Validation and Revision of the Domestic Violence Screening Instrument (DVSI) for Assessing Risk of Domestic Violence in Hennepin County

Introduction

Domestic violence is a common problem that affects approximately 12 million people in the United States every year (Smith, Chen, Basile, Gilbert, Merrick, Patel, Walling & Jain, 2017). One in four women and nearly one in ten men in the U.S. have experienced contact sexual violence, physical violence, and/or stalking by an intimate partner during their lifetime and reported some form of IPV-related impact (Smith, Zhang, Basile, Merrick, Wang, Kresnow & Chen, 2018). Data from U.S. crime reports suggest that about one in six homicide victims are killed by an intimate partner (CDC, 2019, Feb 26).

Debra Nonemaker
Research Consultant
Nonemaker Consulting,

Jessica Wildermuth, Ph.D.
Jessica.Wildermuth@hennepin.us

Joa Carlson, Manager
Joa.Carlson@hennepin.us

In Minnesota, more than 65,000 adults receive domestic violence services from programs each year (Violence Free Minnesota, 2018). This number may underestimate actual services needed since less than 50% of Minnesotans who experience domestic violence reach out for services (Violence Free Minnesota, 2018). The national rate of nonfatal domestic violence was declining (Catalano, 2015). However, as the COVID-19 pandemic rages on, domestic violence is on the rise. With families forced to stay at home, there have been increased reports of domestic abuse. Recently, the United Nations called for urgent action to combat the surge in domestic violence worldwide (Taub, 2020). In one report, nine of twenty large metropolitan police departments that provided data saw double-digit percent increases in domestic violence cases or 911 calls in March, when compared to the previous year or to earlier months in 2020 (Tolan, 2020).

In Minnesota, the law necessitates a pre-sentence investigation be conducted prior to sentencing a domestic violence offender. The report must include: "a recommendation on any limitations on contact with the victim and other measures to ensure the victim's safety" (MS 609.2244). The Department of Community Corrections and Rehabilitation's (DOCCR) mission centers on community safety, community restoration, and reduction of a client's risk to reoffend. One way to address both the mission of DOCCR and the critical victim safety issues with domestic violence offenders is the use of a specialized tool to assess the risk of future domestic violence,

placing clients under appropriate supervision with services based on their risk. DOCCR uses the Domestic Violence Screening Instrument (DVSI) to provide an evidence-informed approach to determine the degree of threat an abuser poses. The DVSI was developed by the Colorado Department of Probation Services in the Colorado Domestic Violence Risk Reduction Project and initially validated in 2002 (Skilling, 2002).

The DVSI is a risk screening tool that is given to clients with any original charge that is domestic violence related. It is administered by probation officers at intake or at the start of probation services and is used for probation placement, case supervision, and to target appropriate services. With inclusion of both static and dynamic factors, the twelve (12) items on the assessment sum to calculate risk scores ranging from 0 to 31 (Domestic Violence Screening Instrument).

To comply with best practices, the DVSI should be regularly validated to establish that it is still working appropriately as a screening tool for clients charged with domestic violence. It was last validated in 2010 (Nonemaker, 2010) and was found to be a valid test. The main goal of this research is to re-validate the DVSI tool to ensure that Hennepin County DOCCR Domestic Violence Units are accurately distinguishing the risk of domestic related recidivism. The vision of the DOCCR is focused on being equity driven and client centered. It is not sufficient to only discuss how the DVSI tool predicts risk as a whole. It is also important to ensure that the DVSI tool is working for all subgroups of clients served. Therefore, gender and racial subgroups are investigated to determine if the tool is a valid screen for these subgroups. This includes a mandate to address inequity in risk measurement. Therefore, this study also explores modifications to content and risk classification of the DVSI that improve gender and racial equity.

There is no direct way to measure a risk to reoffend, so we use recidivism rates as a proxy measure. Recidivism is defined as a conviction (adult) or adjudication (juvenile) within Minnesota for a new offense. Recidivism events include misdemeanor level offenses and above. This report will focus on one-year domestic related recidivism rates across domestic violence units in the Department of Community Corrections and Rehabilitation. The limitations of using recidivism as an indicator of successful measurement of risk are well known. Some of those limitations include not tracking clients who had an initial conviction in Minnesota who later are reconvicted in another state; systemic racial bias in detection, response, arrest and conviction rates; and plea bargains that reduce an original charge to a more minor charge. However, for the time being, recidivism rates are the most common accepted proxy for risk to reoffend.

For this analysis as in the previous DVSI validation study (Nonemaker, 2010), domestic violence related recidivism is broadly defined. When narrowly defined, offenses are classified as domestic offenses include domestic assault as defined by the Domestic Abuse Act (Minnesota Statute 518B.01) and violation of a no contact order as defined by Minnesota statute 629.75. The broader definition of domestic related recidivism, person recidivism, is defined as any person offense (ex. Murder, Kidnapping, Domestic Assault, Sexual Assault, Harassment). This more fully captures domestic related offenses that would be missed due to plea bargains as well as more serious offenses such as murder or sexual assault that have a basis in domestic violence.

Clients with any original charge that is domestic related may also be given a general screening called the Prescreener. The Prescreener was recently validated for prediction of general recidivism (Nonemaker, 2019). In this study, the predictive accuracy of the Prescreener and DVSI assessment for person and general recidivism will be compared for a subset of clients who received the screenings on the same day. A secondary goal of this research is to determine if both screenings are needed.

Methodology

The validation sample was comprised of clients with DVSI assessments completed between July 1st, 2013 and September 5th, 2017 (N =4,472). One-year recidivism was investigated for the full sample. Two-year (N = 3,389) and three-year recidivism (N = 2,264) were available for smaller samples. Only those with a one-year recidivism time frame plus one year for case outcomes to resolve were included in the sample. The recidivism period was partially adjusted for those with confinement time at the Adult Corrections Facility. For clients with multiple assessments during the sample time frame, only the first assessment was retained. Forty-three records were eliminated from the full sample because they were family court assessments or because they were non-Minnesota intake offenses with record matching constraints for the collection of recidivism data. Sample demographics and intake offense information was obtained from the Court Services Tracking System (CSTS). Recidivism data was provided by the Automated Recidivism (MNCED) application, relying upon data from the Minnesota Court Information System (MNCIS).

Sample demographic variables included age at assessment, gender, and race. Ethnicity was not reported due to unreliable data. Intake offense variables included offense level and offense type. Recidivism was defined as the occurrence of a misdemeanor offense or above within the recidivism period resulting in a subsequent conviction. Recidivism variables included one-, two-, and three-year general recidivism, person recidivism, number of recidivism offenses, number of felony recidivism offenses and number of person recidivism offenses.

The primary outcome variable was one-year person recidivism, with secondary outcomes of two- and three-year person recidivism. The predictive variable was DVSI total score. Additional analyses compared the performance of the DVSI and the Prescreener on a smaller sample of clients who had both scales administered on the same day, with Prescreener total score as an additional predictive variable. Statistical procedures included subgroup means, frequencies and percentage comparisons, ANOVA, Pearson R correlation, Independent Sample T-test, Chi-Square, Reliability Analysis, Regression, ROC curve, and AUC diff analysis. Non-parametric statistical procedures and tests were used when analyzing skewed distributions. Analysis were run using SPSS and R software. For this validation study, AUC values at or above .600 are considered confirmation of validity. For predictive accuracy, AUC values of .600 to .639 are considered to be borderline, .640 to .699 are considered good, and .700 or above are considered excellent (Desmariais & Singh, 2013). Differences between groups are reported when there was a statistical probability of less than five percent that such differences are due to chance ($p < .05$).

Domestic Violence Screening Instrument (DVSI)

Clients were administered a DVSI if they were charged with an offense classified as Domestic Violence (DV) related or closely associated with domestic violence. The DVSI is a 12-item scale with scores from 0 to 2 or 0 to 3, depending on the item. The range of total scores on the DVSI is 0 to 31. Those with a score of 0 to 6 are classified as low risk for domestic re-offense, with scores of 7 or above classified as high risk. Appendix A details DVSI items and item-score intercorrelations. DVSI variables included assessment date, assessment unit, item scores, total score, and risk classification.

Prescreener

Though not the primary focus of this study, a comparison of the predictive accuracy of the Prescreener and the DVSI was investigated for clients who received both assessments on the same day. The Hennepin County Prescreener is used by probation officers after clients are sentenced to screen for general risk to reoffend. It is based upon a modification of the Wisconsin DOC Risk Assessment. The Prescreener is a 12-item scale with a score range of 0 to 39 and three risk categories. Prescreener variables included total score and risk classification.

Sample Description

Appendix B lists detailed summaries of sample characteristics, with some high-level findings below.

Demographics

- The majority (86%) of the sample was male, with fourteen percent (14%) female.

- The largest racial designation was black (48%) followed by white (42%), with American Indians and Asians comprising a small percentage of the sample population (3% each).

- Female representation within racial groups was highest among American Indians (25%), followed by whites (16%).

- There were significant differences in age across major racial groups ($F = 22.47$, $p < .000$), with whites being the oldest on average (36 years) and blacks and American Indians the youngest (33 years).

Recidivism

- The one-year person recidivism rate for the full sample (N = 4,472) was 13%, with a three year person recidivism rate for a partial sample (N = 2,264) of 22%.
- Males were much more likely to have a person re-offense within one year (14%) compared to females (6%).
- American Indians and Blacks had higher one-year person recidivism rates (19% and 16%, respectively) compared to Whites and Asians (10% and 7% respectively).
- One-year person recidivism rates were highest for those with domestic intake offenses (19%) and lowest for those with conduct intake offenses (8%).

DVSI Total Scores

- The average DVSI total score for the full sample was 9.6, with males scoring significantly higher on average (9.9) compared to females (7.6).
- American Indians and Blacks had significantly higher DVSI scores on average (12.2 and 10.8 respectively), compared to Whites and Asians (8.3 and 7.8 respectively).
- Those with domestic related intake offenses had the highest average DVSI scores (11.8) and those with conduct intake offenses were lowest on average (7.1).
- DVSI scores varied positively with age (Pearson R = .10, $p < .000$), meaning that those who were older at assessment tended to have higher scores.

Analysis of the Performance of the DVSI

Frequency Distribution of DVSI Scores

Figure 1 shows the frequency distribution of DVSI scores for the full sample. The distribution was positively skewed indicating that most clients scored at the lower end of the DVSI risk scale. Risk classification frequencies are also displayed in Figure 1.

Figure 1. Frequency Distribution of DVSI Scores
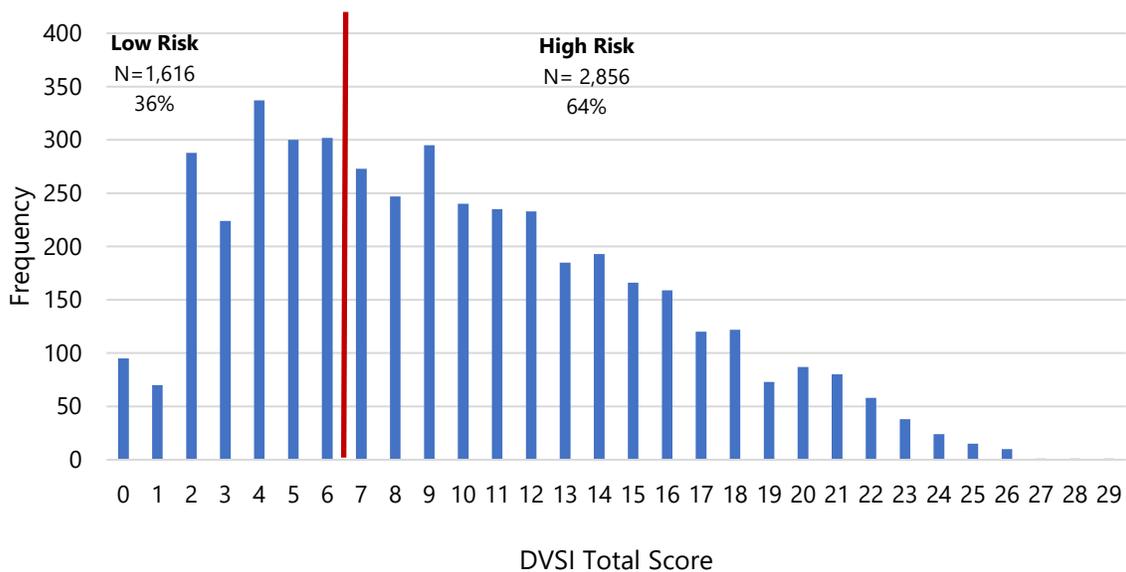
Items of the DVSI

See Appendix A for intercorrelation of the items of the DVSI. The internal consistency of a scale estimates the between-score correlation. An analysis of item interrelationships indicates that the DVSI has adequate internal consistency (Lambda 2 = .733, Alpha = .703). Values for Guttman's Lambda and Cronbach's Alpha above .70 are considered indicators that items that make up a scale are measuring the same latent variable (Osburn, 2000). Results indicate that internal consistency of items would be increased by the exclusion of risk factors of Q7 (Weapon Present) and Q8 (Child Present).

Table 1 provides correlations of item scores with the outcome variables of one-year and three-year person recidivism. Two risk factors, Q7 (Weapon Used) and Q8 (Child Present) were not significantly correlated with those outcome measures. Q10 (Separated from Victim) displayed very weak predictive power ($R < .08$).

Two items on the DVSI were not significantly correlated with person recidivism.

Table 1. DVSI Item Pearson R Correlation with Domestic Related Recidivism

DVSI Risk Factor	Person Recidivism	
	One-Year	Three-Year
Q1 Prior Non-domestic	.159**	.231**
Q2 Prior Assault	.193**	.259**
Q3 Prior Domestic Intervention	.105**	.153**
Q4 Prior Drug/Alcohol Treatment	.092**	.138**
Q5 Prior No Contact Order	.159**	.204**
Q6 Prior Violation of NCO	.151**	.198**
Q7 Weapon Used	.015	.021
Q8 Child Present	.021	.039
Q9 Employment	.114**	.149**
Q10 Separated from Victim	.040**	.085**
Q11 Victim NCO	.115**	.151**
Q12 Prior Supervision	.101**	.141**
*Significant at the .05 level (2-tailed) **Significant at the .01 level (2-tailed). Weak predictive factor (<.08)*		

Full Sample Validation of the DVSI

There is a significant positive relationship between the DVSI total score and the primary outcome variable of one-year person recidivism (Pearson R = .215, p < .000). This relationship is shown visually in Figure 2, where those with higher scores are more likely to re-offend. The relationship is stronger as time from assessment increases with smaller samples of two- and three-year DV recidivism. Person recidivism rates by risk category are also displayed in Figure 2.

Figure 2. Percent of Person Recidivism by DVSI Total Score
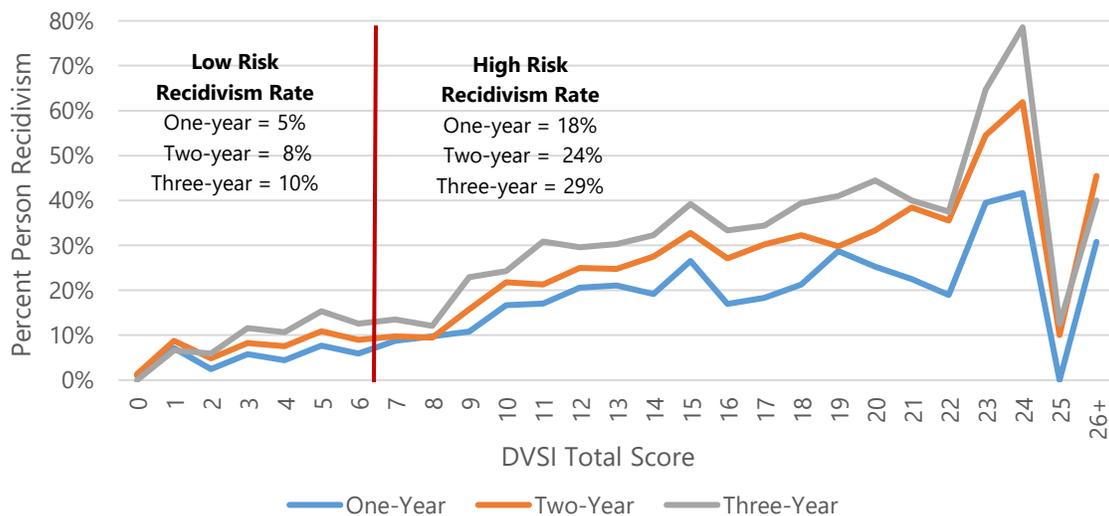
A Relative Operating Characteristic (ROC) curve compared the rate of correctly predicting person recidivism (sensitivity) to the rate of correctly predicting no person recidivism (1-specificity) of the DVSI. Areas greater than .50 indicate predictive power greater than chance. An AUC analysis of DVSI prediction of one-year person recidivism yielded an AUC of .686 (p < .001). This value exceeds the AUC of .600, the minimum criteria in this study for determining validity and indicates good predictive accuracy (AUC > .64).

The DVSI is a valid measure of risk for person re-offense within one year (AUC = .686, p < .001).

Table 2 summarizes the evidence of the validity and accuracy of the DVSI for predicting person recidivism. Correlations and AUC values with confidence limits are shown for one-, two-, and three-year person recidivism, the broad definition of a domestic violence related offense.

Table 2. DVSI Correlation and AUC by Recidivism Period for Person Recidivism

Person Recidivism	Pearson R Correlation	AUC	AUC Confidence Interval (CI)	
			Lower	Upper
One-year	.215*	.686*	.664	.707
Two-year	.272*	.702*	.679	.724
Three-year	.292*	.702*	.677	.727
Significant at the .001 level (2-tailed).				

Risk Classification of the DVSI

As indicated with the above analysis, the DVSI is an effective predictor of domestic violence related re-offense over the full range of scores, as broadly defined to include any violent offense. Most often, however, the scores of risk tools are used as the basis for risk categorization. Good decision points for classification determine whether accurate decisions are made in an applied setting. An evaluation of the practicality, differentiation, and error rate of risk categories provide this applied accuracy perspective.

The distribution of risk levels speaks to the issue of practicality, the question of whether the distribution matches to resources of the organization. As previously shown in Figure 1, sixty four percent (64%) of domestic related offenders assessed at DOCCR are classified as high risk for future domestic related recidivism, a rather high percentage. The comparative recidivism rates of risk categories speak to differentiation and Figure 2 shows good differentiation (t=-13.99, p<.000) of one-year person recidivism rates when comparing low to high risk categories.

False positive errors (i.e., violence was predicted but did not occur) and false negative errors (i.e., violence was not predicted but did occur) represent misclassification. It is important to note that misclassification does not necessarily mean that there are problems with the DVSI risk classification. Risk is not recidivism. It is a proxy for recidivism. There are many influences that contribute to whether a person reoffends. It could be that they are not currently with a partner so there is no opportunity to recidivate. On the other hand, it could also be that they are re-offending and they haven't been caught. Though some misclassification is to be expected in risk prediction, the goal is to minimize both types of errors. In corrections, more emphasis tends to be on reducing false negatives for the protection of the public.

Table 3 presents the one-year person recidivism contingency table across risk categories, with the percentage of the two types of errors indicated by red shading. Risk category distribution and recidivism rates for each risk category are also shown. These results show that false positive misclassification is quite high (61%). Misclassifications over a three-year are shown in Table 4, with similar misclassification patterns.

Table 3. Summary of DVSI Risk Classification for Prediction of One-Year Person Recidivism

One-year Person Recidivism		Low Risk	High Risk	Total Sample
Not Recidivist	N	1534	2352**	3886
	%	39%	61%	100%
Recidivist	N	82*	504	460
	%	14%	86%	100%
Total Sample	N	1616	2856	4472
	%	36%	64%	100%
Recidivism Rate		5%	18%	13%
*False Negative Error **False Positive Error				

Table 4. Summary of DVSI Risk Classification for Prediction of Three-Year Person Recidivism

Three-year Person Recidivism		Low Risk	High Risk	Total Sample
Not Recidivist	N	753	1007**	1760
	%	43%	57%	100%
Recidivist	N	85*	419	504
	%	17%	83%	100%
Total Sample	N	838	1426	2264
	%	37%	63%	100%
Recidivism Rate		10%	29%	22%
*False Negative Error **False Positive Error				

While a dichotomous (yes/no) recidivism variable is an appropriate outcome variable for validation analysis, the number and severity of these offenses can provide further insight. For those with person recidivism, the number and severity (felony, gross misdemeanor, misdemeanor) of offenses across risk categories was compared. Though there was no significant difference in number of person re-offenses, there was a significant difference in the severity of offenses when comparing those classified as low and high risk (t = -6.56, p<.000). This indicates that when the DVSI misclassified a recidivist as low risk, the re-offense was likely to be less serious compared to re-offenders classified as high risk.

