenders but varies the minority status of the offenders. This can only be done with an experiment in which one group of probation officers (assigned at random) conduct LS/CMI evaluations with data from one set of offenders who are labelled as non-minorities. A second group of probation officers (assigned at random) conduct LS/CMI evaluations with the same data except that these offenders are labelled as minorities.

Figure 23: Risk levels for non-minority and minority status probationers on each of the eight criminogenic factors and overall risk.

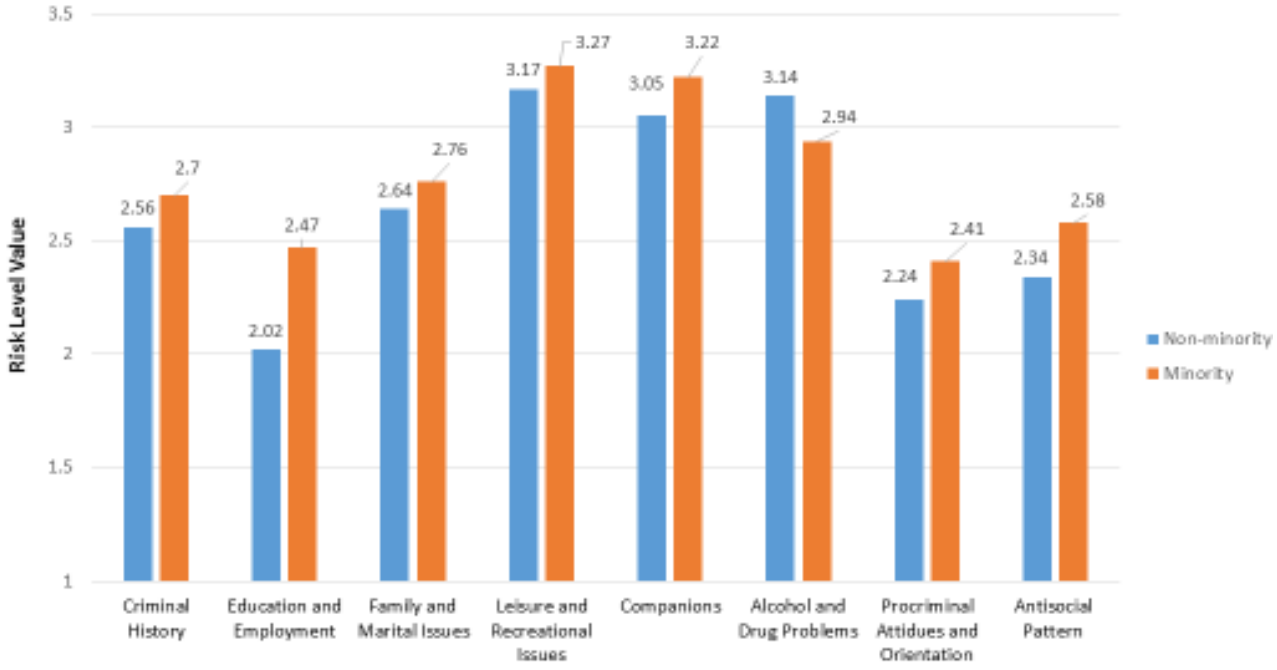


Table 14 summarizes the results of the Multivariate Analysis of Variance that produced Figure 23 and the accompanying interpretation. Table 14 is an Analysis of Variance Table identical in set up to Table 12 above. The overall multivariate model is significant, Wilk's Lambda = .958, F (9,17851) = 97.49, $p < .001$, $eta^2 = .042$ as are all the minority status differences ($p < .001$). The means for each risk factor along with tests of significance appear in

Figure 23. Table 12 adds no information that is not portrayed graphically in Figure 23 but shows the exact values for each of the statistics except for the means of factors which are shown in Figure 23.

