Hennepin County
Department of Community Corrections and Rehabilitation
Office of Policy, Planning and Evaluation

DOCCR Validation Study of the Research Institute on Addiction Self-Inventory (RIASI)

October, 2010

Introduction

In Minnesota, 32,756 motorists were arrested for driving while impaired (DWI) during 2009 and 41% of these violators had at least one prior DWI offense on record.[1] According to results of a profile of Hennepin County adults under supervision with the Hennepin County Department of Community Corrections and Rehabilitation (DOCCR) on December 31, 2009, 39% (N=9312) of the corrections population was on probation for a DWI offense.[2]

Repeat offenders pose a significant threat to public safety and reducing DWI recidivism is an important goal of DOCCR. The first step in achieving that goal is the identification of those DWI offenders who are at higher risk to reoffend by the use of a valid screening process, one that is predictive of subsequent DWI offenses. Human behavior is complex and future behavior cannot be perfectly predicted by any risk screening instrument. Psychometric research supporting an instrument's predictive validity can indicate whether it is a valuable tool for risk screening purposes. The intent of this research study is to determine the predictive validity of one assessment tool currently being piloted for DWI risk screening.

The Research Institute on Addiction Self-Inventory (RIASI) is a risk screening instrument designed for use with DWI offenders. Its purpose is to identify the need for more intense clinical evaluation for chemical dependency. It consists of 52 items that measure distal factors such as depression, loss of control, or social skills and proximal factors such as drinking behavior, alcohol beliefs, or family history, all of which have been associated with alcohol or drug problems.[3]

The RIASI has been shown to be a valid predictor of drug and alcohol problems.[4] A smaller Recidivism Subscale within the RIASI consists of 15 items identified as having some relationship to subsequent arrests and convictions for DWI offenses. Preliminary studies of this subscale indicated that it may be superior to the full 52 item scale in identifying individuals subsequently arrested for a DWI offense.[5]

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[1] 2009 Impaired Driving Facts. *http://www.dps.state.mn.us/ots/Laws_Legislation/impaired_driving.asp*

[2] 2009 Profile of Adults on Supervision. *Hennepin County Community Corrections and Rehabilitation/Reports and Publications*

[3] Nochajski, T. H. (2006). Training Manual for the Research Institute on Addictions Self Inventory (RIASI). *Research Institue on Addictions*; Buffalo, NY, USA, p. 3

[4] Shuggi, R, Mann, R. E., Flam Zalcman, R., Chipperfield, B. G. A., & Nochajski, R. Predictive validity of the RIASI: alcohol and drug use and problems six months following remedial program participation. *American Journal of Drug and Alcohol Abuse.* 2006, 32: 180-192.

[5] Nachajski, T. H., Walter, J. M., & Wieczorek, W. F. (1997). Identification of drinker-driver recidivists. In C. Mercier-Guyon (ed.), *Alcohol, drugs and traffic safety – T97*, pp. 797-802 CERMT: Annecy, France.

DOCCR began administering the RIASI in July of 2007 to offenders under supervision for a DWI offense or careless driving. A DWI offense is defined as a 4th degree through 1st degree DWI or refusal to submit to a chemical test (implied consent law), mainly codified in Minnesota Statues, chapter 169A.[6] A predictive validation study was designed to determine the usefulness of the RIASI for DWI risk assessment. It was also of interest to determine the usefulness of the Recidivism Subscale of the RIASI. A 15 item assessment tool, if equally predictive of risk, would have administrative and scoring advantages over the longer 52 item RIASI.

Currently in Hennepin County, two populations of DWI offenders receive the RIASI based on offense history. Those who have no previous DWI offenses and have a blood alcohol level (BAC) below .18 for their current offense are usually referred to a One Day DWI program. At the start of the program, the RIASI is administered. Later in the day, feedback regarding the score is given to offenders. Repeat offenders and those with higher BAC levels could have a court order for incarceration and are assigned to probation. Before seeing a probation officer, they complete the RIASI and their scores are included as one factor in an interview completed by the probation officer. They may then be referred to a variety of programs, such as Chemical Dependency Assessment, Level II Alcohol Education programming, Inpatient or Outpatient chemical dependency treatment, the Minnesota Driving With Care Program, and/or MADD Victim Impact programs.