Analysis of Assessment Location

Most DVSI assessments were conducted by probation officers in two units, Felony Investigations (N=1057, 24%) and Misdemeanor Investigations (I, II, III, IV) (N = 3282, 73%). As the unit names imply, most who were assessed within Felony Investigations had felony intake offenses (75%) while most Misdemeanor Investigations

intake offenses were misdemeanors (90%). Other differences include higher percentage of blacks, lower percentage of females, higher average DVSI score, and higher recidivism rate for the Felony Investigations subgroup. Comparison of AUC analysis for these two units indicates significant differences in accuracy in prediction of one-year person recidivism. Within Felony Investigations, the confidence intervals extend well below the criteria for validity, while the AUC value for Misdemeanor Investigations indicates excellent accuracy. These AUC values are displayed in Table 5. AUC values for prediction of three-year person recidivism are also displayed, with results showing a gain in predictive accuracy within Felony Investigations.

Table 5. AUC for DVSI Prediction of Person Recidivism across Assessment Unit

Person Recidivism	Unit	AUC	AUC Confidence Interval (CI)	
			Lower	Upper
One-year	Felony Investigations	.604*	.563	.646
	Misdemeanor Investigations	.707*	.681	.733
Three-year	Felony Investigations	.647*	.595	.699
	Misdemeanor Investigations	.707*	.677	.737
Significant at the .001 level (2-tailed).				

Regression analysis indicates differences between assessment unit subgroups in prediction of person risk over the range of DVSI score (See Appendix C). Figure 3 shows the comparison of unit subgroup prediction visually. The best fit predictive intercepts and slopes are significantly different. This difference may be based in the greater variation in rate of one-year person recidivism across DVSI scores within the Felony Investigations sample, reflecting less accuracy. Also displayed are person recidivism rates for risk categories.

Figure 3. Percent of One-year Person Recidivism by DVSI Total Score and Assessment Unit
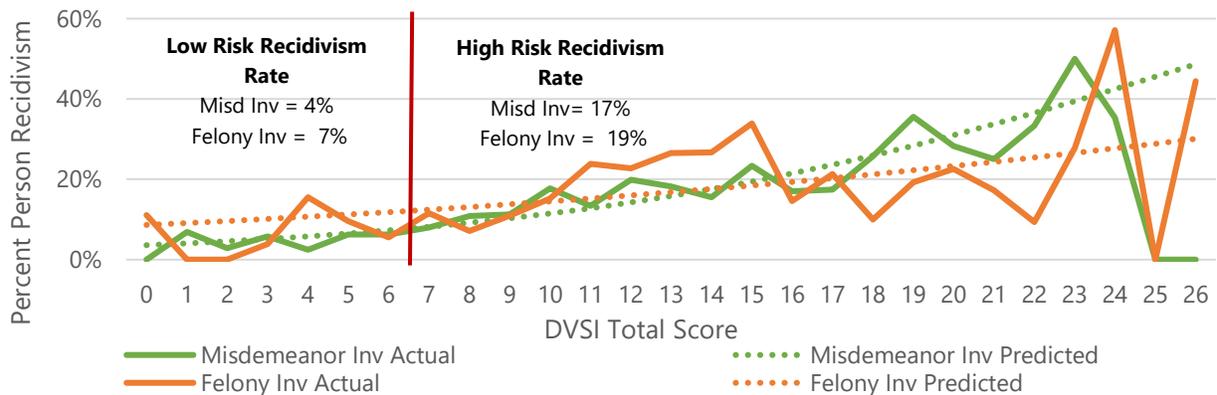
Overrides

The override function allows the assessor to modify the risk classification. Most often, this involves raising the risk level due to factors not assessed on the scale, such as a clearly displayed mental health issue. Overrides exceeding ten percent (10%) of assessments point to problems either in the assessment tool or in the training of assessors. The percent of overrides within the current sample of DVSI assessments is less than two percent (1.5%), a percentage well within the expected range. The vast majority of overrides (93%) were adjustments upward in risk classification.

Analysis of Subgroups

Gender Subgroup Validation

The distribution of DVSI scores for gender subgroups is displayed in Figure 4, including risk categories and percentages.

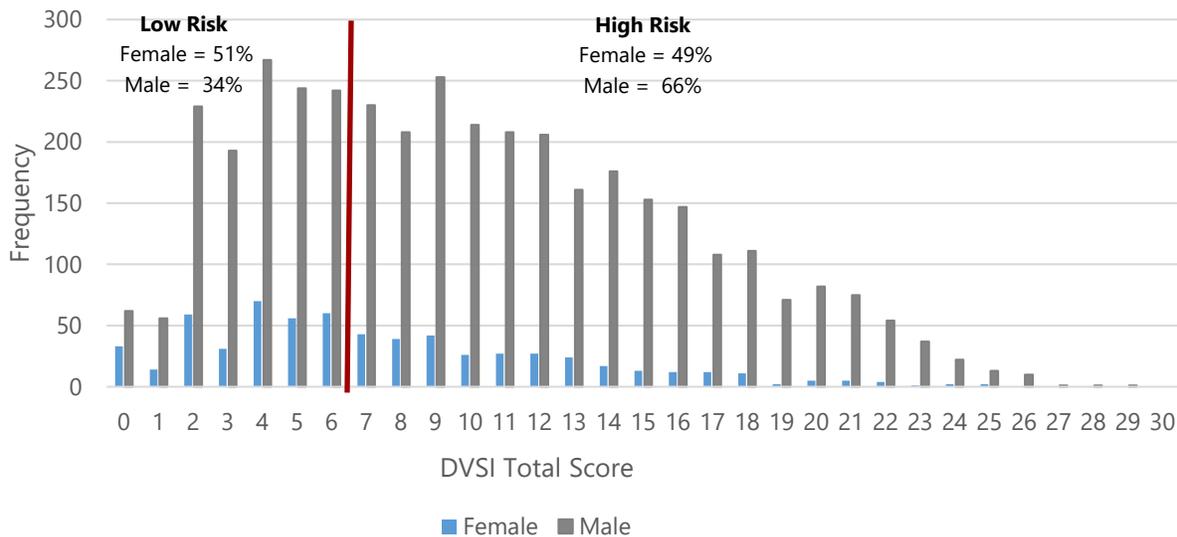Figure 4. Distribution of DVSI Scores and Risk Levels by Gender

Table 6 displays the AUC values of DVSI scores for prediction of one-year person recidivism for gender subgroups. Results indicate that the DVSI is valid for both male and female subgroups. Accuracy is significantly higher for females compared to males for one-year person recidivism prediction (z = 2.141, p < .03). Results for prediction of three-year person recidivism are also shown, with improved accuracy among males. The lower AUC value for females is likely due to the small female three-year sample size (N=311), as evidenced by the very broad confidence intervals.

The DVSI is a valid measure of risk for domestic related re-offense for females (AUC = .773) and males (AUC = .669) .

Table 6. AUC for DVSI Prediction of Person Recidivism by Gender

Person Recidivism	Gender	AUC	AUC Confidence Interval (CI)	
			Lower	Upper
One-Year	Female	.773*	.693	.853
	Male	.669*	.646	.691
Three-Year	Female	.646*	.537	.755
	Male	.697*	.671	.723
*Significant at the .001 level (2-tailed).				

Regression analysis for gender subgroups indicates that there are differences in both the slope and intercept of person risk prediction across gender subgroups (See Appendix C). Figure 5 and 6 displays these differences visually across the range of total scores for the DVSI. Also displayed are the person recidivism rates within risk classifications by gender. These rate comparisons are problematic and have implications for fairness of risk classification across gender. As can be seen, high risk females as a group had a person recidivism rate similar to low risk males.

There are issues with DVSI fairness for person risk measurement across gender subgroups.

Figure 5. One-year Person Recidivism Rate by DVSI Score for Gender Subgroups
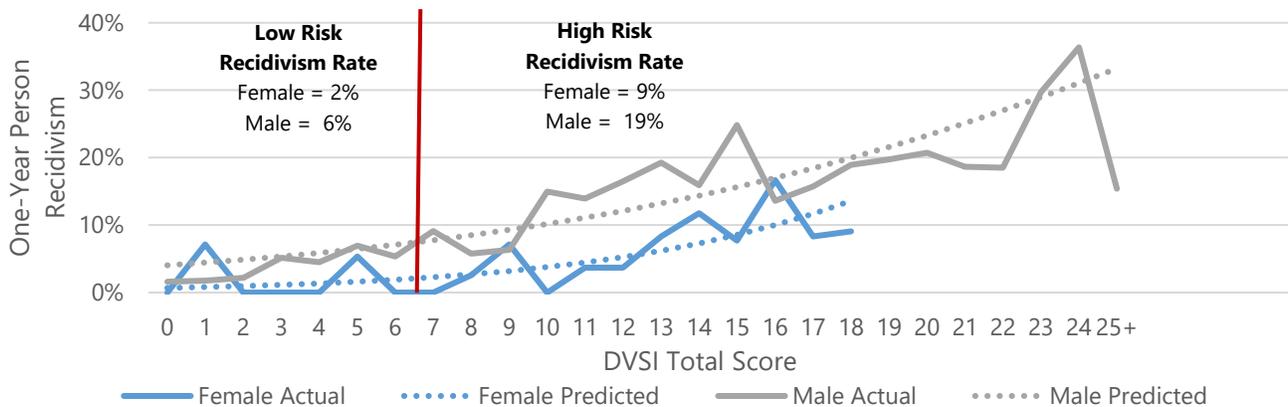

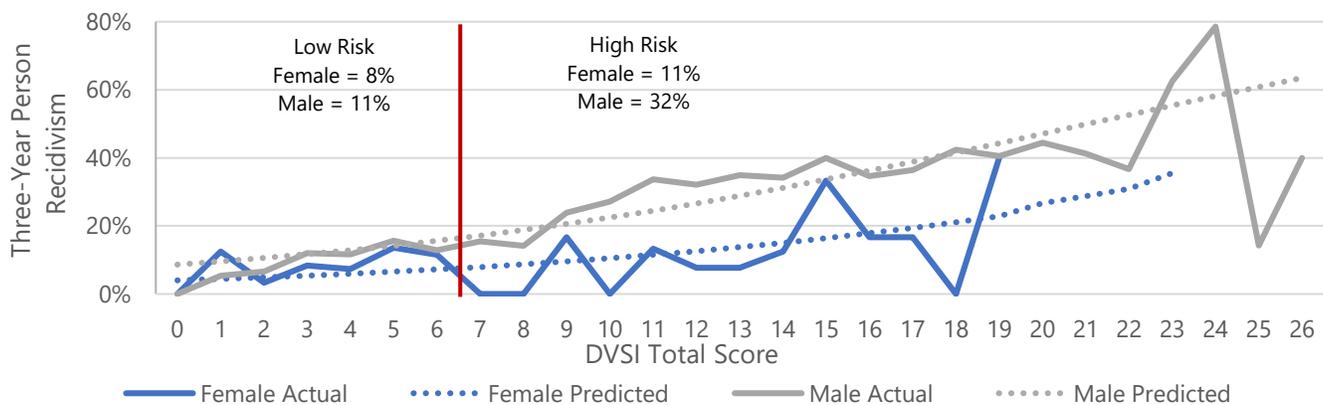Figure 6. Three-year Person Recidivism Rate by DVSI Score for Gender Subgroups

Table 7 provides correlations of item scores with the outcome variables of one-year and three-year person recidivism across gender subgroups. Also displayed are correlations of item scores with gender, coded as zero (0) for females and one (1) for males. Comparative patterns can be indicative of item gender bias when a risk factor displays weak or no relationship to domestic related recidivism while correlating with gender. Q7 (Weapon Used) displays such a pattern. The negative correlation of this risk factor with gender indicates that women score significantly higher as a group compared to men. Q8 (Child Present), while not gender biased, does not display evidence of risk prediction for female or male subgroups. Previous analysis did not find evidence of risk prediction for the full sample as well (See Table 1). Correlations with three-year person recidivism are also shown. Note that lowered correlations among females are likely caused by a small sample size (N=311).

Table 7. DVSI Item Pearson R Correlation with Person Recidivism by Gender

DVSI Risk Factor	Correlation with Person Recidivism				Correlations with Gender
	One-Year		Three-Year		
	Female	Male	Female	Male	(Female = 0, Male = 1)
Q1 Prior Non-domestic	.134**	.150**	.197**	.150**	.158**
Q2 Prior Assault	.166**	.185**	.084	.185**	.158**
Q3 Prior Domestic Intervention	0.077	.098**	0.056	.098**	.106**
Q4 Prior Drug/Alcohol Treatment	.135**	.084**	.136*	.084**	.050**
Q5 Prior No Contact Order	.176**	.148**	.097	.148**	.119**
Q6 Prior Violation of NCO	.234**	.137**	.138*	.137**	.085**
Q7 Weapon Used	0.000	0.026	0.039	0.026	-.079**
Q8 Child Present	-0.039	0.018	-0.082	0.018	0.024
Q9 Employment	.114**	.115**	.128*	.115**	0.002
Q10 Separated from Victim	.092*	0.029	.050	0.029	.065**
Q11 Victim NCO	.259**	.096**	.164*	.096**	.072**
Q12 Prior Supervision	.092*	.096**	.039	.096**	.073**
*Significant at the .05 level (2-tailed) **Significant at the .01 level (2-tailed). ☐ Weak predictive factor (<.08) ☐ Gender Bias					

Q10 (Separated from Victim), though predictive of domestic related re-offense for females, does suggest some degree of gender bias since there is no significant risk prediction for males but a significant correlation with gender, with males scoring higher. Other risk factors (Q1, Q3, Q9) are poor risk predictors for females, though the smaller female sample size (N=637) provides less statistical power in detecting relationships. Correlations with three-year person recidivism are also shown. Note that lowered correlations among females are likely caused by an even smaller sample size (N=311) for the three-year female sample.

Two items of the DVSI display gender bias, including Q7 (Weapon Used) and Q10 (Separated from Victim).

Racial Subgroup Validation

Table 8 displays the AUC values for DVSI scores in prediction of one-year person recidivism for racial subgroups. These results are evidence of validity across all racial subgroups. Validation must be considered preliminary for American Indians. Possibly due to the limited sample size, the AUC confidence interval for this subgroup is very broad and extends below the criteria for validity. The DVSI displays greater accuracy for Asians and Whites compared to Blacks and American Indians (z= 2.86, p < .004). Three-year person recidivism AUC analysis is also shown. Considering the limited sample size of American Indians and Asians, further exploration of differences in measurement across race were limited to comparisons of Blacks and Whites.

The DVSI is a valid measure of risk for person re-offense for all racial subgroups.

Table 8. AUC for DVSI Prediction of Person Recidivism by Race

Person Recidivism	Racial Subgroup	Recidivism Rate	AUC	AUC Confidence Interval	
				Lower	Upper
One-Year	American Indian	19%	.646*	.524	.767
	Asian	7%	.802*	.697	.907
	Black	16%	.633*	.603	.663
	White	10%	.720*	.683	.757
Three-Year	American Indian	29%	.628	.489	.767
	Asian	13%	.767*	.598	.935
	Black	29%	.645*	.610	.679
	White	15%	.729*	.684	.774
**Significant at the .001 level (2-tailed)*					

The distribution of DVSI scores for Black and White subgroups is displayed in Figure 7, including risk category percentages. Regression analysis for Black and White subgroups indicates that there are differences in both the slope and intercept of person risk prediction across these racial subgroups (See Appendix C).

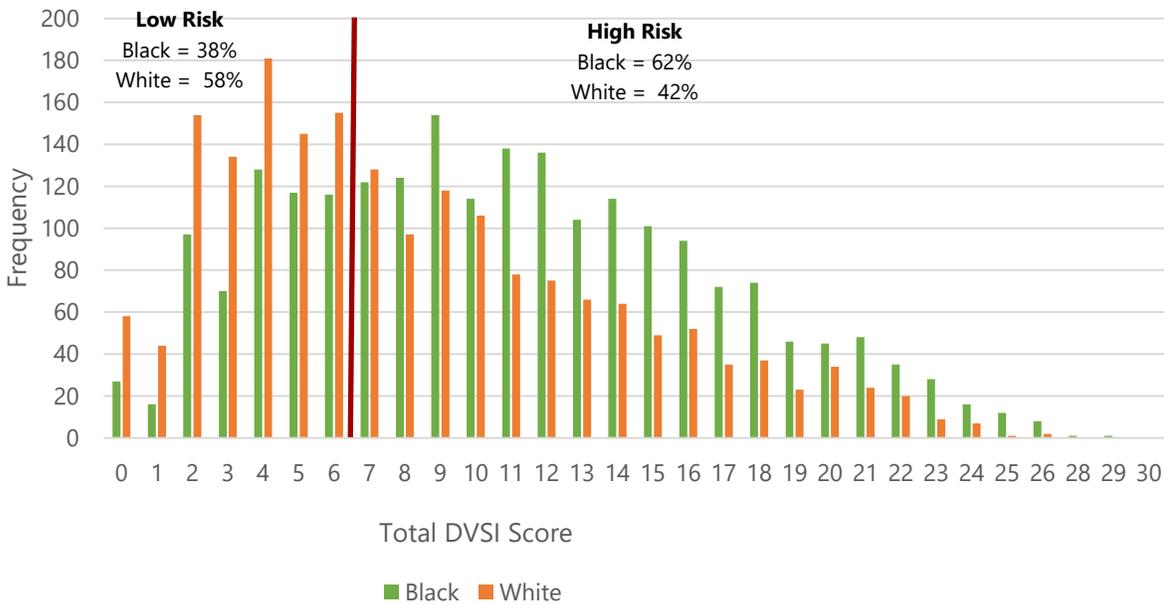Figure 7. Distribution of DVSI Scores and Risk Levels by Race

Figure 8 displays these differences visually, showing that there are differences in the measurement of one-year person risk when comparing Blacks and Whites with the same DVSI score. There is also disproportionate representation of Blacks within higher risk categories. However, when viewing risk categorization as the DVSI is used in an applied setting, Blacks and Whites have similar rates within similar risk categories. Similar results were obtained for three-year person recidivism, as shown in Figure 9.

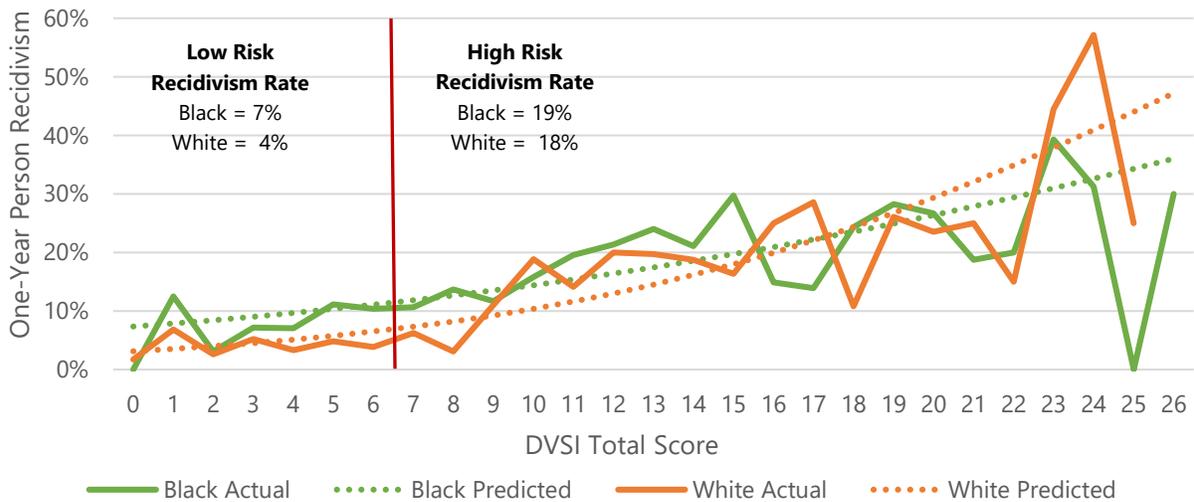Figure 8. One-year Person Recidivism Rate by DVSI Score for Racial Subgroups

Low Risk
Recidivism Rate
Black = 7%
White = 4%

High Risk
Recidivism Rate
Black = 19%
White = 18%

X-axis: DVSI Total Score
Y-axis: One-Year Person Recidivism

Legend: Black Actual | Black Predicted | White Actual | White Predicted

Figure 9. Three-year Person Recidivism Rate by DVSI Score for Racial Subgroups

Low Risk
Recidivism Rate
Black = 17%
White = 7%

High Risk
Recidivism Rate
Black = 34%
White = 22%

X-axis: DVSI Total Score
Y-axis: Three-Year Person Recidivism

Legend: Black Actual | Black Predicted | White Actual | White Predicted
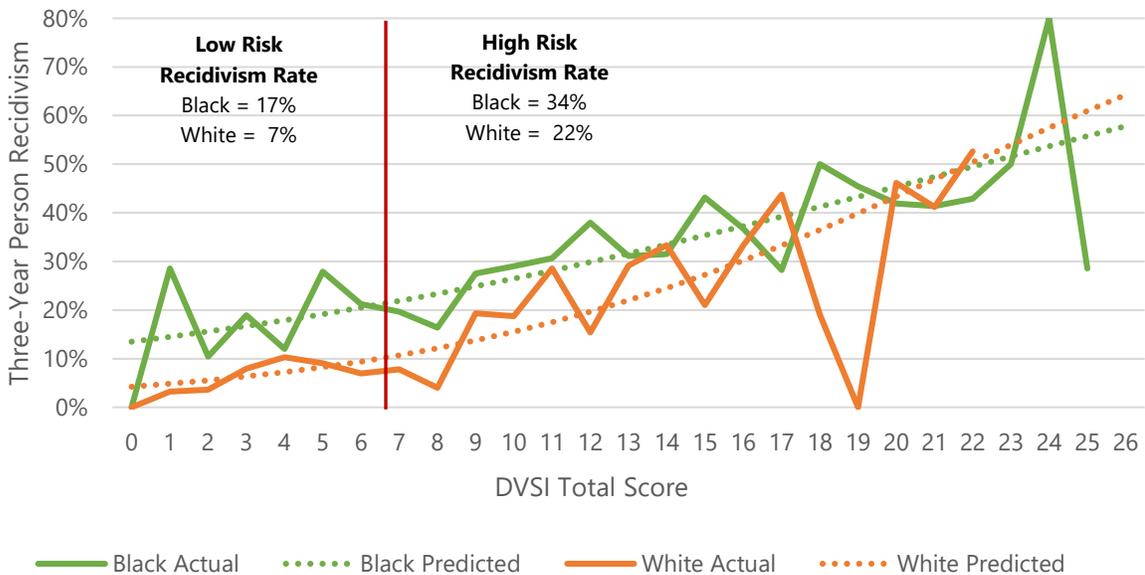
Table 9 provides correlations of item scores with the outcome variables of one-year and three-year person recidivism across Black and White racial subgroups. Also displayed are correlations of item scores with race, coded as zero (0) for Blacks and one (1) for Whites. With this coding, a negative correlation indicates higher scores associated with Blacks. Three items, including Q7, Q8, and Q10, display patterns indicative of racial bias, with little or no relationship to subsequent domestic related recidivism and significantly higher scores for Blacks compared to Whites. Three-year correlations are also shown, with similar results.