Table 14

Multivariate Analysis of Variance: Effects of Minority Status on the Eight LS/CMI Criminogenic Factors

Source	Sum of Squares (d.f = 1)	Mean Square Effect	Mean Square Error (d.f. = 17858)	F-value	Eta Square
Criminal Hist.	62.341	62.341	.806	77.376*	.004
Education	724.545	724.545	1.432	505.857*	.028
Family	44.791	44.791	1.466	30.553*	.002
Leisure	40.248	40.248	1.229	32.753*	.002
Companions	101.190	101.190	2.262	44.744*	.002
Substances	141.408	141.408	1.676	84.357*	.005
Procriminal	98.775	98.775	1.676	58.951*	.003
Antisocial	192.841	192.841	1.413	136.492*	.008

Note: * $p < .001$.

Relationship between the Nebraska Adult Probation Screener (NAPS) and the LS/CMI

Summary of Findings the relationship between the NAPS and LS/CMI

One final question concerning the LS/CMI is whether it adds information beyond the NAPS, the assessment tool which probation officers collect for all County Court offenders and some District Court offenders. First, we examined the relationships between the NAPS risk level, the LSCMI risk level and recidivism

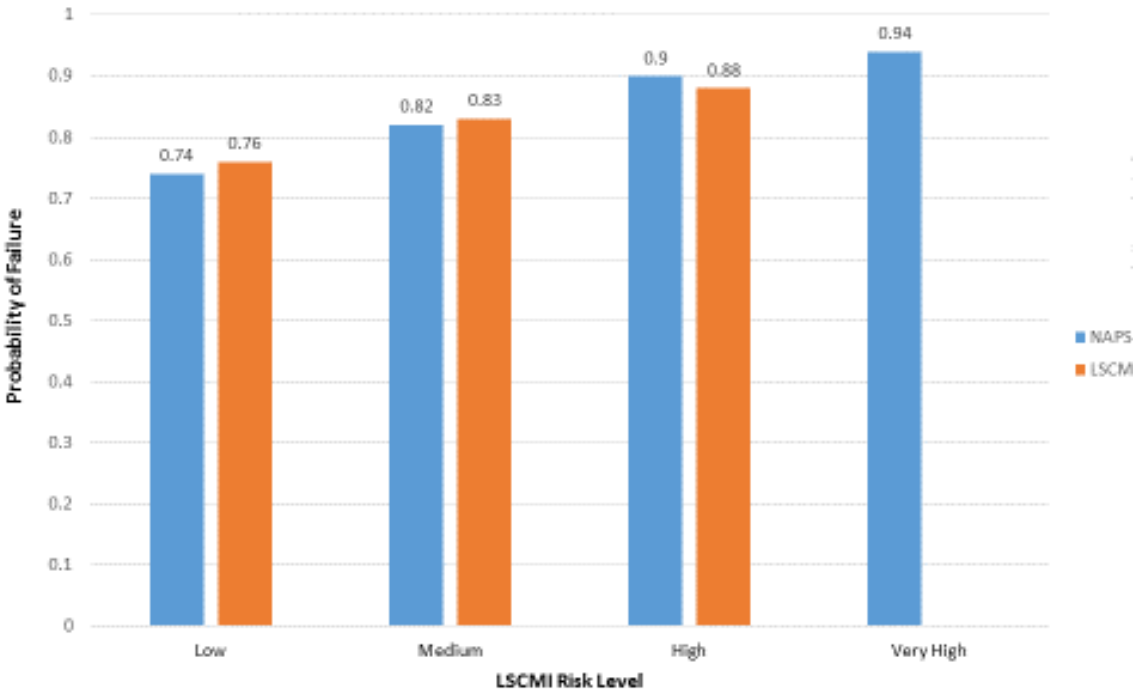
defined as a subsequent probation or jail sentence. Figure 24 displays the probabilities of failure for the NAPS and LS/CMI risk levels showing that increases in risk level associated with either measure increases is associated with increases in the probability of failure. Furthermore, both the NAPS risk and the LS/CMI added significantly to the prediction model even after controlling for the other measure's contribution to the prediction. Finally, Figure 25 shows increases in LS/CMI risk are associated with increases in the NAPS risk with an effect size of r = .21. However, the large percentage of observations in the off diagonal cells shows that the two instruments provide unique information. Thus, administering the LS/CMI after the NAPS improves the measurement of risk in the Nebraska sample.