Risk Levels were generated for two RIASI scales:

- Full Scale RIASI
- Recidivism Subscale

Though there is some overlap in program content, First Time DWI offenders are generally assigned to a different probation program setting than repeat offenders and the RIASI is administered in a different setting and time frame. It is important to determine whether the RIASI is an effective risk assessment instrument in both settings, Therefore, offense history was of particular importance in validating the RIASI risk score for first time DWI offenders versus repeat DWI offenders.

Methodology

Assessment scores were collected for a period of ten months, from July 2007 through April, 2008, to conduct a predictive validation study comparing RIASI scores to subsequent DWI offense convictions. Information regarding gender and age were also recorded. This sample of offenders was followed for a two year period subsequent to the RIASI assessment date.

Convictions occurring within two years of the date of their RIASI assessment for a DWI offense were collected from the Minnesota Court Information System (MNCIS), a statewide case management system. Convictions for which the offense date preceded the RIASI assessment date were not included as a new conviction. Those with at least one new subsequent conviction were given a Recidivism score of one (1). Those with no new DWI offense were scored zero (0).

Full Scale RIASI scores were grouped into Risk Levels of Low (0 to 9), Moderate (10 to 19), and High (20 or more). The Recidivism Subscale was grouped into Risk Levels of Low (0 to 3), Moderate (4 to 8), and High (9 or above). Offense History prior to the RIASI assessment was also collected to determine if their probation offense was their first impaired driving offense. Offenders were then classified as First Time or Repeat Offenders.

[6] https://www.revisor.mn.gov/statutes/?id=169a

Analysis was conducted using three statistical procedures. Nonparametric statistical procedures were chosen to analyze data, since the scores on the RIASI are skewed toward lower scores. The Kendall's Tau-B for correlation of ordinal data tested the relationship between Full Scale RIASI Risk Level (Low=1, Moderate=2, High=3) and Recidivism (Non-Recidivism=0, Recidivism=1). Similar tests were carried out for the relationship between the Recidivism Subscale Risk Level and Recidivism.

An Independent Samples Man-Whitney U Test was performed to determine significant differences in Full Scale RIASI Risk Levels comparing Recidivism groups, those who had a subsequent DWI conviction within two years versus those with no subsequent DWI conviction. Similar procedures were carried out for Recidivism Subscale Risk Levels. A Relative Operating Characteristic (ROC) curve compared the true positive rate (sensitivity) to the false postive rate (1-specificity) of the Full Scale RIASI and the Recidivism Subscale in predicting DWI recidivism. This provided a diagnostic benefits analysis of the RIASI in risk assessment and investigated selection of the optimal scoring criteria for risk classification.

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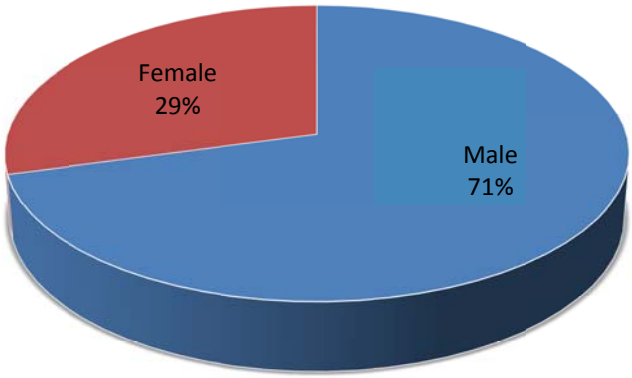
Demographics