Three items of the DVSI display racial bias, including Q7 (Weapon Used), Q8 (Child Present), and Q10 (Separated from Victim)

Table 9. DVSI Item Pearson R Correlation with Person Recidivism by Black/White Subgroups

| DVSI Risk Factor | Correlation with Person Recidivism | | | | Correlation with Race |
| | One-Year | | Three-Year | | (Black = 0, White = 1) |
	Black	White	Black	White	
Q1 Prior Non-domestic	.129**	.161**	.134**	.197**	-.207**
Q2 Prior Assault	.163**	.193**	.172**	.186**	-.257**
Q3 Prior Domestic Intervention	.081**	.129**	.076*	.129**	-.079**
Q4 Prior Drug/Alcohol Treatment	.055*	.151**	.059*	.179**	.118**
Q5 Prior No Contact Order	.125**	.185**	.126**	.192**	-.174**
Q6 Prior Violation of NCO	.120**	.173**	.118**	.174**	-.058**
Q7 Weapon Used	-0.016	0.036	-0.001	-0.012	-.128**
Q8 Child Present	0.023	-0.020	0.014	0.012	-.071**
Q9 Employment	.077**	.124**	.082**	.114**	-.176**
Q10 Separated from Victim	0.024	.047*	0.014	.050	-.092**
Q11 Victim NCO	.077**	.152**	.077*	.168**	-.054**
Q12 Prior Supervision	.087**	.089**	.0116**	.094**	-.056**

*Significant at the .05 level (2-tailed)   **Significant at the .01 level (2-tailed). ☐ Weak predictive factor (<.08) ☐ Gender Bias*

Another comparative pattern of note is the consistently higher correlations of most risk factors of the DVSI with domestic related recidivism for Whites compared to Blacks, with the exclusion of Q12 (Prior Supervision). This suggests that the lower accuracy of the DVSI for Blacks is not based only in the three items found to be racially biased. There appears to be a more generalized difficulty in predicting risk for Blacks across almost all risk factors. Similar results were found over a three-year period.

Modification of the DVSI (DVSI-2)

Item analysis provides strong evidence for the removal of Q7 (Weapon Used), Q8 (Child Present), and Q10 (Separated from Victim) due to gender and racial bias. With DVSI total score calculated with the exclusion of these items, AUC analysis (AUC = .692, p<.000) shows no significant loss of accuracy in predicting one-year domestic related recidivism. To lend more confidence to this scale modification, referred to in this analysis as DVSI-2, the sample was split between earlier versus later assessments, with similar AUC values obtained, as shown in Table 10. Predictive accuracy is retained over three years as well. Validation of this modified scale with an independent sample is necessary to confirm these results.

With three racially biased items remove, the DVSI-2 shows no significant loss of accuracy in predicting person recidivism.

Table 10. AUC for DVSI-2 Compared to DVSI for Prediction of Person Recidivism

Person Recidivism	Sample	AUC	
		DVSI Total Score	DVSI-2 Total Score
One-Year	Q2 2013 thru Q2 2015	.691*	.697*
	Q3 2015 thru Q3 2017	.679*	.685*
	Total Sample	.686*	.692*
Three-Year	Q2 2013 thru Q2 2015	.701*	.705*
	Q3 2015 thru Q3 2017	.702*	.699*
	Total Sample	.702*	.705*
Significant at the .001 level (2-tailed)			

The distribution of total scores for the DVSI-2 is displayed in Figure 10. Note that with the elimination of three items, the range of possible scores is 0 to 22. The distribution of the DVSI-2 is more positively skewed compared to the DVSI, meaning lower scores occur more frequently. A modification of item content required a cut point analysis to determine optimal decision points for risk classification. Taking into consideration the distribution of scores, the pattern of recidivism across scores, and the sensitivity versus specificity of decision points, cut point analysis suggested a three-category risk classification. The proposed risk categories are marked in Figure 10 along with risk classification distributions.

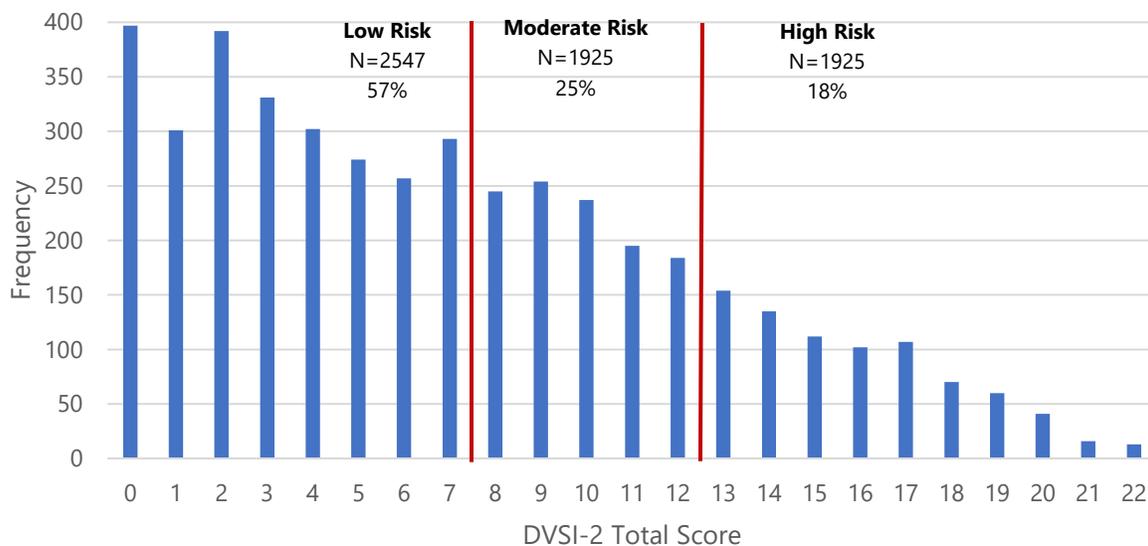Figure 10. Frequency Distribution of DVSI-2 Scores

Figure 11 provides a visual picture of person recidivism rate at each score of the DVSI-2. The proposed risk categories are also displayed, with one-, two-, and three-year person recidivism rates across risk categories.

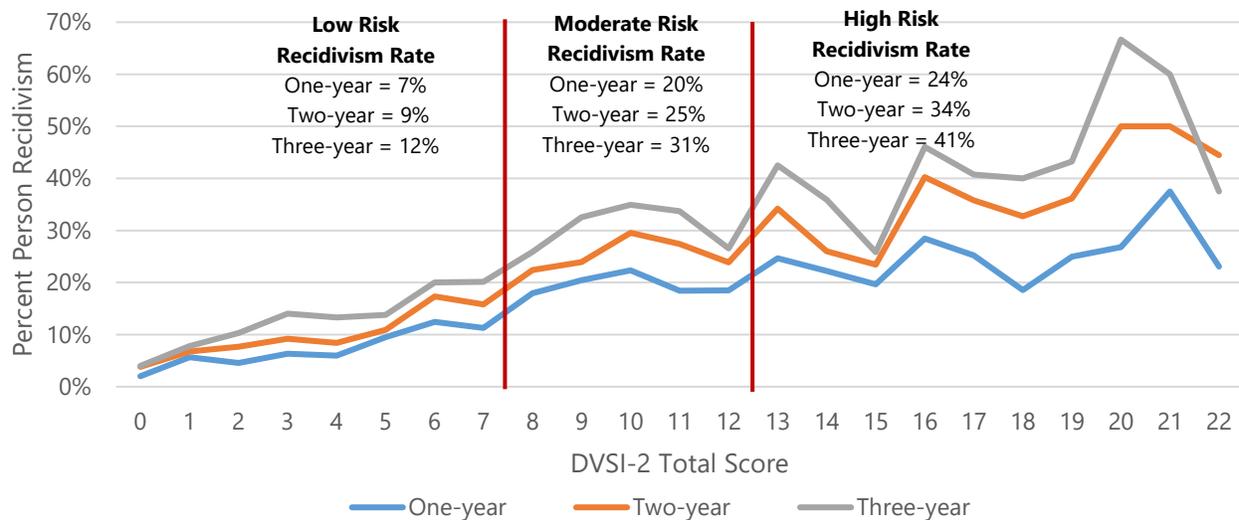Figure 11. Percent of Person Recidivism by DVSI-2 Total Score

Table 11 presents the one-year person recidivism contingency table of misclassifications across risk categories, with the percentage of the two types of errors indicated by red shading. These results show that false positive errors (39%, combining moderate and high categories) and false negative errors (30%) are more appropriately balanced with these decision points.

Table 11. Summary of DVSI-2 Risk Classification for Prediction of One-year Person Recidivism

One-Year Person Recidivism		Low Risk	Moderate Risk	High Risk
Not Recidivist	N	2374	896**	616**
	%	61%	23%	16%
Recidivist	N	173*	219	194
	%	30%	37%	33%
Total Sample	N	2547	1115	810
	%	57%	25%	18%
Recidivism Rate		7%	20%	24%
*False Negative Error **False Positive Error				

When viewing the three-year person recidivism risk classification errors as shown in Table 12, false negative errors (27%) and false positive errors (39%) retain this balance. In other words, the low risk category retains sixty one percent (61%) of non-recidivists and passes seventy three percent (73%) of recidivist to moderate or high-risk categories. The low-risk category prioritizes minimizing false negative errors, where a recidivist is classified as low risk, an error with public safety ramifications. The high-risk category places more emphasis upon minimizing false positive errors that can have a negative impact upon the individual who is misclassified, retaining only seventeen percent (17%) of non-recidivists.

Table 12. Summary of DVSI-2 Risk Classification for Prediction of Three-year Person Recidivism

Three-Year Person Recidivism		Low Risk	Moderate Risk	High Risk
Not Recidivist	N	1189	435**	327**
	%	61%	22%	17%
Recidivist	N	84*	120	109
	%	27%	38%	35%
Total Sample	N	1273	555	436
	%	56%	25%	19%
Recidivism Rate		8%	23%	33%
*False Negative Error **False Positive Error*				

DVSI-2 Accuracy across Units

Table 13 displays the results of AUC analysis of the DVSI-2 across units compared to values obtained for the DVSI. Results indicate that the revision of the DVSI had no significant impact upon accuracy for Unit subgroups. The accuracy of the DVSI-2 within Felony Investigations remains in the borderline range (AUC < .64).

Table 13. AUC for DVSI-2 Compared to DVSI for Prediction of Person Recidivism by Unit

Person Recidivism	Unit	AUC	
		DVSI Total Score	DVSI-2 Total Score
One-Year	Misdemeanor Investigations	.707*	.714*
	Felony Investigations	.604*	.610*
Three-Year	Misdemeanor Investigations	.707*	.712*
	Felony Investigations	.647*	.644*
***Significant at the .001 level (2-tailed)*			

Gender Subgroup Analysis of DVSI-2

Table 14 presents comparative AUC values for gender subgroups, showing that the DVSI-2 retains predictive accuracy in gender subgroup analysis. Though AUC values are slightly higher with modified scoring for most subgroups, these differences are not significantly different. As with the full sample analysis, these results require a follow up validation with an independent sample.

Table 14. Gender Subgroup AUC for DVSI-2 Person Risk Prediction

	One-Year Person Recidivism		Three-Year Person Recidivism	
Gender	DVSI	DVSI-2	DVSI	DVSI-2
Female	.773*	.772*	.646*	.659*
Male	.669*	.674*	.697*	.698*
Significant at the .001 level (2-tailed)				

DVSI-2I total score and risk category distributions for gender subgroups are shown in Figure 12.

Figure 12. Distribution of DVSI-2 Scores and Risk Levels by Gender
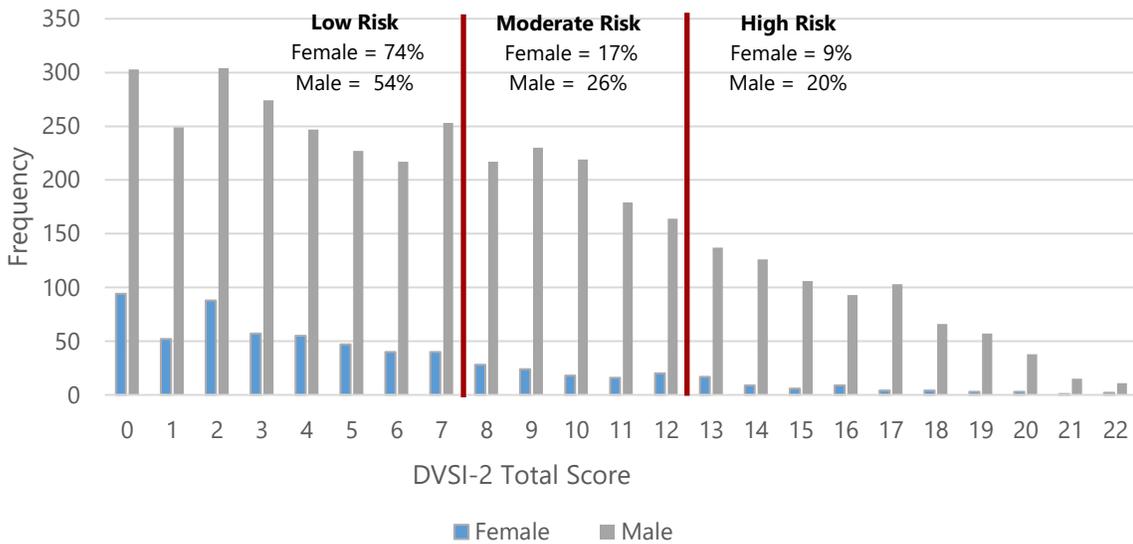
Regression analysis of gender subgroups continue to show that, as with the DVSI analysis, there are differences in both the slope and intercept of person risk prediction across gender subgroups (See Appendix C). Figure 13 displays these differences for measurement of one-year person recidivism. Also shown are recidivism rates for males and females within proposed risk categories. For males, data analysis suggests that the DVSI-2 is as effective in predicting domestic related recidivism as the DVSI. The three-category risk classification suggested by cut point analysis displays differentiation across risk levels for males, though differences are greatest in the differentiation of low risk from moderate risk.

Figure 13. One-year Person Recidivism Rate by DVSI-2 Score for Gender Subgroups
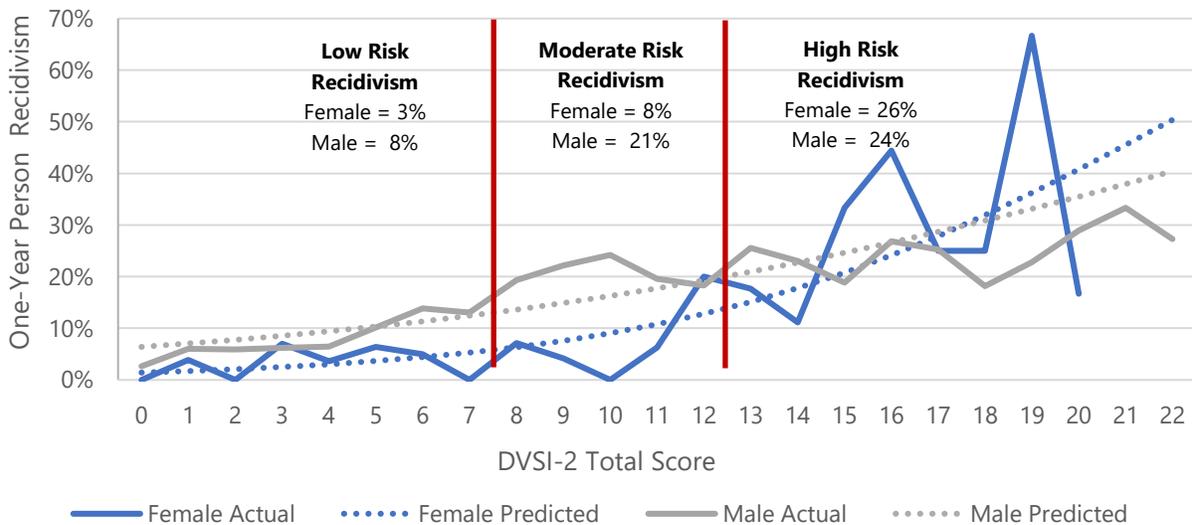
Figure 14 displays three-year person recidivism rates across DVSI-2 scores. Note that the small sample size for females combined with a low base rate results in unreliable analysis at this individual score level. This is evident in the greater deviations from the best fit prediction line for females.

Figure 14. Three-year Person Recidivism Rate by DVSI-2 Score for Gender Subgroups
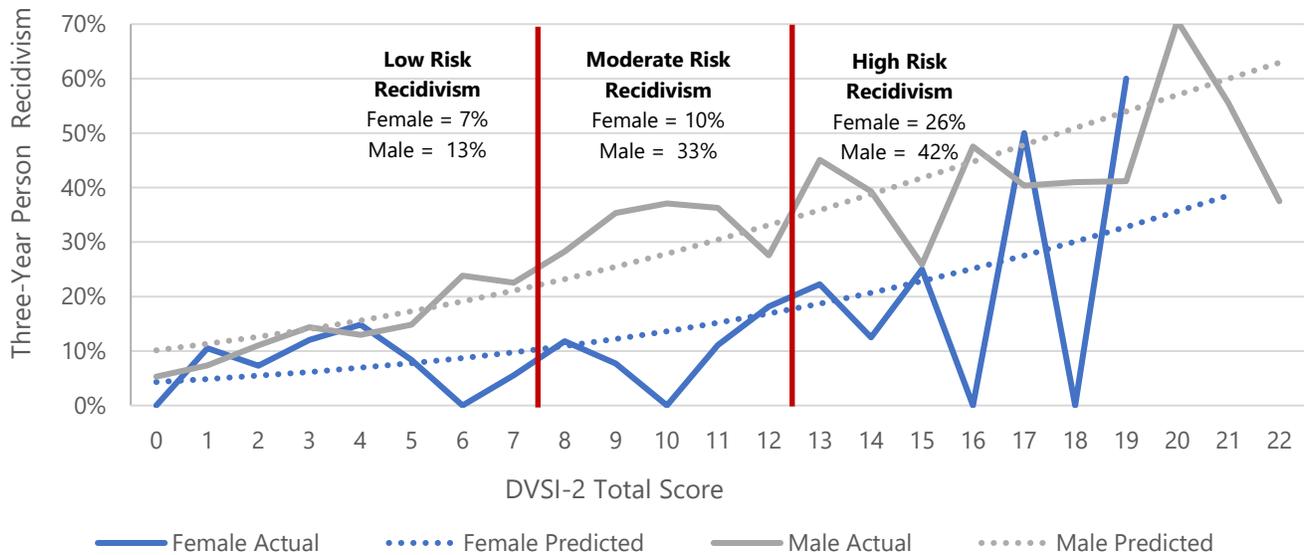
The revision of the DVSI does not appear to have impacted issues of gender fairness. As visually displayed in Figures 12 and 13, there continue to be equity issues with the three-category risk classification. As a group, moderate-risk females have recidivism rates similar to low-risk males and high-risk females have rates similar to moderate-risk males. Finally, the differentiation between low-risk and moderate-risk within the female subgroup is not adequate.