Predicting Outcomes

One final question concerning the LS/CMI is whether it adds information beyond the NAPS, the assessment tool which probation officers collect for all County Court offenders and some District Court offenders depending upon the charges. The current database contains 2,316 cases in which there are both NAPS risk levels and LS/CMI risk levels. First, we examined the relationships between the NAPS risk level, the LSCMI risk level and recidivism. The definition of recidivism for this analysis was whether the probationer showed a subsequent probation or jail sentence in the 5.5 year window in the data file following the index offense (See Figure 8 and Table 3). Because there were only 2,316 cases, the analyses that follow collapsed the LS/CMI into 3 categories low risk (very low and low risk, $N = 311$) vs. medium risk (medium low risk, medium risk, and medium high risk, $N = 969$) vs. high risk (high risk and very high risk, $N =$

1036). The recoding allowed for a meaningful comparison of the LS/CMI and the NAPS with limited data. Figure 24 displays the probabilities of failure for the NAPS and LS/CMI risk levels. Both measures show a linear increasing function with increases in risk level associated with increases in probability of failure. All differences in probability are significant across the NAPS risk levels and the LSCMI risk levels (low vs. medium vs. high).

Figure 24: Probability of failure at each NAPS and LS/CMI risk level.



All levels of NAPS risk are significantly different from each other; all levels of LS/CMI risk are significantly different from each other.

A logistic regression analysis tested the contribution of the NAPS and LSCMI risk levels predicting failure controlling for the contribution of the other factor. Table 15, with a set up similar to the other logistic regression summary tables (see Table 3) summarizes the results. After controlling for how much time probationers spent in the system after their index offense, both the NAPS risk level (r = .18, p < .001) and the LSCMI (r = .12, p < .001) added significantly to the prediction model. Furthermore, as seen in Table 15 even after controlling for

the contribution to the prediction model of the other factors both the NAPS and the LSCMI contributed significantly to the model. The results shows that the predictive information in the LSCMI is not redundant with the NAPS but adds beyond the information collected in the NAPS. Finally, the Odds Ratios in Table 15 show that the odds that a probationer fails increase consistently with increases in risk in either instrument.

Table 15

Logistic Regression Analysis: Predicting Subsequent Jail or Probation by NAPS and LS/CMI Risk Levels (Reference Group = Low Risk)

Predictor	Beta	S.E.	Wald	d.f.	Odds Ratio
Days since LS/CMI (control factor)	.000	.000	6.235*	1	1.00
NAPS Risk Level			48.148**	3	
NAPS (Medium)	.409	.146	7.812*	1	1.506
NAPS (High)	1.022	.193	28.067**	1	2.780
NAPS (Very High)	1.593	.282	31.900**	1	4.916
LS/CMI Three Levels of Risk			15.981**	2	
LS/CMI (Medium)	.255	.164	2.423ns	1	1.291
LS/CMI (High)	.647	.174	13.795**	1	1.911
Constant	.491	.184	7.102	1	1.634

Note: Model χ^2 (6) = 95.257, $p < .001$; Nagelkerke $R^2 = .069$; ns not significant, * $p < .01$, ** $p < .001$.

Association between the LSCMI and the NAPS

Finally, Figure 25 shows the relationship between the LSCMI and the NAPS. Generally, increases in LSCMI risk are associated with increases in the NAPS risk with an effect size of $r = .21$. However, the large percentage of observations in the off diagonal cells shows that even though the relationship is significant, χ^2 (6) = 206.226, $p < .001$, the two instruments provide

new information. Thus, administering the LSCMI after the NAPS improves the measurement of risk in the Nebraska sample.

Figure 25: The association between the three LS/CMI risk categories and the NAPS risk levels.