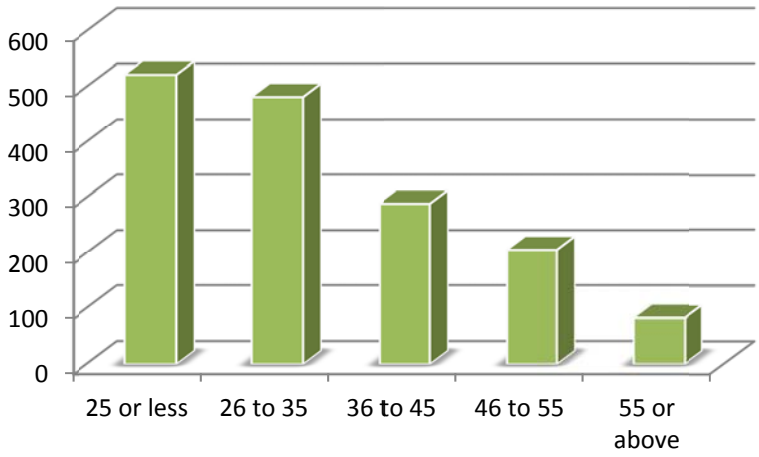
The total number of offenders completing the RIASI during the ten month collection period was 1758. Seventy one percent were male (N=1244) and twenty nine percent were female (N=514), as displayed in Figure 1.

Figure 1. Gender Distribution.



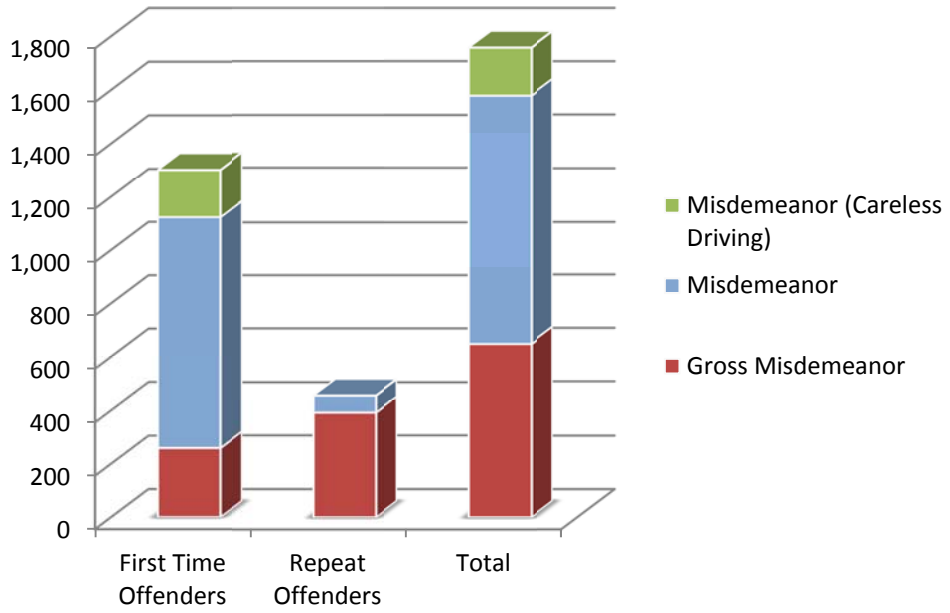
The average age of offenders at the time of assessment was 33, with ages ranging from 16 to 83. Figure 2 shows frequencies across five age ranges.

Figure 2. Age Range Distribution.



For the total sample of 1758, 74% (N=1302) were First Time DWI or Careless Driving Offenders and 26% (456) were Repeat Offenders. Level of offense for which offenders were under supervision are shown in Figure 3 for First Time Offenders, Repeat Offenders, and Total Sample. There was one felony level offense within the Repeat Offender group, not shown in Figure 3. Felony level DWI offenders are referred to Drug Court and a felony DWI caseload. With one exception, they are not included in this sample.