When reviewing the person recidivism rates of women over one year (6%), two years (8%), and three years (9%), a valid interpretation of these rates as well as DVSI and DVSI3 findings is that women as a group can be considered to be low-risk for domestic recidivism. However, the DVSI as well as the modified DVSI-2 exhibit high statistical accuracy in domestic related risk prediction among women. Also, the three-category risk classification suggested here does clearly differentiate a high-risk category from a moderate/low risk category among female domestic related offenders.

One classification option that fits these findings is a two-category domestic related risk classification for women, with the low and moderate categories collapsed into female low-risk classification. This merged category results in a one-year person recidivism rate of eight percent (8%) comprising approximately ninety percent (91%) of the female sample population. This reduces that excessive false positive errors among women with the current classification, takes advantage of the predictive power of the DVSI-2 with women, and addresses some though not all of the fairness issues across gender lines.

Racial Subgroup Analysis of DVSI-2

Table 15 presents comparative AUC values for Black and White racial subgroups, showing that the DVSI-2 retains predictive accuracy in racial subgroup analysis.

Table 15. Racial Subgroup AUC for DVSI-2 Person Risk Prediction

| Racial Subgroup	One-Year Person Recidivism		Three-Year Person Recidivism	
	DVSI	DVSI-2	DVSI	DVSI-2
Black	.633*	.641*	.646*	.659*
White	.720*	.726*	.697*	.698*
Significant at the .001 level (2-tailed)				

DVSI-2 total score and risk category distributions for Black and White racial subgroups are shown in Figure 15.

Figure 15. Distribution of DVSI-2 Scores and Risk Levels by Race
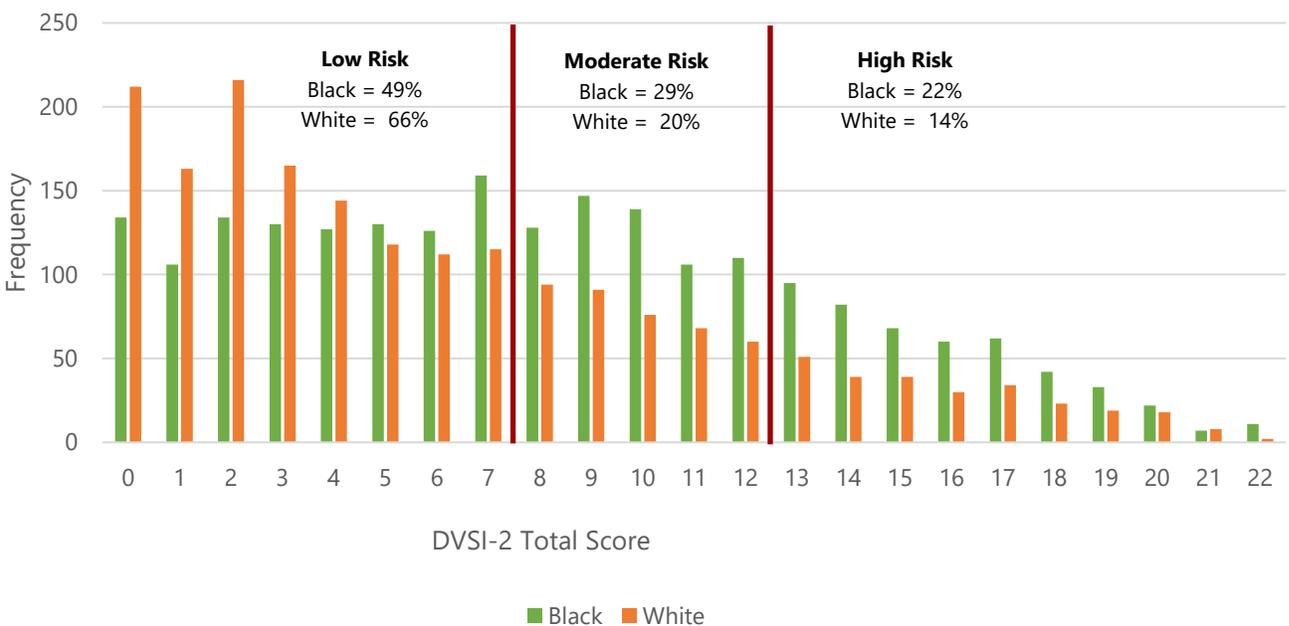
Regression analysis of racial subgroups continue to show that there are differences in both the slope and intercept of person risk prediction across racial subgroups (See Appendix C). The revision of the DVSI does appear to have impacted issues of racial fairness. This is visually displayed in Figure 16, with one-year person recidivism rate at each score of the DVSI-2. The best fit predictive line for Blacks appears more closely aligned to that of Whites. Though differences in measurement across race are still present, these differences appear to have been reduce by the exclusion of racially biased items. Recidivism rates are distinguished among Blacks and Whites for the revised risk categories, though most clearly at the decision point between low and moderate risk. Comparative rates within risk categories are closely aligned when comparing racial groups. With the DVSI scale and its two-category risk classification before revision, as shown in Figure 8, domestic related recidivism rates for those classified as low risk (6% and 3% for Blacks and Whites, respectively) are similar to the rates for the revised low risk category.

Figure 16. One-year Person Recidivism Rate by DVSI-2 Score for Racial Subgroups
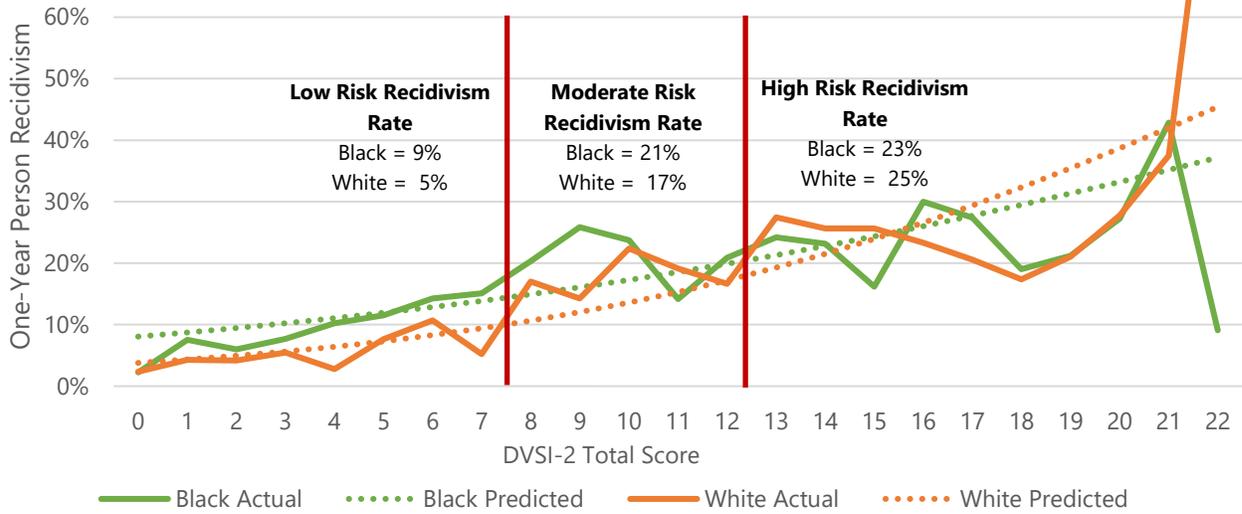
Comparisons for three-year person recidivism, as shown in Figure 17, are more problematic. The differences in slope and intercept are more pronounced, with the greatest differences in rates at the lower score levels. Consequently, Blacks classified as low risk have more than twice the recidivism rate of low-risk Whites. Rates increase over the length of the scale at a greater pace for Whites so that measurement is fairly comparable in high-risk person recidivism for Blacks and Whites.

Figure 17. Three-year Person Recidivism Rate by DVSI-2 Score for Racial Subgroups
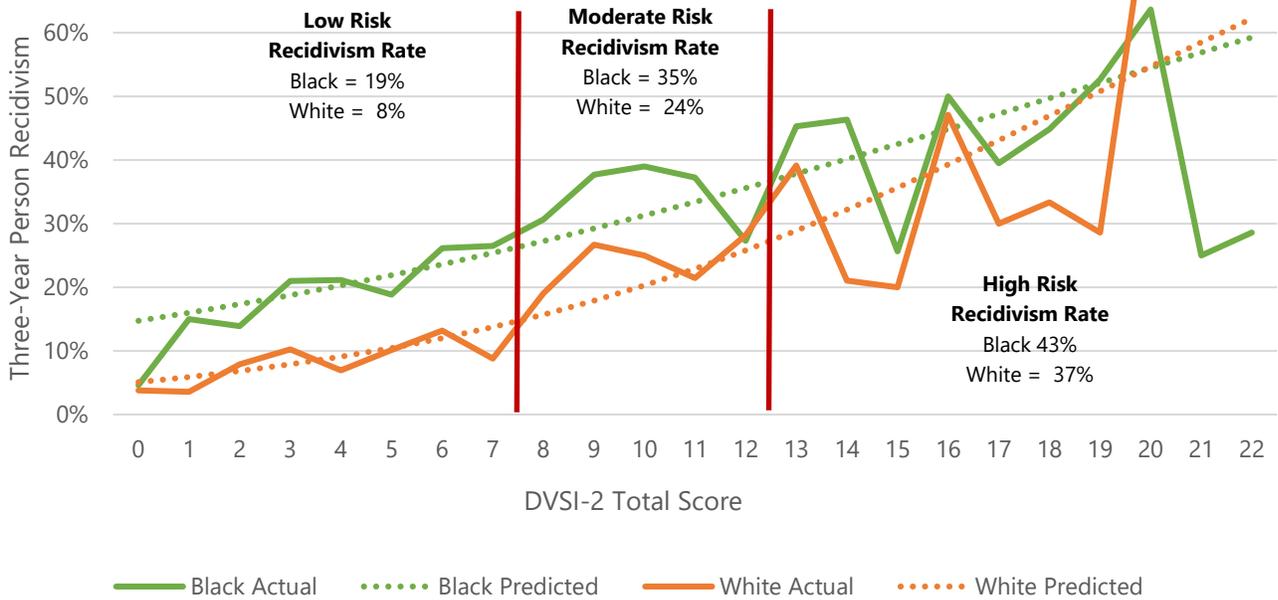
Comparison of DVSI-2 and Prescreener

For those clients who were assessed with the DVSI and the Prescreener on the same day (N = 2553), the accuracy in predicting person and general recidivism was compared. Given the positive results of the analysis of the revision to the DVSI, the DVSI-2 was used for comparison to the Prescreener. To compare risk category performance, the proposed three level risk classification of the DVSI-2 was used. There were differences in the characteristics of this dual assessment subsample compared to the total DVSI validation sample. The vast majority of the dual assessments (96%) were administered within Misdemeanor Investigations. Intake offenses were primarily misdemeanors (91%), with nine percent (9%) being gross misdemeanors.

Dual Assessment Sample Score and Risk Level Distribution

Figures 18 and 19 display frequency distributions of the DVSI-2 and the Prescreener, respectively. Risk level percentages are also displayed.

Figure 18. Distribution of DVSI-2 Scores and Risk Levels for Dual Assessment Sample
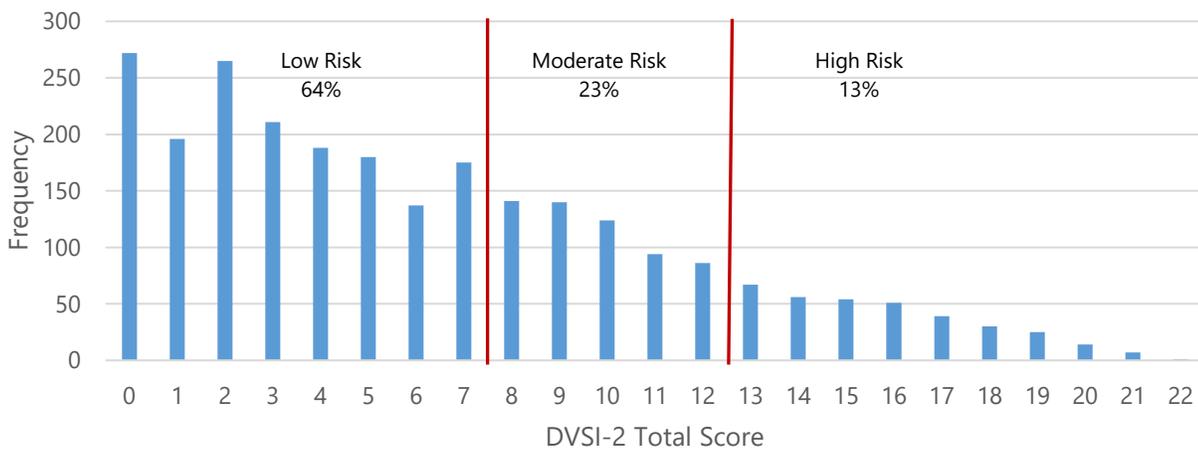

Figure 19. Distribution of Prescreener Scores and Risk Levels for Dual Assessment Sample
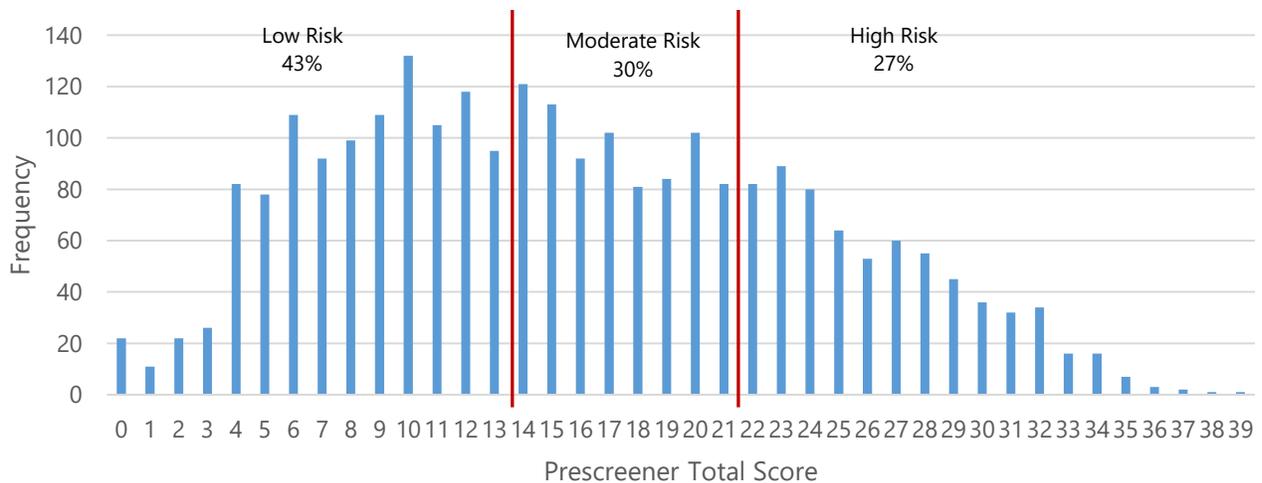
Comparison of Domestic Related Risk Prediction

Figures 20 and 21 display the relationship between domestic related (person) recidivism and total score for the two scales. Recidivism rates for risk levels are also shown.

Figure 20. Person Recidivism Rates by Total Score for DVSI-2 – Dual Assessment Sample
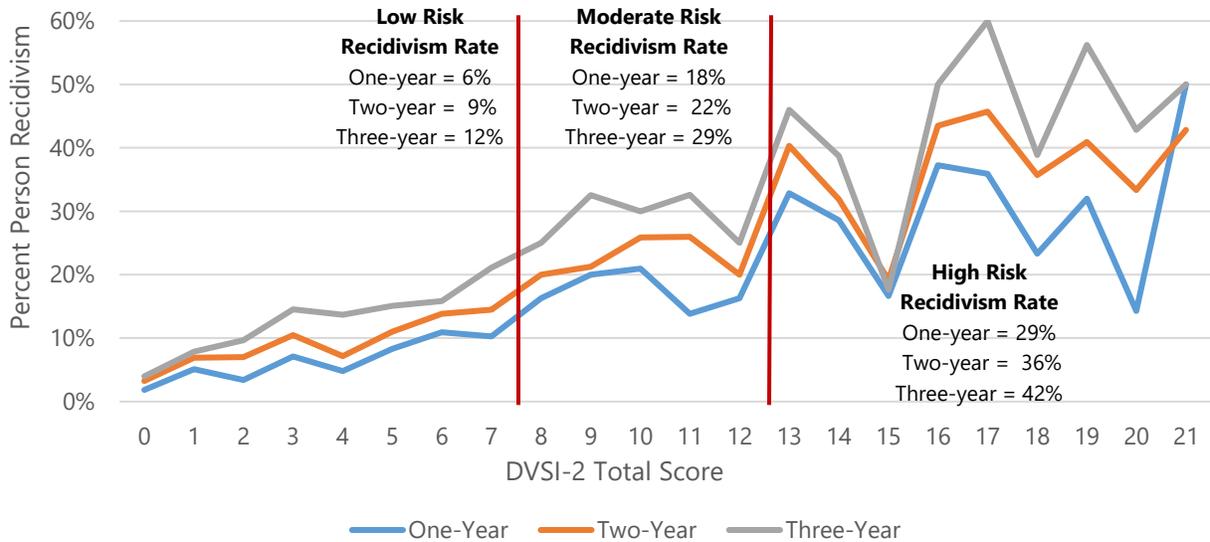
Figure 21. Person Recidivism Rate by Total Score for Prescreener – Dual Assessment Sample
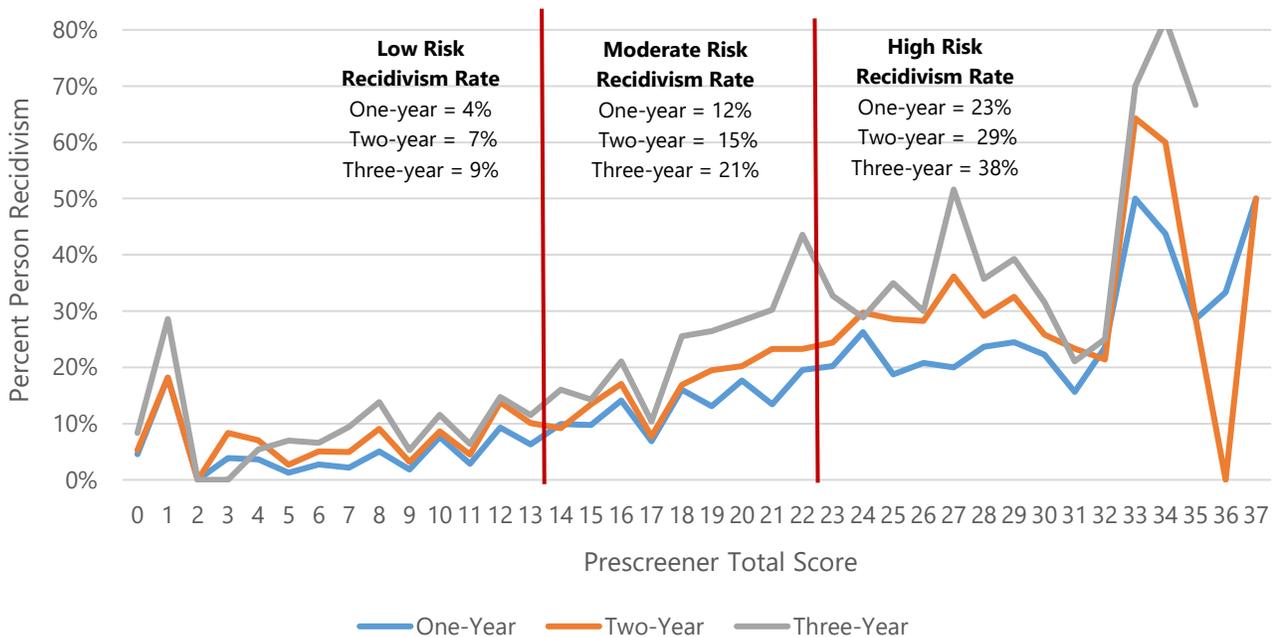
Table 16 gives the AUC values for prediction of person recidivism, comparing the accuracy of the DVSI-2 and the Prescreener. Both scales show predictive accuracy in the excellent range, with no significant difference between AUC values when comparing scales for prediction of one-year person recidivism (z= .5335, p = .488498) (DeLong, 1988). Similar results were found for two- and three-year person recidivism. Though AUC values for the DVSI-2 were consistently higher, the differences were not statistically significant.