		NAPS Risk Level				
		Low	Medium	High	Very High	Total
LS/CMI Level	Low	124 39.9%	137 44.1%	37 11.9%	13 4.2%	311
	Medium	152 15.7%	492 50.8%	224 23.1%	101 10.4%	969
	High	94 9.1%	505 48.7%	248 23.9%	189 18.2%	1036
	Total	370 16%	1134 49%	509 22%	303 13.1%	2316

Additional Analyses, Next Steps, and Conclusions

Overall, the analyses show overall support for the LS/CMI risk level categorization but with varying degrees of effect sizes depending upon the risk measure. There are a number of additional analyses that the LPUNL team could conduct (some requiring more data) to assist in improving the effect sizes and predictive power of the LS/CMI:

1. Given the flat nature of the LS/CMI curves in the middle of the scale and our anecdotal information suggesting that there is some subjectivity in the way in which officers administer the instrument, reducing the inconsistencies in applying the instrument may go a long way towards increasing its predictive validity. We suggest validity training on the LS/CMI across the system as the first step followed by a reexamination of the data. LPUNL will work closely with OPA to set up the training and evaluation in a way that allows us to measure the success of the training on increasing fidelity of the LS/CMI administration.

2. Following validity training and subsequent evaluation of increases in predictive validity, we recommend analyses of the internal consistency of each of the LS/CMI scales coupled with an analysis using the individual scale levels to predict the outcome measures using ROC (Receiver Operating) statistics. This will allow us to determine which of the scales are most and least predictive of risk. These analyses will allow the LPUNL team to determine if revisions to scale cutoffs will help improve the predictive validity of the LS/CMI as it is used in Nebraska. These analyses will be most useful following additional validity training on the LS/CMI. Additional analyses may also produce a weighting scheme using the existing scores that may produce higher effect sizes in the Nebraska environment.

3. LPUNL recommends an experimental analysis presenting offenders with varying minority status backgrounds to probation officers (holding constant criminogenic factor evidence) to determine if there is any bias in how the officers apply the LS/CMI to minorities and non-minorities in Nebraska. Conducting such an experiment will reveal ways to decrease any observed bias.

Concluding Comments

Our final conclusions based upon the analyses reported here are that 1) Administration of the LSC/MI in Nebraska predicts recidivism as well as anywhere else in the United States. 2) The relationship between the risk levels on the LS/CMI and recidivism follow a pattern that one would expect given the current view of rehabilitation in the criminal justice system. 3) Use of the LS/CMI in Nebraska has been successful but future work at improving the fidelity of the measure, examining weights and cutoffs, and isolating officer bias could improve the predictive validity of the instrument as it is used in this state.

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Appendix I: Outcome Analysis

(January 1, 2007 – July 1, 2013)

(Note all percentages are based on total sample of Probationers after January 1, 2007)

(N = 19,344)

Individuals whose first experience was jail: n = 1,067 (5.5%)

1. No other subsequent jail time or probations: n = 00 (0%)
2. Subsequent Jail terms: (jail > 1): n = 519 (2.68%) and 525 (2.71%) did not go back to jail but all were subsequently on probation at least once) (23 with missing data)

Individuals whose first experience was probation: n = 18,277 (94.5%)

1. No other jails or probations: 4,104 (21.2%)
2. Subsequent Jail terms: (jail > 0): n = 2,873 (14.8%)
3. Subsequent probations: (Additional Probations > 0): 14,176 (73.2%)

Total Success Rate:

Number without subsequent probation or jail: n = 4104 (21.2%)

Number with subsequent probation or jail: n = 15,240 (78.8%)

Total Success Rate with One Additional Probation Counted as a Success:

Number with 0 or 1 subsequent probations and no additional jail sentences: n = 8875 (45.9%)

Number with 2 or more subsequent probations or 1 or more jail sentences: n = 15,240 (54.1%)

Total Success Rate for Last Charge Using the Nebraska Supreme Court Definition:

Success: n = 5136 (29.4%)

Failure: n = 12351 (71.6%)