Figure 3. Offense Level by Offense History

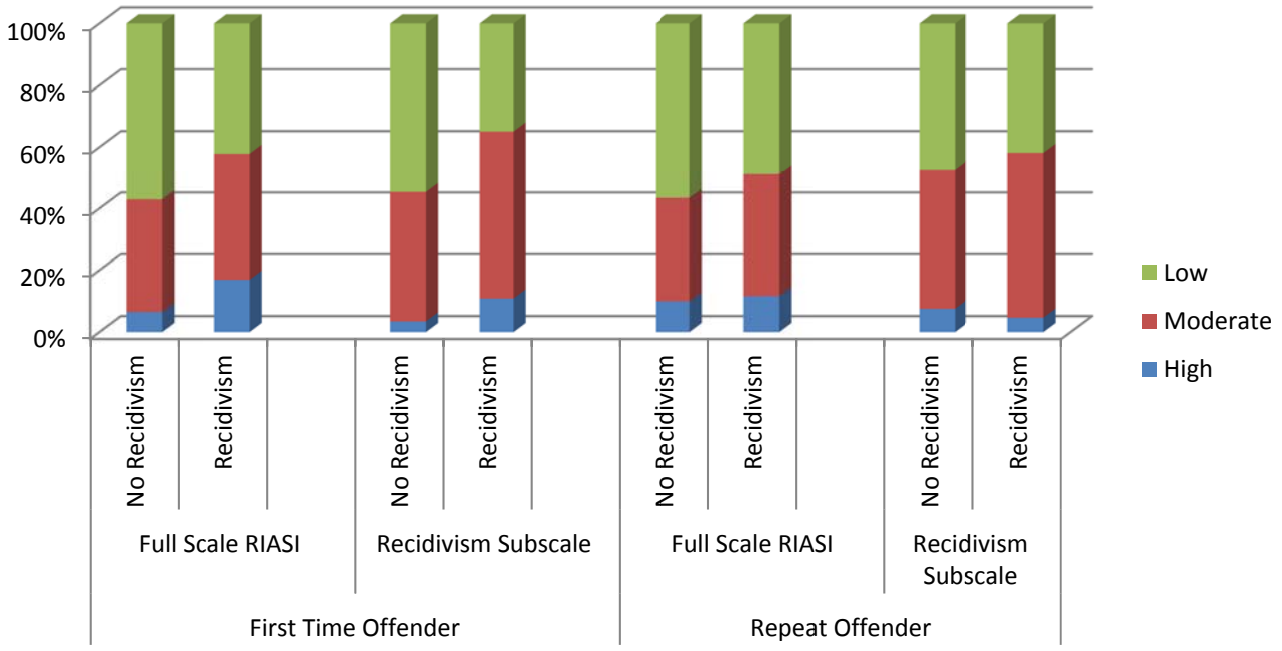


Validation

The relationship between Full Scale RIASI Risk Level and Recidivism was significant as shown by a Kendall's Tau-B Correlation of .073, (p<.001). When splitting the sample by Offense History, it was only for the First Time Offenders that a significant relationship existed (Kendall's Tau-B Correlation=.086, p<.001). For Repeat Offenders, a RIASI Risk Levels to Recidivism relationship was not present (Kendall's Tau-B Correlation=.042, p<.175).

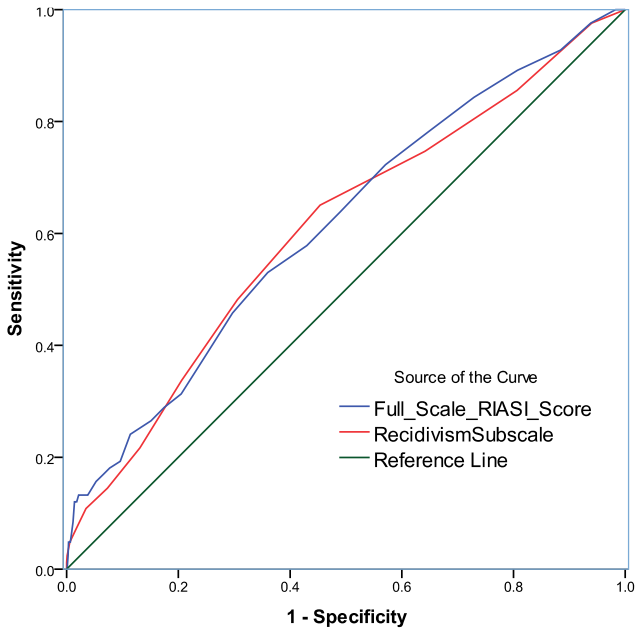
Similar results were obtained when correlating the Recidivism Subscale Risk Levels with Recidivism. Using a Kendall's Tau-B, the correlation was .083 (p<.001), indicating a significant relationship. With the sample split by Offense History, results varied by group. For First Time Offenders, the correlation coefficient was .106 (p<.001), indicating a significant relationship. For Repeat Offenders, no relationship was present (Kendall's Tau-B Correlation=.020, p<.334). The statistical summary of these results can be found in Appendix A.