Table 16. DVSI-2 and Prescreener AUC for Prediction of Person Recidivism

Person Recidivism Period	Assessment	AUC	AUC Confidence Interval	
			Lower	Upper
One-year N = 2553	DVSI-2	.726*	.697	.755
	Prescreener	.709*	.679	.738
Two-year N= 2276	DVSI-2	.715*	.686	.744
	Prescreener	.703*	.674	.732
Three-year N = 1472	DVSI-2	.710*	.678	.742
	Prescreener	.707*	.675	.740
Significant at the .001 level (2-tailed)				

These results indicate that the DVSI-2 and Prescreener are effective predictors of person recidivism. This is true not only over the full range of scores of both tools, but also in comparison of risk classification. AUC analysis of risk levels of the DVSI-2 (.697, p < .000) and Prescreener (.691, p <.000) for prediction of one-year person recidivism confirm this similarly effective classification. Similar results were also obtained for prediction of person recidivism over two- and three-year periods.

The DVSI-2 and Prescreener are both valid and accurate predictors of domestic related recidivism.

The comparison of percentages of one-year person recidivism classification errors of the DVSI-2 and Prescreener are shown in Table 17. The proposed risk categories of the DVSI-2 result in a balance of error types. Note that risk classification is determined by decisions regarding applied use of a tool rather than being a characteristic of a tool. Different decision points would result in different error rates.

Table 17. Summary of DVSI-2 and Prescreener Risk Classification Errors for One-year Person Recidivism

One-Year Person Recidivism			Low Risk	Moderate Risk	High Risk
DVSI-2	Not Recidivist	N	1528	481**	243**
		%	68%	21%	11%
	Recidivist	N	96*	104	101
		%	32%	34%	34%
	Total Sample	N	1624	585	344
		%	64%	23%	13%
	% Recidivism		6%	18%	29%
One-Year Person Recidivism			Low Risk	Moderate Risk	High Risk
Prescreener	Not Recidivist	N	1050	681**	521**
		%	47%	30%	23%
	Recidivist	N	50*	96	155
		%	17%	32%	51%
	Total Sample	N	1100	777	676
		%	43%	30%	27%
	% Recidivism		4%	12%	23%
* False Negative Error **False Positive Error					

Comparison of General Risk Prediction

The Prescreener is a general risk screen. Therefore, a comparison of the performance of the DVSI-2 and Prescreener needs to also compare prediction of general recidivism. Figures 22 and 23 display the relationship between general recidivism and total score for the two scales. Recidivism rates for risk levels are also shown, indicating that the DVSI-2 proposed risk categories have higher tolerance for recidivism within each category compared to the Prescreener.

The DVSI-2 and Prescreener are similarly effective in classification of general recidivism.

Figure 22. General Recidivism Rate by Total Score for DVSI-2 – Dual Assessment Sample
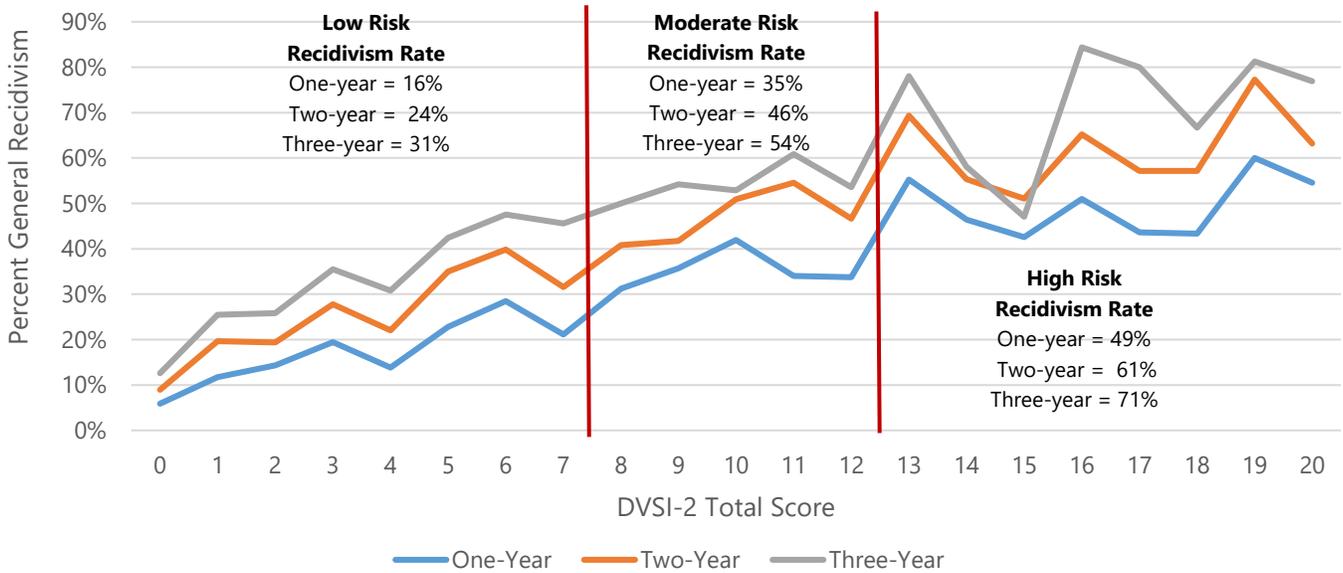

Figure 23. General Recidivism Rates by Total Score for Prescreener – Dual Assessment Sample
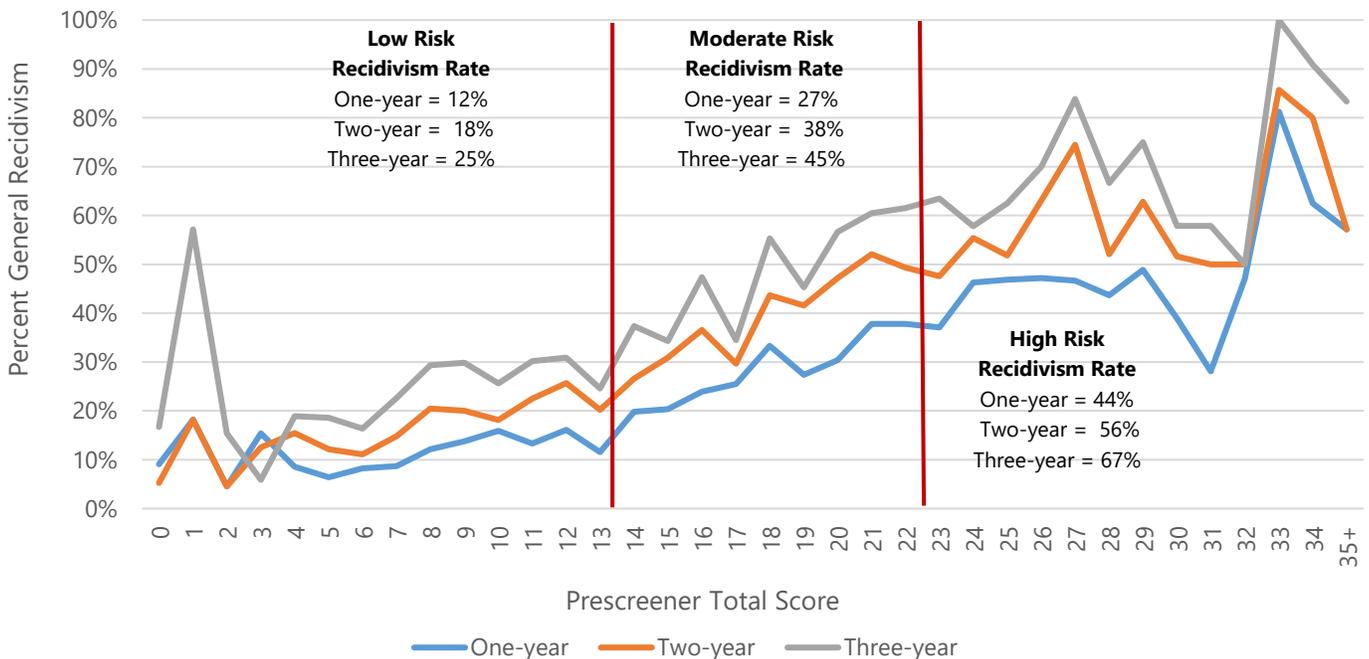
Table 18 gives the AUC values for prediction of general recidivism. Both scales are valid predictors of risk for general recidivism. Results indicate no significant difference in accuracy for one-year general recidivism prediction (z= 0.4468, p = .655) (DeLong, 1988). Similar results were found for two- and three-year general recidivism.

Table 18. DVSI-2 and Prescreener AUC for Prediction of General Recidivism – Dual Assessment Sample

Recidivism Period	Assessment	AUC	AUC Confidence Interval	
			Lower	Upper
One-year N = 2553	DVSI-2	.699*	.676	.722
	Prescreener	.707*	.684	.730
Two-year N= 2274	DVSI-2	.701*	.679	.724
	Prescreener	.714*	.692	.736
Three-year N = 1472	DVSI-2	.702*	.675	.728
	Prescreener	.708*	.682	.735
**Significant at the .001 level (2-tailed)*				

The comparison of percentages of one-year general recidivism classification errors of the DVSI-2 and Prescreener are shown in Table 19. The percentages for the Prescreener indicate an emphasize on reduction of false negative errors, the error of classifying a person as low risk who will subsequently have an offense. This is an emphasis on public safety with the tradeoff being loss of classification sensitivity, resulting in larger numbers of offenders assigned to higher risk levels.

Table 19. DVSI-2 and Prescreener Risk Classification Errors for One-year General Recidivism

One-Year Person Recidivism			Low Risk	Moderate Risk	High Risk
DVSI-2	Not Recidivist	N	1363	378**	175**
		%	71%	20%	9%
	Recidivist	N	261*	207	169
		%	41%	32%	27%
	Total Sample	N	1624	585	344
		%	64%	23%	13%
	% Recidivism		6%	18%	29%
One-Year Person Recidivism			Low Risk	Moderate Risk	High Risk
Prescreener	Not Recidivist	N	970	570**	376**
		%	50%	30%	20%
	Recidivist	N	130*	207	300
		%	20%	33%	47%
	Total Sample	N	1100	777	676
		%	43%	30%	27%
	% Recidivism		4%	12%	23%
*False Negative Error **False Positive Error*					

Comparison of Risk Prediction for Gender Subgroups

The majority of the dual assessment sample are male (84%, N = 2152), with females comprising sixteen percent (16%, N = 401). Males have a higher base rate of one-year domestic related recidivism compared to females (13% and 5% respectively). The distributions of the DVSI-2 and Prescreener total scores for gender subgroups are displayed in Figure 24 and Figure 25. Risk categories and percentages are also shown.

Figure 24. Distribution of DVSI-2 Scores and Risk Levels by Gender - Dual Assessment Sample
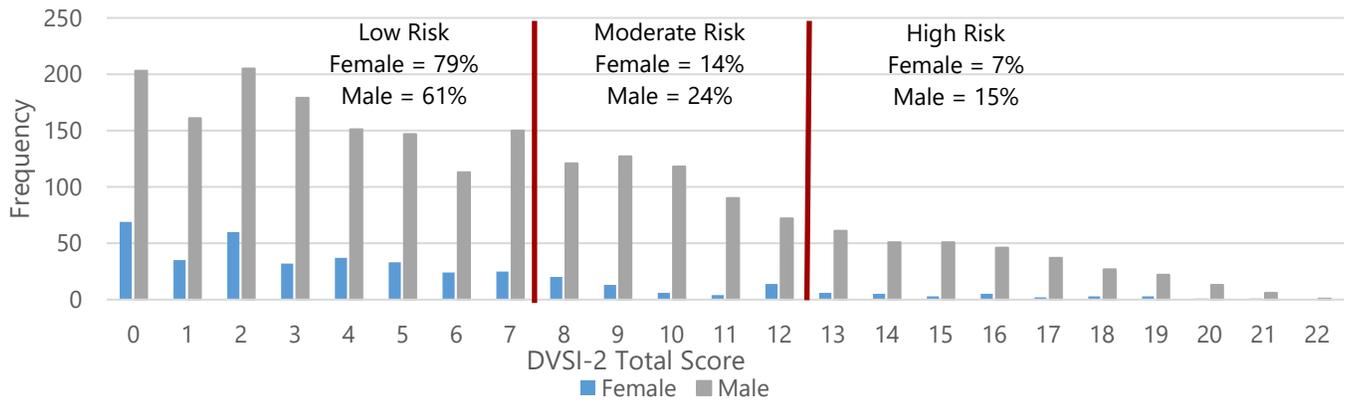
Figure 25. Distribution of Prescreener Scores and Risk Levels by Gender – Dual Assessment Sample
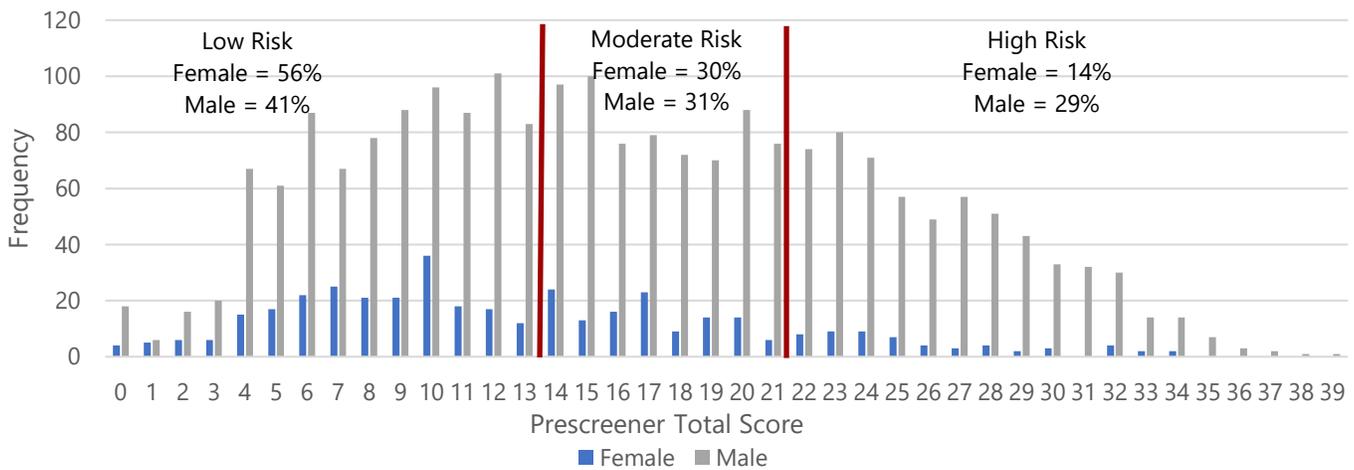
The results of AUC analysis across gender for prediction of one-year person and general recidivism for both the DVSI-2 and Prescreener are shown in Table 20. Both tools are valid and accurate predictors of risk to reoffend for gender subgroups, with no significant difference in accuracy in prediction of multiple outcomes.

Table 20. Gender Subgroup AUC for Prediction of One-Year Outcomes with Dual Assessments

Recidivism	Person Recidivism		General Recidivism	
Assessment	DVSI-2	Prescreener	DVSI-2	Prescreener
Female	818*	.724*	.707*	.696*
Male	.707*	.697*	.691*	.703*
Significant at the .001 level (2-tailed)				

The extremely low person recidivism rates of females in this dual assessment sample in combination with a relatively low sample size makes analysis of patterns across the range of scores of the two tools for females difficult to interpret reliably. The instability of these results should be noted when viewing Figures 26 and 27 which display one-year person recidivism at each score of the DVSI-2 and Prescreener as well as risk category person recidivism rates. Figures 28 and 29 present these recidivism rates at each score level for general recidivism across gender subgroups. Based upon regression analysis, there is no significant difference in slope or intercept for person or general recidivism risk with either tool (See Appendix C). In other words, both scales display fairness of measurement across gender subgroups with this dual assessment sample.

Figure 26. One-Year Person Recidivism Rates by Total Score and Gender for DVSI-2 – Dual Sample

Figure 27. One-Year Person Recidivism Rates by Total Score and Gender for Prescreener – Dual Sample
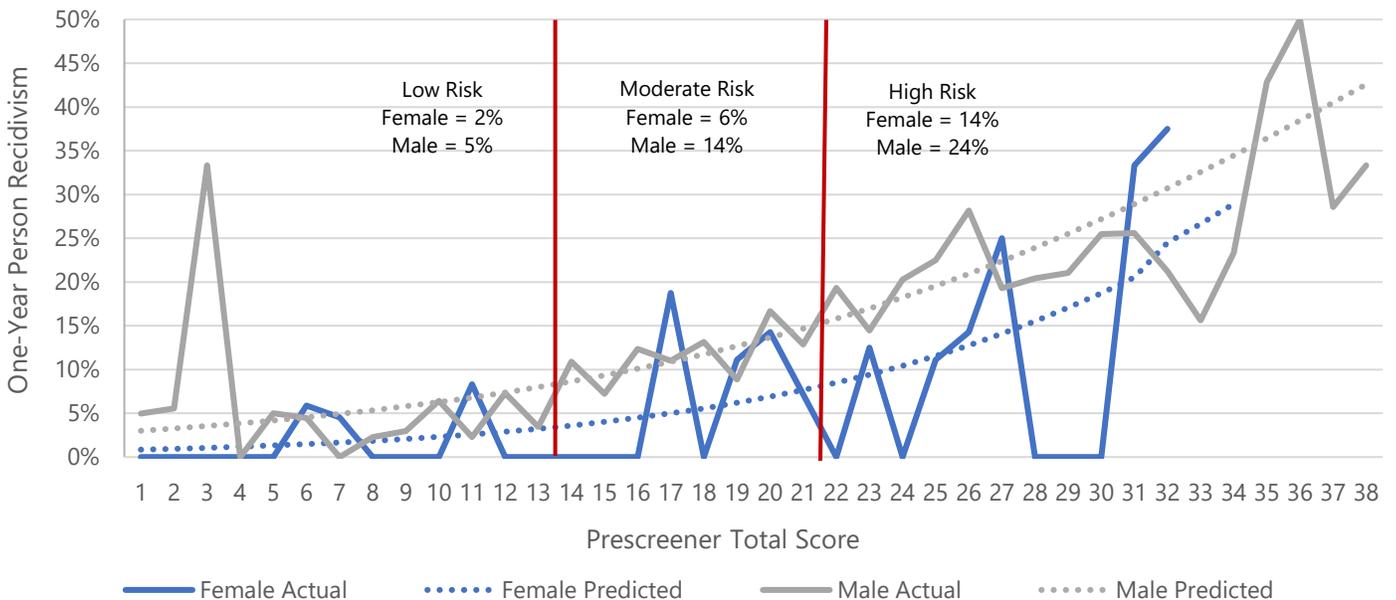
Figure 28. One-Year General Recidivism Rates by Total Score and Gender for DVSI-2 – Dual Sample
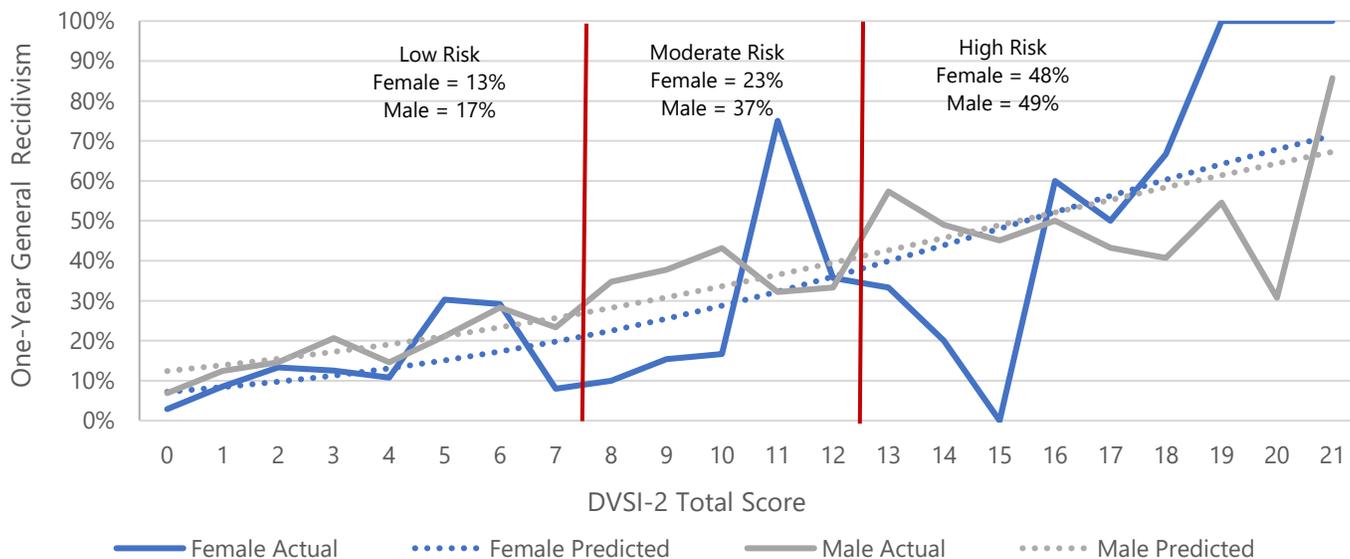
Figure 29. General Recidivism Rates by Total Score and Gender for Prescreener – Dual Sample
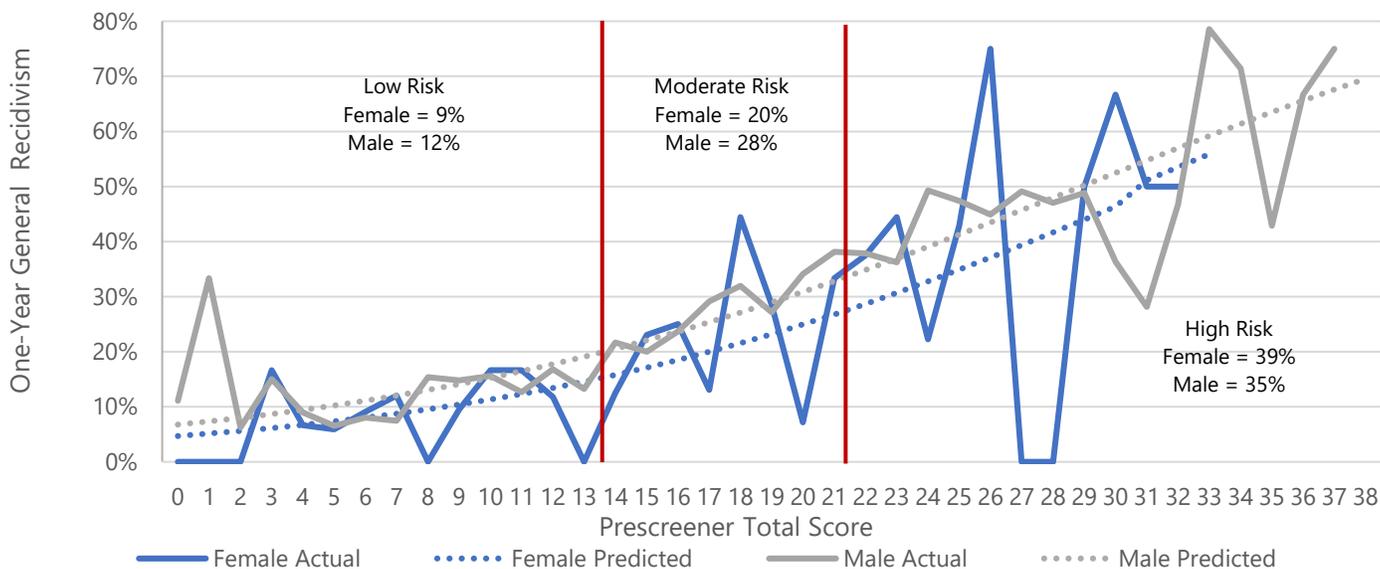
The DVSI-2 and Prescreener are fairly comparable in risk classification for males, with categories that are well differentiated in terms of recidivism rates for all types of recidivism. Among females, both tools differentiate risk across categories equally well for one-year general recidivism. Both tools display problems with person recidivism for females. The Prescreener does not show adequate differentiation of recidivism rates across the three risk categories. The DVSI-2 does not differentiate low from moderate risk classifications based upon category recidivism rates. However, high risk females are well differentiated from low/moderate risk females as well as having a recidivism rate comparable to males who are classified as high risk.