An Independent Samples Man-Whitney U Test was performed to determine significant differences in RIASI Full Scale as well as Recidivism Subscale Risk Levels across Recidivism groups. RIASI Risk Levels were significantly higher for those who had a new offense. When splitting the sample by Offense History, the significant difference in RIASI Risk Levels across Recidivism groups resides only with First Time Offenders. For Repeat Offenders there was no difference in RIASI Risk Levels based upon Recidivism classification. Results were similar for both Full Scale and Subscale Risk Level scores. Figure 4 gives a visual depiction of these results, showing the percentage of Risk Levels by Recdivism across groups of First Time Offenders and Repeat Offenders. Both Full Scale and Ricidivism Subscale Risk Level percentages are shown.



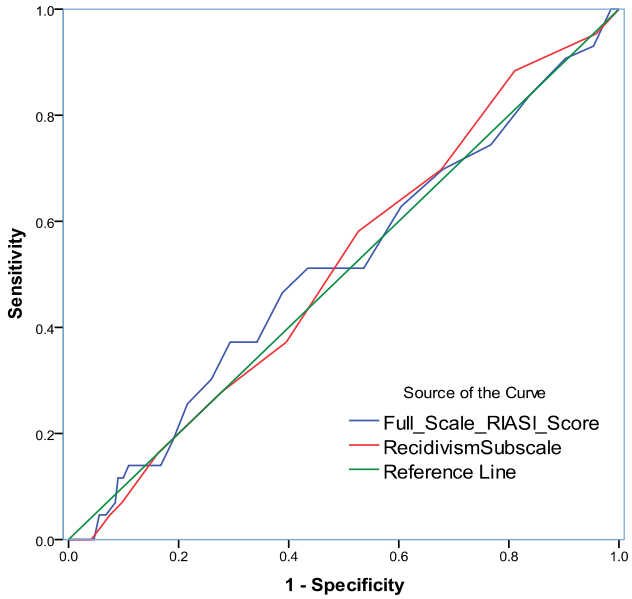
A ROC Curve is a useful graphical representation of the true positive (sensitivity) and false negative (1-specificity) classifications of recidivism for each possible cutoff score of the Full Scale and Subscale of the RIASI. Figure 5 displays the ROC Curve for First Time Offenders,. In interpreting area under the curve, .50 (green reference line) is the level of chance, so that areas greater than .5 (above the green reference line) indicate greater predictive power. Figure 6 shows the ROC Curve for Repeat Offenders. Refer to Appendix A for statistical summaries.

Figure 5. ROC Curve for First Time Offenders



For Repeat Offenders, RIASI scores were not significantly better than chance at predicting risk for reoffense.

Figure 6. ROC Curve for Repeat Offenders.



Risk Screening Cutoff Score Analysis

In exploring possible cutoff points for risk screening, the above results indicate that the RIASI has predictive value in risk assessment for the First Time Offender group only. In light of these results, the analysis of possible cutoff scores for screening purposes included only First Time Offenders at the time of RIASI administration.

Table 1 shows Risk Level frequency counts and percentages for First Time Offenders by Recidivism for the Full Scale RIASI and Recidivism Subscale.

Table 1. Risk Level Frequency and Percentage by Recidivism for First Time Offenders.

SCALE	RISK LEVEL	No Recidivism		Recidivism	
		N	%	N	%
Full Scale RIAS	Low	695	57%	35	42%
	Moderate	445	36%	34	41%
	High	79	7%	14	17%
Recidivism Subscale	Low	666	55%	29	35%
	Moderate	511	42%	45	54%
	High	42	3%	9	11%

For this validation study, two cutoffs were utilized to generate three risk levels. This may not be practical in application as a screening instrument where one cutoff score is needed to make programming decisions.

Table 2 displays the sensitivity and specificity of the Full Scale RIASI at each RIASI total score for First Time Offenders. Sensitivity is the probability that a high risk offender is correctly classified. Specificity is the probability that a low risk offender is correctly classified. The cutoff point that maximizes both sensitivity and specificity for the Full Scale RIASI is a score of 10, with sensitivity at 58% and specificity at 57%.

A cutoff score of 10 maximizes the RIASI's predictive power in screening risk to reoffend for First Time Offenders.

Table 2. Possible Full Scale RIASI Cutoff Scores.

RIASI Sc	Sensitivit	Specificit	RIASI Sc	Sensitivit	Specificit
.00	1.000	1.00	**18.50**	.181	.923
.50	1.000	.005	**19.50**	.169	.935
1.50	1.000	.017	**20.50**	.157	.947
2.50	.976	.062	**21.50**	.133	.962
3.50	.928	.116	**22.50**	.133	.973
4.50	.892	.193	**23.50**	.133	.979
5.50	.843	.271	**24.50**	.120	.982
6.50	.783	.350	**25.50**	.120	.984
7.50	.723	.429	**26.50**	.084	.989
8.50	.639	.510	**27.50**	.060	.992
9.50	.578	.570	**28.50**	.048	.993
10.50	.530	.640	**29.50**	.048	.995
11.50	.458	.730	**30.50**	.048	.996
12.50	.386	.749	**31.50**	.048	.997
13.50	.313	.795	**32.50**	.024	.998
14.50	.289	.825	**34.00**	.012	.998
15.50	.265	.849	**36.00**	.000	.999
16.50	.241	.886	**38.00**	.000	1.00
17.50	.193	.904			

Figure 7 shows the distribution of Full Scale RIASI scores for First Time Offenders. In visually analyzing the distribution, there is a noticeable drop in frequencies of scores at the 10 point score level. This lends further confirmation for a cutoff score of 10 for screening purposes. With this cutoff, any score of 10 or above would be classified as high risk.

Figure 7. Distribution of Full Scale RIASI Scores.