Unfortunately, risk classification for person offense prediction with women continues to be problematic. For the Prescreener, high-risk women have similar rates to moderate risk men and moderate risk women have rates like those of low-risk men. For the DVSI-2, high-risk women are well differentiated and similar to high-risk men, but the moderate-risk category is not distinguished from low-risk and has a group rate slightly less that than of low risk men.

Given the very low base rate of domestic violence recidivism, the highly skewed distribution of lower scores, and the effectiveness of the DVSI-2 in identifying the small percentage of women who are at high-risk for a repeat offense, one option would be to use a two risk classification of domestic violence risk while retaining the three risk classification of general risk for women.

Comparison of Risk Prediction for Racial Subgroups

The majority of the dual assessment sample are Black (45%, N = 1155) or White (45%, 1161). American Indian and Asian samples are not sufficient for reliable analysis and were not included in comparative racial subgroup analysis . The results of AUC analysis across race for prediction of one-year person and general recidivism for both the DVSI-2 and Prescreener are shown in Table 21. Both tools are valid and accurate predictors of risk to reoffend for racial subgroups, with no significant difference in accuracy in prediction of multiple outcomes.

Table 21. Racial Subgroup AUC for Prediction of One-Year Outcomes with Dual Assessments

Recidivism Period	Person Recidivism		General Recidivism	
One-Year	DVSI-2	Prescreener	DVSI-2	Prescreener
Black	.670*	.663*	.664*	.673*
White	.754*	.714*	.705*	.700*
Three-Year	DVSI-2	Prescreener	DVSI-2	Prescreener
Black	.651*	.663*	.660*	.673*
White	.742*	.711*	.691*	.689*
Significant at the .001 level (2-tailed)				

The distributions of DVSI-2 and Prescreener total scores for racial subgroups are displayed in Figure 30 and Figure 31. Risk categories and percentages are also shown.

Figure 30. Distribution of DVSI-2 Scores and Risk Levels by Race for Dual Sample
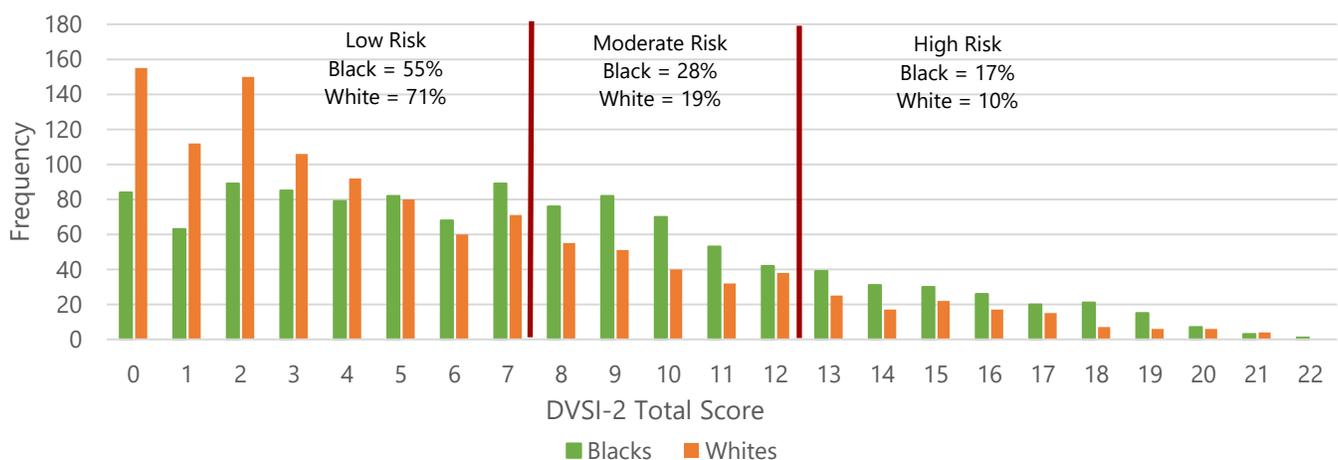
Figure 31. Distribution of Prescreener Scores and Risk Levels by Race for Dual Sample
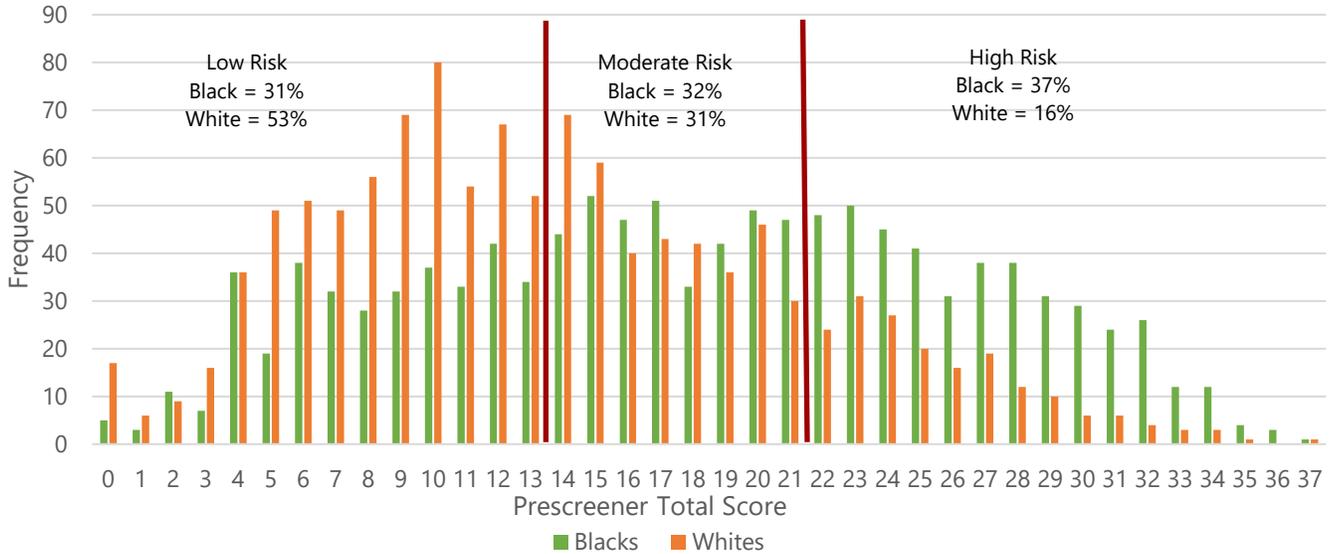
Figures 32 and 33 provide racial comparisons of one-year person recidivism rates for each score of the DVSI-2 and Prescreener, respectively.
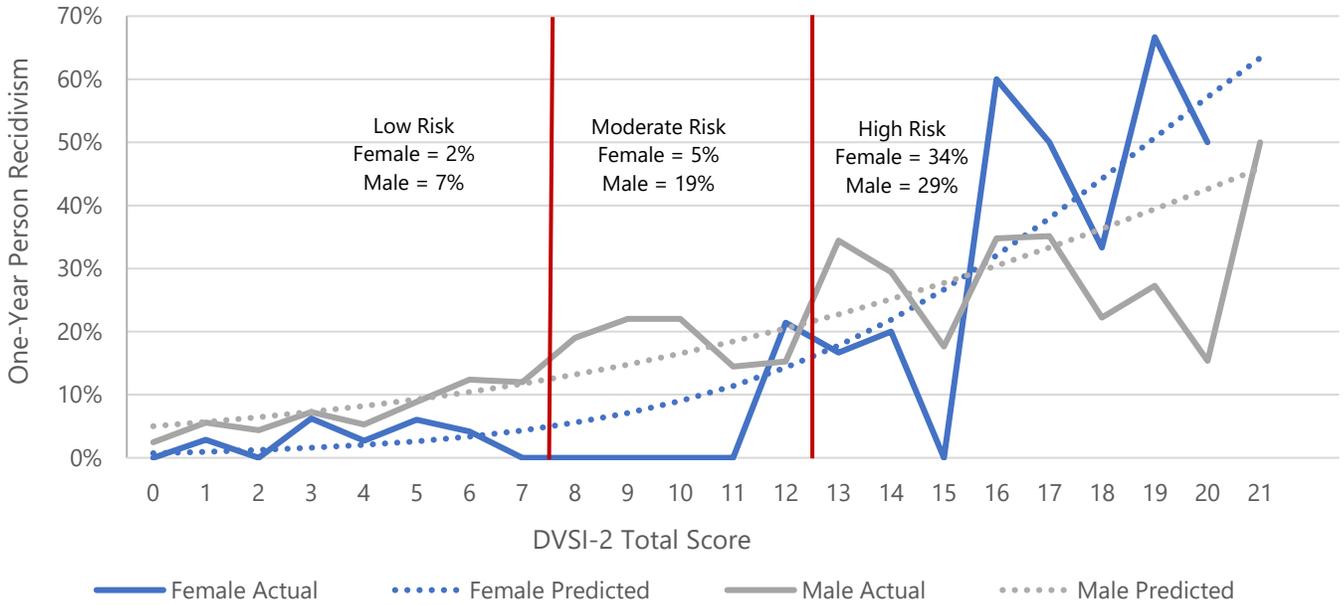
Figure 32. One-Year Person Recidivism Rate by Total Score and Race for DVSI-2 – Dual Sample
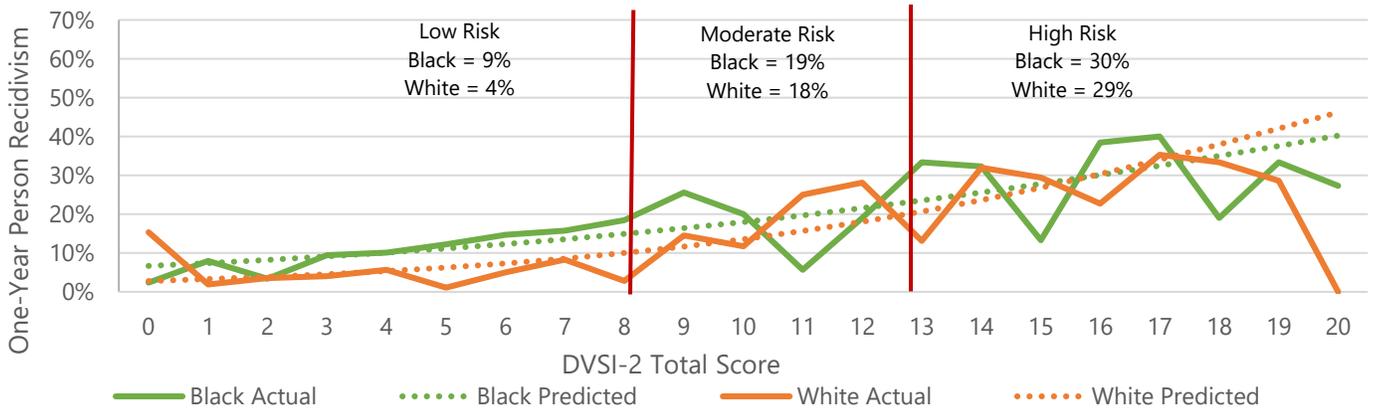
Figure 33. One-Year Person Recidivism Rate by Total Score and Race for Prescreener – Dual Sample
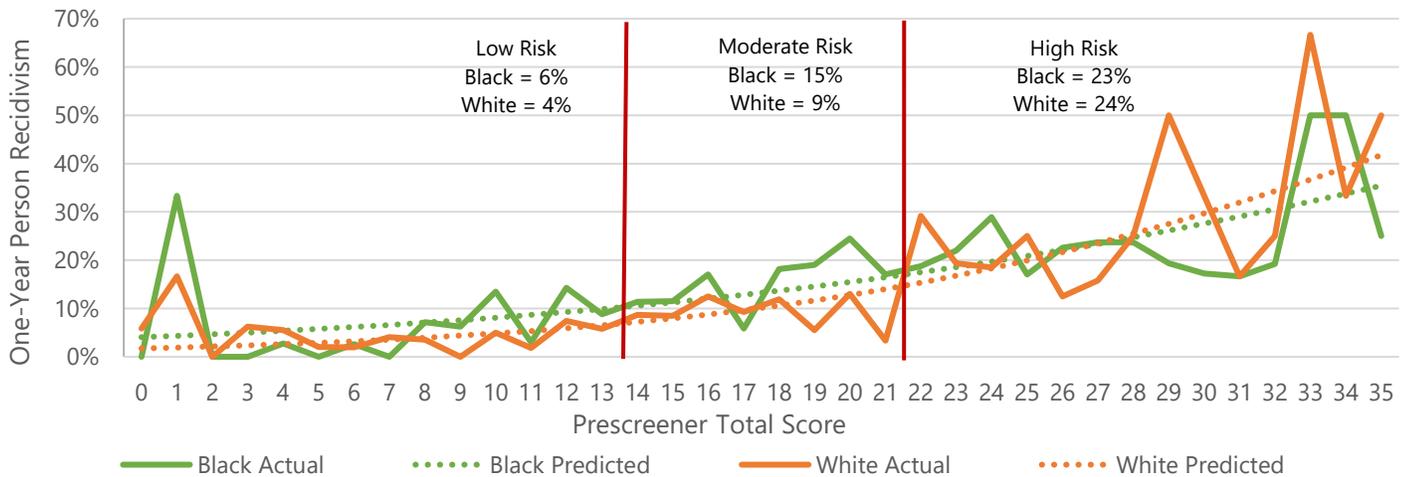
Regression analysis indicates that there are differences in measurement across race in both intercept and slope for both tools (See Appendix C). Though these slight differences are present, the recidivism rates within each three-risk classification are similar when comparing racial groups.

Figures 34 and 35 provide racial comparisons of one-year general recidivism rates for each score of the DVSI-2 and Prescreener, respectively. Regression analysis indicates that there are differences in measurement across race in the intercept but not the slope for both tools (See Appendix C). In other words, for both tools Blacks have a consistently higher recidivism rate than whites at each total score but the rate of recidivism increase with increased scores is similar across racial groups.

Figure 34. One-Year General Recidivism Rates by Total Score and Race for DVSI-2 – Dual Sample
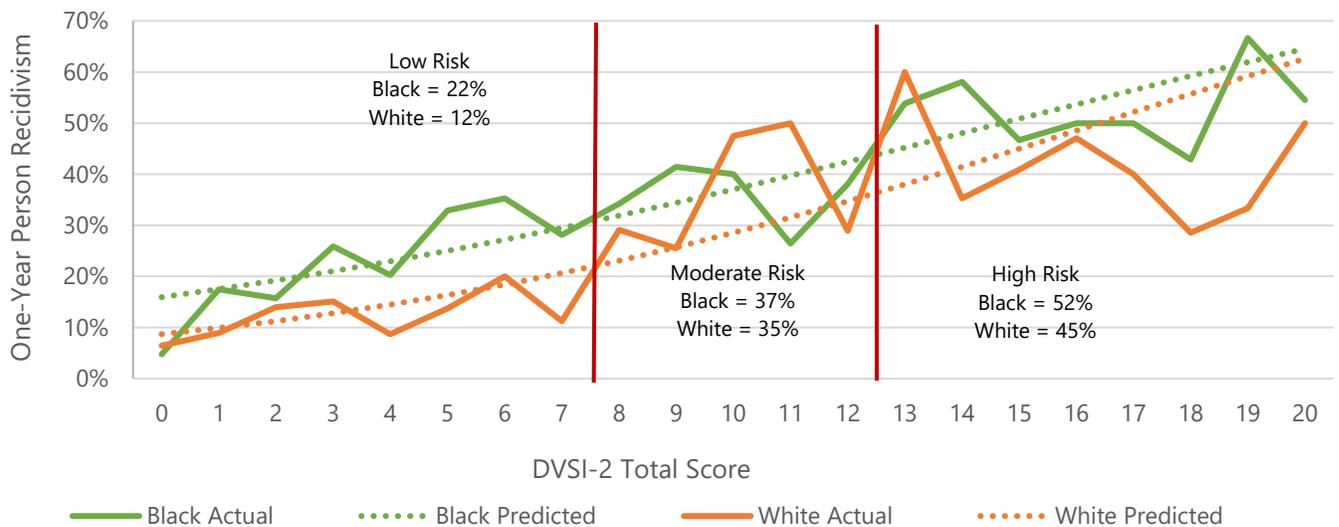
Figure 35. One-Year General Recidivism Rates by Total Score and Race for Prescreener – Dual Sample

Validation of the DVSI   December, 2020
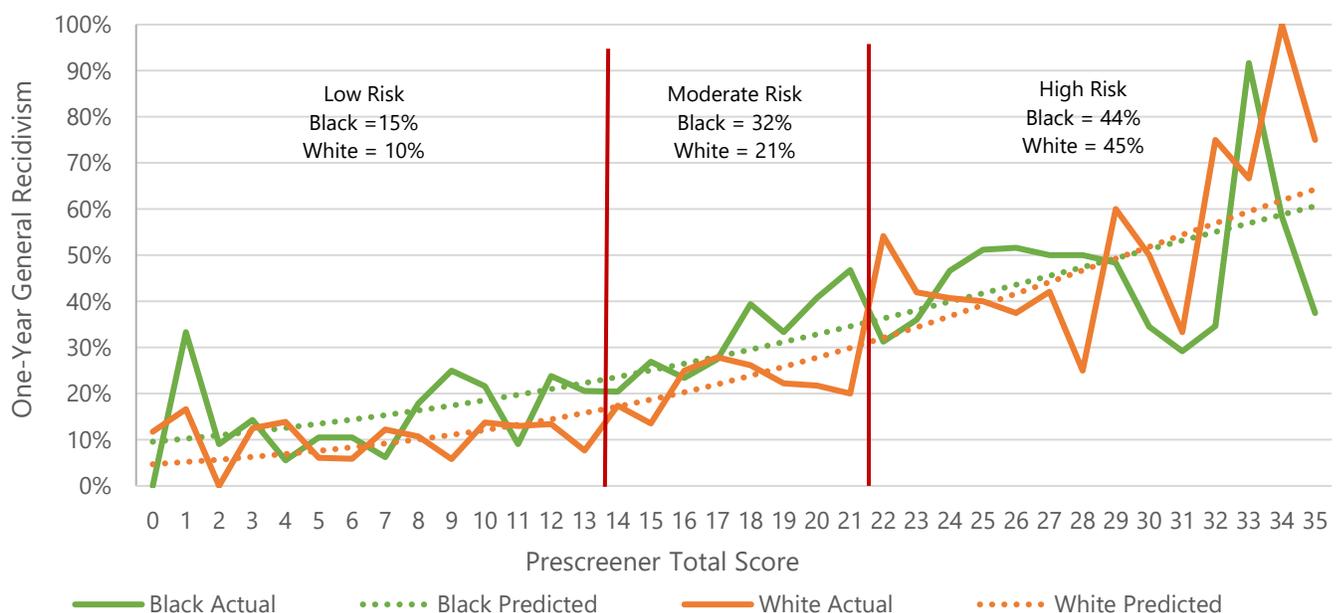
Summary of Results

The comparative analysis indicates that the DVSI-2 and Prescreener tools represent a duplication of service. Both tools are valid predictors of domestic related and general recidivism, with a gain in domestic related risk prediction with the DVSI-2. When viewing risk classification, recidivism rates are rather high for DVSI-2 general risk classification and rather low for Prescreener domestic related risk classification. If one tool is chosen to eliminate duplication of service, these results suggest that different decision points for classification of domestic related and general risk should be explored.