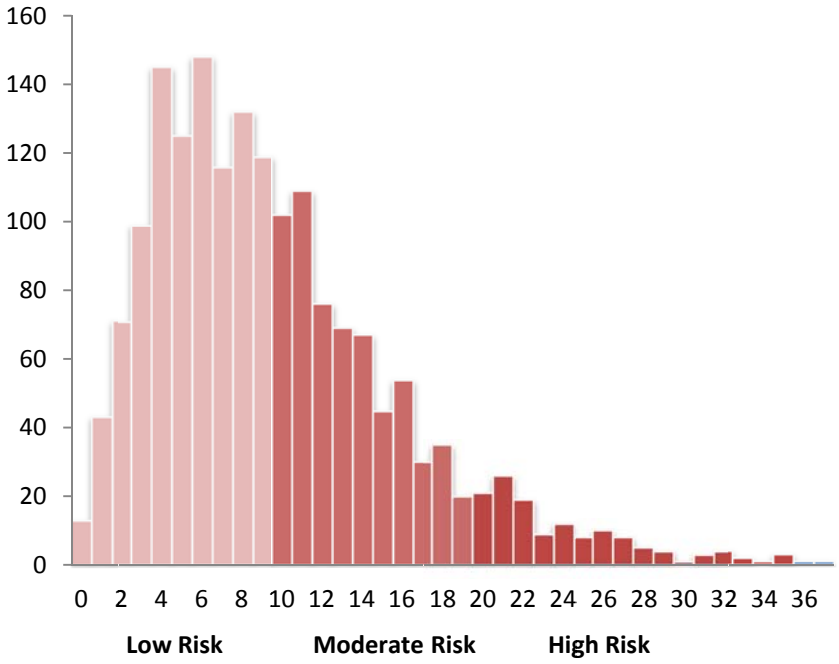


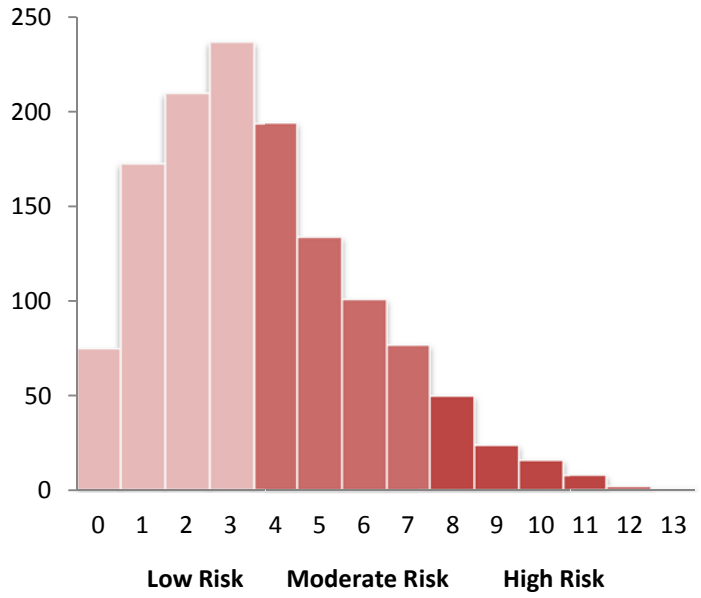
Table 3 displays the sensitivity and specificity of the Ricidivism Subscale at each Subscale score for First Time Offenders. The cutoff point that maximizes both sensitivity and specificity for the Recidivism Subscale is a score of 4, with sensitivity at 65% and specificity at 55%.

Table 3. Possible Recidivism Subscale Cutoff Scores

RIASI Score	*Sensitivity*	*Specificity*
.00	*1.00*	*.000*
.50	*.976*	*.006*
1.50	*.855*	*.194*
2.50	*.747*	*.358*
3.50	*.651*	*.546*
4.50	*.482*	*.694*
5.50	*.337*	*.794*
6.50	*.217*	*.896*
7.50	*.145*	*.927*
8.50	*.108*	*.966*
9.50	*.072*	*.983*
10.50	*.048*	*.994*
11.50	*.024*	*.999*
12.50	*.012*	*1.00*
14.00	*.000*	*1.00*

Figure 8 shows the distribution of the Recidivism Subscale scores of the RIASI for First Time Offenders. In visually analyzing the distribution, frequencies begin to decline at the 4 point score. This lends further confirmation for a cutoff score of 4 for screening purposes. With this cutoff, any score of 4 or above would be classified as high risk.

Figure 8. Distribution of the Recidivism Subscale Scores.



Conclusion

Limitations

Few if any research studies are perfect. Any differences between groups being studied that are not part of the group definition introduce contamination into the research design. One contaminant contained within this study is the introduction of a DWI One Day Program for First Time Offenders. The majority of First Time Offenders within our sample attended this program. Therefore, the setting and time of assessment varied for Repeat Offenders and the majority of First Time Offenders. These differences in test administration could have differentially affected scores. Repeat Offenders may have been more distrustful in a probation setting and First Time Offenders may have been more comfortable in a community setting.

The administration of the RIASI may be another contaminant to the validation study. Though not currently used as a screening instrument, feedback was given to offenders regarding their RIASI score. Referral for intervention programming may have been suggested to those with high risk scores. Any positive impact this may have had on future behavior is certainly a good outcome, but could have a muting effect upon the results of this validation study. In other words, the feedback given to offenders with high risk scores may have helped them to seek further intervention, reducing their risk to reoffend.

Findings

The Full Scale RIASI is a valid DWI risk assessment instrument for use with those offenders who have committed their first DWI offense.The Recidivism Subscale of 15 items within the RIASI is just as predictive of risk as the Full Scale RIASI (52 items) for first time offenders. There is no evidence that the RIASI is predictive of risk to reoffend for repeat offenders, using either the Full Scale RIASI or the Recidivism Subscale.

Recommendations

It is recommended that neither the Full Scale RIASI nor the Recidivism Subscale be used to classify repeat offenders for programming.

The RIASI Recidivism Subscale is recommended for use as a risk screening instrument with first time DWI offenders.

While this study validates use of the Full Scale RIASI for DWI risk screening with First Time Offenders, the decision regarding continued use of the RIASI must include consideration of the length of the instrument and ease of administration and scoring. These results also indicate that the Recidivism Subscale of the RIASI is just as proficient at risk screening, while having the advantage of more efficient administration and scoring. Considering the advantages of a shorter 15 item scale, it is recommended that the Recidivism Subscale replace the RIASI as a risk screening instrument with first time offenders

The optimal cutoff for high risk classification for the Ricidivism Subscale is a score of 4 or above. Based upon our two year recidivism data, this would lead to the correct identification of 65% of high risk offenders for further service referral and the elimination of 55% of low risk offenders from further intervention strategies. Use of this cutoff would further the DOCCR goal of targeting resources to those at highest risk and eliminate the bulk of offenders at low risk from limited service delivery models.

These results are based upon one administration of the Full Scale RIASI, with the 15 items of the Recidivism Subscale embedded within the full scale. If the Recidivism Subscale is utilized as a stand alone 15 item screening instrument, it is recommended that this stand alone scale be validated through a predictive validation study. It seems likely that this shorter stand alone scale using the same items currently embedded in the RIASI would exhibit the same predictive power shown in these results. However, a stand alone scale would be a different assessment instrument than a subscale within a larger test, and as such is in need of independent validation.

The recidivism rates captured in this two year period will continue to grow in following years. The strength of the relationship between recidivism and RIASI scores may or may not grow as well. These results are more of a snapshot of a process not yet completed rather than an end product. Should DOCCR continue to utilize the Full Scale RIASI or the Recidivism Subscale, it is recommended that this sample continue to be followed to confirm the validity of the these risk assessment instruments with first time DWI offenders over longer periods of time.

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Appendix A

Table A1. Kendall's Tau-B Correlations of Risk Level with Recidivism

OFFENSE HISTORY	FULL SCALE RIASI RISK LEVEL			RIASI RECIDIVISM SUBTEST RISK LEVEL		
	Correlation Coefficient	Significance Level (1-tailed)	N	Correlation Coefficient	Significance Level (I-tailed)	N
First Time DWI Offenders	0.086	.001*	1302	0.106	.000*	1302
Repeat DWI Offenders	0.042	.175	455	0.02	.334	455
Total DWI Offender Sample	0.073	.001*	1757	0.083	.000*	1757

*Correlation is significant at the .01 level (1-tailed).

Table A2. Mann-Whitney U Test of Significant Differences in Risk Level by Recidivism.

OFFENSE HISTORY	FULL SCALE RIASI RISK LEVEL				RIASI RECIDIVISM SUBTEST RISK LEVEL			
	Mann Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Mann Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
First Time DWI Offenders	41306.5	784896.5	-3.184	.001*	392270.5	782860.5	-3.891	.000*
Repeat DWI Offenders	8178	93256	-0.935	.350	8544	93622	-.428	.669
Total DWI Offender Sample	87478.5	1418374.5	-3.158	.002*	85487	1416383	-3.565	.000*

*Correlation is significant at the .01 level (1-tailed).

Table A3. ROC Area Under the Curve and Significance for Full Scale and Subscale RIASI.

OFFENSE HISTORY	FULL SCALE RIASI RISK LEVEL			RIASI RECIDIVISM SUBTEST RISK LEVEL		
	Area	Std. Error	Asymp. Sig. (2-tailed)	Area	Std. Error	Asymp. Sig. (2-tailed)
First Time DWI Offenders	.614	.032	.001*	.608	.033	.001*
Repeat DWI Offenders	.514	.047	.761	.514	.044	.763