Figure 36 displays the general recidivism rate at each score of the DVSI-2 for the full sample of domestic offenders in this study with modified classification cut points. Proposed DVSI-2 risk classifications rates for one-year general recidivism are displayed as well. This proposed general risk classification aligns with that of the Prescreener.

Figure 36. Proposed Revision to General Risk Class for DVSI-2 – Full Sample
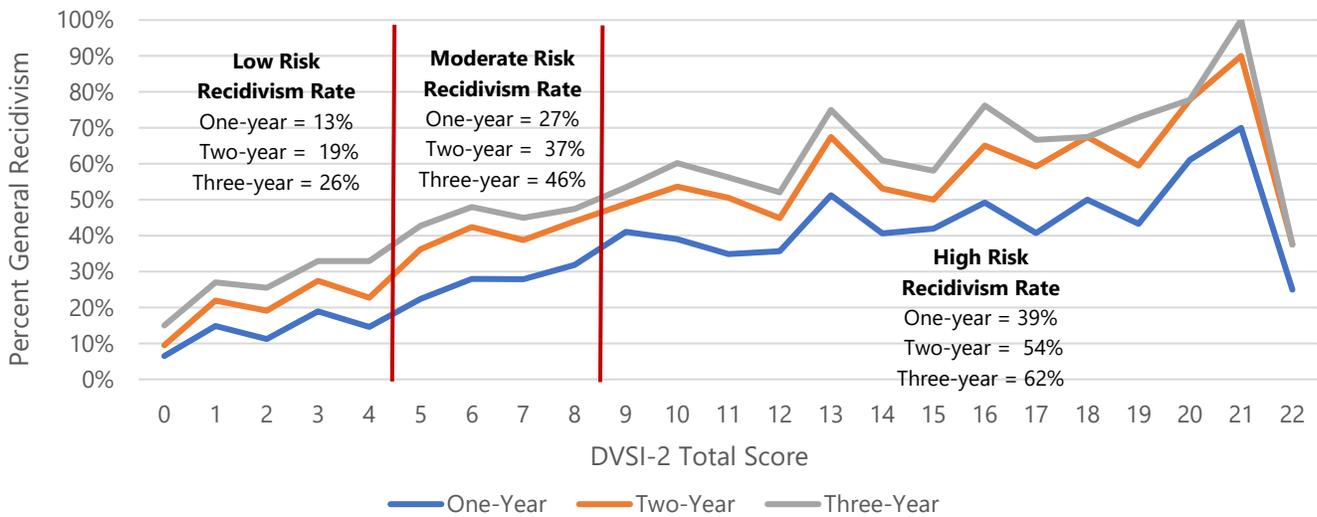
With revision of the DVSI, eliminating three items that are not predictive of risk but introduce gender/racial bias, the DVSI-2 displays gains in accuracy and racial equity compared to the DVSI. With the proposed modifications to domestic related risk classification, there are also gender equity gains within the high-risk classification. The proposed merging of low and moderate risk categories in domestic related risk classification into a low-risk classification for women also generates gender equity for low-risk classification. With the proposed modification to general risk classification for the DVSI-2, assessment of general risk is comparably in both domestic related and general risk accuracy for the DVSI-2 and Prescreener. However, the more skewed distribution of DVSI-2 scores toward more frequent low scores compared to the normally distributed Prescreener results in risk classification that is more efficient in elimination of false positive errors for the DVSI-2. The proposed revision to content, scoring, and risk classification of the DVSI-2 is summarized in Appendix D.

Discussion

The DVSI is a specialized risk assessment tool designed to measure the risk for future intimate partner violence (Williams, 2004). The primary purpose of this study was to validate the DVSI for prediction of domestic violence related recidivism. A broader criteria of any person conviction within the recidivism period was used as an outcome variable, with the recognition that this may capture some recidivism offenses that are not related to domestic violence. This broader criterion is like that used in the most recent previous validation of the DVSI within DOCCR (Nonemaker, 2010). With a robust sample of assessments over a five (5) year period, results indicate that the DVSI is a valid and accurate predictor of domestic related recidivism. Using AUC analysis as evidence of validity, values ranged from .686 to .702, with greater predictive accuracy as time from assessment increased, indicating good accuracy for domestic related risk classification.

With the establishment of validity and accuracy across the full range of scores, the applied use of the DVSI still is only as good as its two-level risk classification. For a sample with a one-year person recidivism rate of thirteen percent (13%), sixty-four percent (64%) were classified as high risk. Misclassifications within the high-risk category (percentage of non-recidivists who were classified as high risk) was also high (61%) compared to misclassification within the low risk category (14%). Finally, as a group, those labeled as high risk for domestic related recidivism had a rather low rate of person recidivism (18%). A domestic violence offense is one that carries public safety concerns, especially for victims. Emphasis on reduction of the low risk misclassification (percent of recidivisms who are classified as low risk) is appropriate with this type of offense. Even with such an emphasis, the risk level distribution and misclassification errors for the DVSI risk classification lacks reasonable balance.

Item analysis also pointed to problems with the content of the DVSI. Two items, Weapon Used and Child Present, were not contributing to risk prediction while a third, Separation from Victim, was very weakly related. An investigation of gender and racial equity determined that these items were consistently scored higher for Blacks compared to Whites, introducing racial bias into DVSI measurement. Within the field of domestic violence prevention, these are all commonly accepted as risk factors for domestic violence, with good reason. A child witnessing domestic violence has been associated with more widespread family violence and contributes to the continuation of the cycle of domestic violence across generations (Huecker & Smock, 2020). An abuser simply having access to a firearm leads to more serious assaults and increases the likelihood of lethality (Zeoli, 2017). It has been well documented that the most dangerous time for a victim of domestic abuse is when they attempt to leave their abuser (Campbell et al, 2003). There is no doubt that these factors are critical risks for more serious domestic assault when present and that all possible measures should be taken to ensure the safety of victims facing these risks. The creation of secure shelters that protect abuse victims who leave the abusive situation are essential. State laws that have limited access to firearms for those convicted of domestic assault have resulted in reduced homicide rates (Zeoli, 2010). Whether these factors are predictive of future recidivism is a different question that could have a different answer. For instance, one study found that use of a weapon during a domestic assault increased the severity of the violence but did not increase the risk or severity of subsequent recidivism (Folkes, Hilton, & Harris, 2013). Based upon the results found in this study, it is clear that, given the sample assessed, the available resources for scoring, and the criteria used for scoring, these items are acting as proxies for race and should be eliminated from the DVSI scale. With this strong evidence for the need to modify the DVSI with the three racially biased items removed from the scale, the characteristics of this revised scale, labeled the DVSI-2, were explored.

Though any revision to an assessment requires follow up validation with an independent sample, the exploration of the performance of the DVSI-2 with this sample yielded very positive results. The DVSI-2 retained accuracy in risk prediction compared to the DVSI for the full sample, for gender subgroups, and for racial subgroups. While AUC values obtained were consistently higher for the DVSI-2 compared to the DVSI, the differences were not statistically significant. The results make sense, since the items eliminated from the scale were not contributing to risk prediction and the elimination of the systematic bias that they introduced result in a consistently slight though statistically insignificant improvement in performance. The development of the DVSI-2 required completion of a cut-point analysis to identify optimal decision points for risk classification. The distribution of scores, pattern of outcomes across scores, and potential error classification percentages pointed to a three level risk classification with decision cut points that balanced false positive and false negative errors, created maximum differentiation between risk levels, and comprised appropriate recidivism rates within risk categories.

DOCCR is an equity-focused organization. For risk assessments, this translates into the requirement that risk tools provide not only valid and accurate measurement of risk, but also strive for fair risk prediction across gender and racial lines. The DVSI-2, like the DVSI, is significantly more accurate in prediction of person recidivism for females (AUC = .772) compared to males (AUC = .674), though all values indicate good to excellent accuracy. Females with the same score as males have lower recidivism rates compared to males, though this difference decreases with increased scores. There are other differences across gender that are not issues of tool fairness. The base rate of one-year person recidivism for males (14%) is more than twice that of females (6%) while the distribution of scores for females is more highly skewed with more frequent low scores. These differences in combination with differences in measurement make risk classification of females very problematic. With such a low domestic related recidivism rate of all females in this sample, females as a group could be considered a low-risk group. A question worthy for discussion is whether there is a need for specialized domestic risk assessment with females. Considering the strong predictive power of the DVSI-2 and the clear differentiation of the eight percent (8%) of females classified as high-risk from low- and moderate-risk classifications, another option would be separate cut-off criteria for males versus females. While the three-level risk classification appears appropriate for males, equitable gender classification for risk of domestic related recidivism for females could be achieved by combining the low and moderate risk levels into a low risk category. This merged low classification forms a group of females with one-year person recidivism rates (4%) comparable to low risk males (8%) and high-risk female rates (26%) comparable to high-risk males (24%).

For racial subgroups, the DVSI was found to be a valid tool for domestic related risk measurement for all major racial groups. Validity is provisional for American Indians, where AUC confidence limits stretched below the criteria for validity. There were gains in racial equity with the DVSI-2, with reduced differences in accuracy and measurement when comparing Blacks to Whites, though differences still exist. Measurement of risk is more accuracy for Whites compared to Blacks, not only when considering the total score but also for every item on the DVSI-2 scale. This suggests that differences in accuracy are not tied to specific risk item content. The racial inequities in every part of our culture are well documented both historically and currently, including education, employment, health care, and the justice system. Blacks face challenges and barriers not experienced by Whites. The path to success, as with risk prediction, is more straightforward for Whites. With the base recidivism rate differences across racial groups, the goals of accuracy and racial equity must be balanced. Though there are racial measurement differences, the proposed three risk classification of the DVSI-2 results in equity of one-year recidivism rates within risk categories, though rates for three-year domestic related recidivism are comparatively higher for low- and moderate-risk Blacks compared to Whites. There is more work

to be done to solve the problems of disparity in risk assessment and within the wider criminal justice system. DOCCR is committed to continuing that work.

One final result of importance is a difference in accuracy in predicting domestic related recidivism across assessment units. DVSI-2 assessments completed within the Felony Investigations unit (AUC = .610), as with the DVSI, were less accurate in predicting one-year person recidivism compared to those completed within Misdemeanor Investigations (AUC = .714). The reduction in accuracy within Felony Investigations may be based upon differences in the sample characteristics. Those assessed in Felony Investigations have a higher percentage of males and blacks, subgroups with comparatively lower predictive accuracy. Differences could also be based in the differences in the intake offenses, in that as the name implies intake offenses are more likely to be felonies and convictions for domestic assaults, compared to the Misdemeanor Investigations sample where the majority are misdemeanors and conduct offenses. These more serious offenders may be a more homogenous group with regard to risk factors, making the task of distinguishing between them intrinsically harder. Being assigned to Felony Investigations may, in effect, actually act as a risk screen so that there is less gain from further screener. Whatever the source of the drop in DVSI accuracy, these results indicate that the DVSI-2 is not providing the discrimination of risk for these offenders compared to the Misdemeanor Unit. A more extensive assessment may be required for risk classification with this group.

Primarily within Misdemeanor Investigations, those with domestic related intake offenses receive two risk screens, the DVSI and the Prescreener. The Prescreener is a risk screen for general recidivism and is administered to the general probation population. Though not relevant to the question of the validity of the DVSI, a comparison of the performance of these two scales provides insight into the benefits of administering both screening instruments. Given the positive performance of the DVSI-2, a comparative analysis of the Prescreener and the DVSI-2 was carried out, comparing prediction of both domestic related and general recidivism.

For those who were administered the two screens on the same day, comparative results indicate that the Prescreener is a valid screen for predicting one-year domestic related recidivism. AUC values were not significantly difference for the Prescreener (AUC = .709) and the DVSI-2 (AUC = .726). This was true for a three-year recidivism period as well (DVSI-2 AUC =.710, Prescreener AUC =.707). Beyond accuracy over the range of scores for the tools, there are differences. The distribution of scores for the DVSI-2 is skewed with more frequent low scores while the Prescreener is normally distributed. This results in different distributions for risk classification. For domestic related risk, the DVSI-2 classifies sixty four percent (64%) of the sample as low-risk in contrast to forty three percent (43%) for the Prescreener. Yet there is only a slight increase in the domestic related recidivism rate for DVSI-2 low-risk classification compared to those identified as low-risk by the Prescreener. This indicates that the DVSI-2 has greater specificity, the accurate identification of those who will not recidivate. The same situation occurs at the high-risk level where, though recidivism rates are similar for the two tools, the DVSI-2 classifies only thirteen percent (13%) compared to a Prescreener classification of twenty seven percent (27%) as high-risk. For general risk assessment this same pattern holds true though the general recidivism rate within risk categories are rather high for the DVSI-2, indicating the need to adjust cut points downward for DVSI-2 general risk classification.

Comparisons of gender subgroup performance of the DVSI-2 and Prescreener find them to be valid measures of domestic related recidivism and equally accurate in predictive power. The most recent validation of the Prescreener showed it to be a gender-neutral tool for general recidivism risk. With this sample of domestic related offenders for prediction of domestic related risk, regression analysis showed that the Prescreener did

display a difference in intercept for males and females, meaning that females had lower recidivism at each score compared to males. Recall that the DVSI-2 shows differences in both intercept and slope. Rates for females tend to be lower than males at lower scores but converge with those of males at higher score levels. This difference in measurement when comparing these tools explains the difficulties with risk classification displayed by each. The Prescreener displays gender equity problems across the full range of scores and therefore within each risk category. The DVSI-2 displays gender equity in one-year domestic related recidivism rates within the high-risk category where the best fit predictive lines converge (48% for females and 49% for males). If the DVSI-2 low- and moderate-risk categories were merge into a designation of low risk for females, domestic related recidivism rate for this category (14%) would be comparable to low-risk males (17%) as well.

The Prescreener and DVSI-2 are also similar in measurement of domestic related risk when comparing performance across racial lines. Both are valid and accurate predictors of domestic related recidivism. Both are similar in that they display differences in slope and intercept measurement when comparing Blacks and Whites. Both distinguish risk levels well for Blacks and Whites, though the DVSI-2 assigns a greater percentage of the sample to lower risk categories. Due to the skewed distribution of scores for the DVSI-2, it displays greater specificity in retaining non-recidivists within lower risk categories compared to the Prescreener. This reduces the disproportionality of high-risk assignment of Blacks compared to Whites.

When comparing the tools across racial groups for general risk prediction, performance is again very similar in terms of validity, accuracy, and fairness of measurement. Both show differences in intercept for Blacks compared to Whites, with Blacks consistently having higher recidivism rates across the range of scores for both tools. Both distinguish risk levels well, with the main difference being the distribution of scores. The DVSI-2 assigns a greater percentage of offenders to lower risk classifications, displaying greater specificity. While recidivism rates are higher within risk categories for the DVSI-2, the lowering of cut points for general risk classification leads to comparable rates within categories.

The comparative analysis of the DVSI-2 and Prescreener suggests that using both tools as risk screens for this sample group of domestic related offenders is a duplication of service. Both are equally valid for both domestic related and general risk prediction, with similar comparative measurement across gender and racial subgroups. The DVSI-2 displays some advantages in risk classification when adopting the proposed three category risk classification, with greater specificity in retaining non-recidivists within lower risk categories, though recidivism rates are slightly elevated within risk categories compared to the Prescreener. This reduces disproportionality of Blacks assigned to high risk classification and provides for meaningful classification of risk for female domestic related offenders. Domestic violence is a crime that has great public safety issues, especially regarding the safety of victims of this crime. Close attention to accurate risk measurement for domestic violence is warranted. With no change in current practices, the DVSI-2 is a specialize risk tool that serves that function well while providing accurate measurement of general recidivism.

This study had the primary goal of validation of the DVSI. While the DVSI was found to be valid and accurate, item analysis lead to a revision of the tool. This revised tool appears to retain accuracy, improve gender/racial equity, and has advantages in risk classification. The DVSI-2 and Prescreener are both valid measures of domestic related and general risk to reoffend. Administering both tools represents a duplication of service. The DVSI-2 displays greater comparative specificity, retaining non-recidivists within low-risk categories and is recommended for use with this group of offenders. The validity and accuracy of the DVSI-2 with an independent sample is necessary to confirm these results.

Recommendations

- A revision of the DVSI (DVSI-2) excluding Q7 (Weapon Used), Q8 (Child Present), and Q10 (Separated from Victim) to address racial bias is recommended. This presumes no change in the criteria for administering a domestic violence screen and the criteria for scoring those items.

- Based upon cut point analysis of the DVSI-2, a three-category risk classification is recommended for domestic-related risk classification of males.

- A merge of the proposed low and moderate categories into a low risk category for females provides gender equitable domestic related risk classification. This two-category risk classification is recommended when determining risk for domestic related recidivism of females.

- In current use within Misdemeanor Investigations, the administering of the DVSI and Prescreener screening tools represents a duplication of service and should be discontinued. The screen that should be used is a business decision. Both tools are valid and accurate screens for both domestic related and general recidivism. The DVSI-2 provides greater benefit for risk classification and is recommended on that basis.

- For DVSI-2 classification of general risk to reoffend among domestic related offenders, lower decision points from those used for classification of domestic related recidivism are recommended.

- If a revision of the DVSI is implemented, a follow up validation of the DVSI-2 with an independent sample is necessary to confirm validity and accuracy.

References

2018 Homicide Report Relationship Abuse in Minnesota. (2018). Violence Free Minnesota. Retrieved from www.violencefreeminnesota.org.

Black, M.C., Basile, K.C., Breiding, M.J., Smith, S.G., Walters, M.L., Merrick, M.T., Chen, J., & Stevens, M.R. (2011). The National Intimate Partner and Sexual Violence Survey (NISVS): 2010 Summary Report. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/violenceprevention/pdf/NISVS_Report2010-a.pdf

Breiding, M. J., Chen J., & Black, M. C. (2014). *Intimate partner violence in the united states — 2010*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Campbell, J, Webster, D. Koziol-McLain, J. Block C. Campbell D, et al. (2003) *Risk Factors for Femicide in Abusive Relationships: Results from a Multisite Case Control Study* American Journal of Public, Vol 93(7) pp 1089-1098. Retrieved from https://ajph.aphapublications.org/doi/pdfplus/10.2105/AJPH.93.7.1089

Catalano, S. *Intimate partner violence, 1993-2010*. (2019, September 29). Bureau of Justice Statistics. Retrieved from https://www.bjs.gov/content/pub/pdf/ipv9310.pdf

Cooper, A., & Smith, E. L. (2011). *Homicide trends in the United States, 1980–2008*. Washington, D.C.: Bureau of Justice Statistics. NCJ 236018.

DeLong, E R., DeLong, D. M, & Clarke-Pearson, D L. (1988, September). *Comparing the areas under two or more correlated receiver operating characteristic curves: a nonparametric approach*. Biometrics, Vol. 44, No. 3, 837-845.

Desmariais, S. & Singh, J. (2013, March). *Risk Assessment Instruments Validated and Implemented in Correctional Settings in the United States: An Empirical Guide.* https://pdfs.semanticscholar.org/a1fd/e39c389fa6ba3e7dd4f03c5e3cd1eed977cb.pdf

Domestic Violence Screening Instrument (n.d.). Retrieved from http://psychology.iresearchnet.com/forensic-psychology/violence-risk-assessment/domestic-violence-screening-instrument/

Folkes, S. E., Hilton, N. Z. & Harris, G. T.. (2013). *Weapon use increases the severity of domestic violence but neither weapon use nor firearm access increases the risk or severity of recidivism.* Interpersonal Violence, April, 1143-1156.

Get the facts and figures. (n.d.). National Domestic Violence Hotline. Retrieved from https://www.thehotline.org/resources/statistics/

Huecker, M.R. & Smock, W. (2020, October). *Domestic Violence.* StatPearls Publishing LLC. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK499891/.

Langan, P. & Levin, D. (2002, June). *Special report: Recidivism of prisoners released from prison in1994.* Washington, D.C.: Bureau of Justice Statistics. Retrieved from http://www.ojp.usdoj.gov/bjs.

Nonemaker, D. (2010, December). *Validation of Two Domestic Violence Risk Instruments: Domestic Violence Screening Instrument (DVSI) & Spousal Abuse Risk Assessment (SARA).*

Hennepin County Department of Community Corrections and Rehabilitations. Retrieved from http://www.ncdsv.org/HCDCCR_DOCCR-Validation-of-Two-DV-Risk-Instruments_1-2011.pdf.

Nonemaker, D. (2019, January). *Validation of the Hennepin County Prescreener for Use in Initial Risk Assessment.* Hennepin County Department of Community Corrections and Rehabilitations.

Osburn, H. G. (2000, September). *Coefficient Alpha and Related Internal Consistency Reliability Coefficients.* Psychological Methods, 5(3), 343-355 Retrieved from https://www.cdc.gov/violenceprevention/pdf/NISVS-StateReportBook.pdf

Preventing intimate partner violence. (2019, February 26). Atlanta, GA: Centers for Disease Control. Retrieved from https://www.cdc.gov/violenceprevention/intimatepartnerviolence/fastfact.html

Report: Hospital-treated intimate partner violence in Minnesota. (March 2019). Minnesota Department of Health. Retrieved from www.health.state.mn.us/injury.

Risk and protective factors for perpetration. (2019, October 8). Atlanta, GA: Centers for Disease Control. Retrieved from https://www.cdc.gov/violenceprevention/intimatepartnerviolence/riskprotectivefactors.html

Skilling, N. (2002). *Validation study for the use of the Domestic Violence Screening Instrument (DVSI) and the Spousal Assault Risk Assessment (SARA) for evaluating probation clients.* Minneapolis, MN: Research and Systems Technology, Department of Community Corrections, Hennepin County.

Smith, S.G., Chen, J., Basile, K.C., Gilbert, L.K., Merrick, M.T., Patel, N., Walling, M., & Jain, A. (2017). *The National Intimate Partner and Sexual Violence Survey (NISVS): 2010-2012 State Report.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/violenceprevention/pdf/NISVS-StateReportBook.pdf

Smith, S.G., Zhang, X., Basile, K.C., Merrick, M.T., Wang, J., Kresnow, M., Chen, J. (2018). *The National Intimate Partner and Sexual Violence Survey (NISVS): 2015 Data Brief – Updated Release.* Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/violenceprevention/pdf/2015data-brief508.pdf

Taub, A. (2020, April 6). A new covid-19 crisis: Domestic abuse rises worldwide. New York: NY. *The New York Times*. Retrieved from http://www.nytimes.com.

Tolan, C. (2020, April 4). *Some cities see jumps in domestic violence during the pandemic.* CNN. Retrieved from https://www.cnn.com/2020/04/04/us/domestic-violence-coronavirus-calls-cases-increase-invs/index.

Violence data brief: Intimate partner violence. (November 2002). Minnesota Department of Health. Retrieved from www.health.state.mn.us

Williams, K. R., & Houghton, A. B. (2004). *Assessing the risk of domestic violence re-offending: A validation study*. Law and Human Behavior, *28*, 437-455. https://stopyouthviolence.ucr.edu/pubs_by_topic/2.Assessing%20the%20Risk.pdf

Zeoli, A.M. (2010) *Effects of domestic violence policies, alcohol taxes and police staffing levels on intimate partner homicide in large US cities.* Injury Prevention, 16(2), 90-95. retrieved from https://vaw.msu.edu/wp-content/uploads/2018/06/nonfatal-gun-dv-zeoli-.pdf

Zeoli, A.M. (2017) N*on-fatal firearms uses in domestic violence.* The Battered Women's Justice Project, Minneapolis, MN, retrieved from https://vaw.msu.edu/wp-content/uploads/2018/06/nonfatal-gun-dv-zeoli-.pdf

Appendix A: DVSI Scale and Item Intercorrelations

Table A1. DVSI Item Description and Average Score by Gender

DVSI Risk Factors	Scoring Range	Average Score		
		Female	Male	Total
Prior convictions. Except domestic violence related offenses.	0-2	0.70	1.09	1.03
Prior arrests for assault, harassment or menacing.	0-2	0.76	1.16	1.10
Prior domestic violence treatment.	0-2	0.20	0.40	0.37
Prior drug or alcohol treatment.	0-2	0.53	0.65	0.63
History of orders for protection.	0-3	0.80	1.23	1.17
History of violations of orders for protection.	0-3	0.41	0.66	0.62
Evidence of object used as weapon in commission of crime.	0-3	0.50	0.33	0.36
Children present during the domestic violence incident.	0-3	0.83	0.91	0.90
Current employment status.	0-2	0.87	0.87	0.87
Victim separated from offender within last six months.	0-3	1.01	1.20	1.17
Restraining order at time of offense.	0-3	0.37	0.62	0.58
Community supervision at the time of offense.	0-3	0.56	0.84	0.80

Table A2. DVSI Interitem Correlations

DVSI Item Intercorrelations

Risk Factors	Convictions	Arrests	DV Treatment	Drug/Alcohol Treatment	Past Order for Protection	Violations of OFP	Weapon Used	Child Present	Employment	Recent Separated	Current Restraining Order	Community Supervision
Convictions	1	.524**	.272**	.376**	.383**	.229**	.118**	-0.007	.209**	.119**	.138**	.276**
Arrests	.524**	1	.430**	.306**	.545**	.351**	.121**	.033*	.229**	.139**	.219**	.274**
DV Treatment	.272**	.430**	1	.257**	.410**	.229**	.097**	.079**	.084**	.036*	.133**	.152**
Drug/Alcohol Treatment	.376**	.306**	.257**	1	.266**	.147**	.084**	-.066**	.195**	0.008	.086**	.218**
Past Order for Protection	.383**	.545**	.410**	.266**	1	.478**	.081**	.048**	.179**	.180**	.336**	.234**
Violation of OFP	.229**	.351**	.229**	.147**	.478**	1	0.008	-0.018	.152**	.163**	.762**	.245**
Weapon Used	.118**	.121**	.097**	.084**	.081**	0.008	1	.080**	.089**	0.027	-.052**	0.015
Child Present	-0.007	.033*	.079**	-.066**	.048**	-0.018	.080**	1	-.073**	-0.029	-.045**	-0.019
Employment	.209**	.229**	.084**	.195**	.179**	.152**	.089**	-.073**	1	.067**	.096**	.144**
Recent Separation	.119**	.139**	.036*	0.008	.180**	.163**	0.027	-0.029	.067**	1	.149**	.064**
Current Restraining Order	.138**	.219**	.133**	.086**	.336**	.762**	-.052**	-.045**	.096**	.149**	1	.225**
Community Supervision	.276**	.274**	.152**	.218**	.234**	.245**	0.015	-0.019	.144**	.064**	.225**	1
Total Score	.592**	.688**	.488**	.453**	.720**	.670**	.231**	.174**	.398**	.334**	.565**	.529**

*Significant at the .05 level (2-tailed)   **Significant at the .01 level (2-tailed)

Appendix B: Summary of Sample Variables

Table B1. Type of Offense

Offense Category	Definition
Domestic Assault	Threat, violence, abuse, or willful neglect toward someone in a family or intimate relationship. (Ex. Domestic Assault, Violation of Order for Protection)
Person (Non-Domestic)	Crimes involving willful attempt or threat to injure someone else, excluding domestic assault. (Ex. Homicide, Assault, Kidnapping, Robbery, Sexual Assault)
Societal Conduct	Crimes involving disruption of public peace or order. (Ex. Disorderly Conduct, Escape, Rioting, Public Intoxication, Loitering,)
Other*	All other crimes, including Drugs, DWI, Property, Prostitution, Traffic, Weapons, and Status offenses.
*Offense types with a frequency of less than five percent (5%) within the validation sample are collapsed into a category of 'Other' for all analysis.	

Table B2. Gender and Racial Distribution

Race	Female		Male		Total	
	N	%	N	%	N	%
American Indian	34	24.6%	104	75.4%	138	3.1%
Asian	16	11.3%	126	88.7%	142	3.2%
Black	267	12.4%	1891	87.6%	2158	48.3%
White	304	16.0%	1593	84.0%	1897	42.4%
Unknown/Other	16	11.7%	121	88.3%	137	3.1%
Total	637	14.2%	3835	85.8%	4472	100%

Table B3. Sample Age Range Distribution

Age Range	N	%
Under 21	273	6.1%
21 thru 30	1745	39.0%
31 thru 40	1238	27.7%
41 thru 50	760	17.0%
Over 50	456	10.2%

Table B4. Intake Offense Severity by Gender

Offense Severity	Female		Male		Total	
	N	%	N	%	N	%
Felony	66	10.4%	748	19.5%	814	18.2%
Gross Misdemeanor	47	7.4%	393	10.2%	440	9.8%
Misdemeanor	523	82.1%	2693	70.2%	3216	71.9%

Table B5. Intake Offense Severity by Race

Offense Severity	American Indian		Asian		Black		White	
	N	%	N	%	N	%	N	%
Felony	35	25.4%	21	14.8%	496	23.1%	251	13.2%
Gross Misdemeanor	12	8.7%	3	2.1%	262	12.1%	154	8.1%
Misdemeanor	91	65.9%	118	83.1%	1399	64.8%	1491	78.6%

Table B6. Intake Offense Type by Gender

Offense Type	Female		Male		Total	
	N	%	N	%	N	%
Domestic Related	208	32.7%	1725	45.0%	1933	43.2%
Person (Non-Domestic)	84	13.2%	425	11.1%	509	11.4%
Conduct	327	51.3%	1558	40.6%	1885	42.2%
Other*	18	2.8%	127	3.3%	145	3.2%
Offense Types with less than five percent (5%) are collapsed into Other Category.						

Table B7. Intake Offense Type by Race

Offense Severity	American Indian		Asian		Black		White	
	N	%	N	%	N	%	N	%
Domestic Related	75	54.3%	48	33.8%	1062	49.2%	692	36.5%
Person (Non-Domestic)	19	13.8%	20	14.1%	252	11.7%	210	11.1%
Conduct	42	30.4%	69	48.6%	768	35.6%	937	49.4%
Other*	2	1.4%	5	3.5%	76	3.5%	58	3.1%
Offense Types with less than five percent (5%) are collapsed into Other Category								

Table B8. Person Recidivism Rate by Recidivism Time Frame and Gender/Racial Subgroups

Time Frame	Gender Subgroups		Racial Subgroups				Total Sample
	Female	Male	American Indian	Asian	Black	White	
One-year (N=4472)	5.7%	14.3%	18.8%	7.0%	16.1%	10.3%	13.1%
Two-year (N=3389)	7.0%	19.4%	26.8%	10.9%	22.3%	13.0%	17.7%
Three-year (N=2264)	9.3%	24.3%	29.0%	13.1%	29.4%	14.7%	22.3%

Table B9. Person Recidivism Rate by Recidivism Time Frame and Intake Offense Type

Intake Offense Type	Domestic	Person (Non-Domestic)	Conduct	Other
One-year (N=4472)	18.8%	12.8%	7.7%	8.3%
Two-year (N=3389)	25.0%	17.7%	10.3%	16.3%
Three-year (N=2264)	29.7%	21.9%	14.1%	22.2%
Offense Types with less than five percent (5%) are collapsed into Other Category.				

Table B10. Average DVSI and DVSI-2 Total Score by Gender and Racial Designation

Race	Female		Male		Total	
	DVSI	DVSI-2	DVSI	DVSI-2	DVSI	DVSI-2
American Indian	10.38	8.00	12.85	10.55	12.24	9.92
Asian	4.31	2.31	8.19	5.44	7.75	5.08
Black	7.93	5.24	11.26	8.59	10.84	8.18
White	7.17	5.11	8.55	6.39	8.33	6.18
Unknown/Other	5.56	3.19	6.95	4.69	6.79	4.51
Total	7.55	5.20	9.94	7.50	9.60	7.17

Table B11. Average DVSI and DVSI-2 Total Score by Intake Offense Type and Gender

Offense Type	Female		Male		Total	
	DVSI	DVSI-2	DVSI	DVSI-2	DVSI	DVSI-2
Domestic Related	9.11	5.69	12.07	9.62	11.75	9.34
Person (Non-Domestic)	9.61	6.63	11.28	8.48	11.00	8.17
Conduct	6.01	3.73	7.28	4.94	7.06	4.73
Other*	7.89	4.94	9.18	6.80	9.02	6.57
*Offense Types with less than five percent (5%) are collapsed into Other Category						

Table B12. Average DVSI and DVSI-2 Total Score by Intake Offense Type and Race

Offense Severity	American Indian		Asian		Black		White	
	DVSI	DVSI-2	DVSI	DVSI-2	DVSI	DVSI-2	DVSI	DVSI-2
Domestic Related	13.44	11.04	9.77	7.27	12.71	10.06	10.62	8.54
Person (Non-Domestic)	12.47	10.58	9.70	5.85	11.96	8.80	9.92	7.51
Conduct	10.14	7.93	5.59	3.16	8.00	5.47	6.31	4.15
Other*	9.00	3.50	10.40	7.60	9.84	7.03	7.98	6.10

Appendix C: Regression Analysis

Table C1. Logistic Regression Models of DVSI and Unit for One-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI Total Score	0.104**	-	0.104**	0.124**
Unit (Felony Investigations)	-	0.392**	0.059	0.929**
DVSI Total Score * Unit	-	-	-	-0.066**
(Constant)	-3.025**	-2.009**	-3.051**	-3.288**
Variance Explained	8%	1%	8%	9%
Model Chi Square	195.11**	15.146**	192.89**	184.24**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C2. Logistic Regression Models of DVSI and Gender for One-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI Total Score	0.104**	-	0.099**	0.094**
Gender (Female)	-	-1.028**	-0.795**	-1.740**
DVSI Total Score * Gender	-	-	-	0.084**
(Constant)	-3.025**	-1.787**	-2.896**	-2.829**
Variance Explained	8%	2%	9%	9%
Model Chi Square	195.11**	43.38**	220.51**	227.99**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C3. Logistic Regression Models of DVSI and Race for One-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI Total Score	0.104**	-	0.096**	0.0.075**
Race (White)	-	-0.509**	-0.282*	-0.900**
DVSI Total Score * Race	-	-	-	0.052**
(Constant)	-3.025**	-1.652**	-2.795**	-2.535**
Variance Explained	8%	1%	8%	8%
Model Chi Square	195.11**	29.18**	177.484**	187.89**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C4. Logistic Regression Models of DVSI-2 and Gender for One-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.115**	-	0.111**	0.104**
Gender (Female)	-	-1.028**	-0.779**	-1.557**
DVSI-2 Total Score * Gender	-	-	-	0.089**
(Constant)	-2.862**	-1.787**	-2.743**	-2.683**
Variance Explained	8%	2%	9%	10%
Model Chi Square	207.58**	43.38**	229.846**	237.47**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C5. Logistic Regression Models of DVSI-2 and Gender for Three-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.128**	-	0.123**	0.123**
Gender (Female)	-	-1.139**	-0.901**	-0.918*
DVSI-2 Total Score * Gender	-	-	-	0.002
(Constant)	-2.316**	-1.135**	-2.184**	-2.183**
Variance Explained	8%	3%	14%	14%
Model Chi Square	193.06**	41.04**	215.68**	215.68**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C6. Logistic Regression Models of DVSI-2 and Race for One-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.115**	-	0.108**	0.0.087**
Race (White)	-	-0.509**	-0.314*	-0.802**
DVSI-2 Total Score * Race	-	-	-	0.052**
(Constant)	-2.862**	-1.652**	-2.645**	-2.434**
Variance Explained	8%	1%	8%	9%
Model Chi Square	207.58**	29.18**	190.127**	199.02**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C7. Logistic Regression Models of DVSI-2 and Race for Three-Year Person Risk Prediction

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.128**	-	0.118**	0.0.097**
Race (White)	-	-0.879**	-0.642*	-1.169**
DVSI-2 Total Score * Race	-	-	-	0.059**
(Constant)	-2.316**	-0.877**	-1.964**	-1.756**
Variance Explained	8%	5%	14%	15%
Model Chi Square	193.06**	64.80**	205.95**	213.64**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C8. Logistic Regression Models of DVSI-2 and Gender for One-Year Person Risk – Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.147**	-	0.142**	0.132**
Gender (Female)	-	-1.051**	-0.798**	-1.970**
DVSI-2 Total Score * Gender	-	-	-	0.128**
(Constant)	-3.155**	-1.896**	-3.034**	-2.942**
Variance Explained	12%	1%	13%	13%
Model Chi Square	161.72**	25.42**	174.55**	182.72**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C9. Logistic Regression Models of Prescreener and Gender for One-Year Person Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
Prescreener Total Score	0.091**	-	0.088**	0.086**
Gender (Female)	-	-1.051**	-0.776**	-1.288*
Prescreener * Gender	-	-	-	0.028
(Constant)	-3.668**	-1.896**	-3.518**	-3.476**
Variance Explained	10%	1%	11%	11%
Model Chi Square	142.10**	25.42**	154.32**	155.14**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C10. Logistic Regression Models of DVSI-2 and Gender for One-Year General Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.134**	-	0.132**	0.127**
Gender (Female)	-	-0.586**	-0.352*	-0.604*
DVSI-2 * Gender	-	-	-	0.038
(Constant)	-2.055**	-1.021**	-1.988**	-1.954**
Variance Explained	12%	1%	13%	13%
Model Chi Square	222.90**	18.55**	228.783**	230.42**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C11. Logistic Regression Models of Prescreener and Gender for One-Year General Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
Prescreener Total Score	0.093**	-	0.091**	0.091**
Gender (Female)	-	-0.586**	-0.310*	-0.389
Prescreener * Gender	-	-	-	0.005
(Constant)	-2.707**	-1.021**	-2.634**	-2.624**
Variance Explained	14%	1%	14%	14%
Model Chi Square	252.364**	18.55**	256.88**	256.94**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C12. Logistic Regression Models of DVSI-2 and Race for One-Year Person Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.147**	-	0.136**	0.112**
Race (White)	-	-0620**	-0.400**	-0.920**
DVSI-2 Total Score * Race	-	-	-	0.058
(Constant)	-3.155**	-1.709**	-2.863**	-2.637**
Variance Explained	12%	1%	12%	12%
Model Chi Square	161.72**	22.92**	146.16**	151.52**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C13. Logistic Regression Models of Prescreener and Race for One-Year Person Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
Prescreener Total Score	0.091**	-	0.086**	0.073**
Race (White)	-	-0.620**	-0.244	-0.876**
Prescreener * Race	-	-	-	0.033
(Constant)	-3.668**	-1.709**	-3.428**	-3.160**
Variance Explained	10%	1%	5%	11%
Model Chi Square	142.10**	22.92**	128.46**	131.84**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C14. Logistic Regression Models of DVSI-2 and Race for One-Year General Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
DVSI-2 Total Score	0.134**	-	0.126**	0.113**
Race (White)	-	-0.647**	-0.457**	-0.687**
DVSI-2 Total Score * Race	-	-	-	0.030
(Constant)	-2.055**	-0.784**	-1.772**	-1.663**
Variance Explained	12%	3%	13%	13%
Model Chi Square	222.90**	44.79**	217.06**	219.35**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Table C15. Logistic Regression Models of Prescreener and Race for One-Year General Risk –
Dual Assessment Sample

Variables	Model 1	Model 2	Model 3	Model 4
Prescreener Total Score	0.093**	-	0.087**	0.077**
Race (White)	-	-0.647**	-0.294**	-0.766**
Prescreener * Race	-	-	-	0.026
(Constant)	-2.707**	-0.784**	-2.451**	-2.245**
Variance Explained	14%	3%	14%	14%
Model Chi Square	252.364**	44.79**	230.19**	233.88**
*Significant at the .05 level (2-tailed) **Significant at the .001 level (2-tailed)*				

Appendix D: DVSI-2 Scale and Risk Classification

Proposed DVSI-2 Risk Factors	Scoring Range
Prior convictions. Except domestic violence related offenses.	0-2
Prior arrests for assault, harassment or menacing.	0-2
Prior domestic violence treatment.	0-2
Prior drug or alcohol treatment.	0-2
History of orders for protection.	0-3
History of violations of orders for protection.	0-3
Current employment status.	0-2
Restraining order at time of offense.	0-3
Community supervision at the time of offense.	0-3
Total Score	0-22

Proposed DVSI-2 Domestic Related Risk Classification		Scoring Range
Female	Low	0-12
	High	13-22
Male	Low	0-7
	Moderate	8-12
	High	13-22

Proposed DVSI-2 General Risk Classification	Scoring Range
Low	0-4
Moderate	5-8
High	9-22