Predicting rapid DUI recidivism using the Driver Risk Inventory on a state-wide sample of Floridian DUI offenders

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ABSTRACT

Background: This project examined the ability of the popular DUI/DWI offender assessment instrument, the Driver Risk Inventory (DRI; Behavior Data Systems, Ltd., 1985), to identify short-term DUI recidivists in a sample of Floridian DUI offenders who were charged with DUI between January 1st, 2008 and December 31st, 2009. The DRI provides a number of behavioral risk scales, DSM-IV substance abuse and dependence classifications, as well as measurement of demographic and criminal history characteristics.
Methods: Cox proportional hazards models were used to identify the demographic, criminal history, and behavioral characteristics most closely associated with the risk of rapid DUI recidivism. Follow-up analyses including ROC curves were used to further examine the ability of the DRI to identify short-term DUI recidivists.
Results: In the final model controlling for all variables, the DRI driver risk scale was the single strongest predictor of rapid DUI recidivism. The DSM-IV substance abuse and dependence classifications were also significant predictors of DUI recidivism. A number of the DRI risk scales and the DSM-IV classifications exhibited significant predictive validity and exhibited sensitivity in identifying recidivists similar to other popular DUI offender assessment instruments.
Conclusions: The DRI provides useful identification of DUI recidivists in a sample able to capture only the most rapid DUI recidivists. The results of this research warrant further examination of the DRI's ability to identify DUI recidivists using longer intervals of time between DUI arrests.

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1. Introduction

Those who repeatedly drive while impaired by alcohol pose a significant threat to the safety of public roadways. While the number of alcohol impaired traffic fatalities in the United States has been decreasing, 11,773 people were killed in alcohol related traffic accidents in 2008, representing an average of one traffic fatality attributable to alcohol every 45 min (NHTSA, 2008). To contribute to the efforts to reduce the population costs of drunk driving, this project evaluated the efficacy of the popular DUI/DWI instrument, the Driver Risk Inventory (DRI; Behavior Data Systems, Ltd., 1985) to identify short-term DUI recidivism in a sample of Floridian DUI offenders arrested for DUI between January 1st, 2008 and December 31st, 2009.

Current literature focusing on alcohol impaired driving is abundant with research indicating the individual characteristics best suited to predict recidivism (see Nochajski and Stasiewicz, 2006 for review). Characteristics of DUI offenders found to predict DUI recidivism range from demographic and criminal history variables, frequently included in DUI offender screening instruments, to diverse indicators of the behavioral risk profile of offenders. DUI recidivism is generally defined as having two or more DUI arrests, and the definition of rapid DUI recidivism in this project is being arrested and re-arrested for DUI within a two-year interval. The average number of days to subsequent arrest in this study was 128 days, or around 4½ months. Therefore, this investigation of DUI recidivism only captures those re-arrested for DUI quickly after initial arrest.

Problematic alcohol use patterns are the behavioral characteristics traditionally associated with the risk of DUI and DUI recidivism. Alcohol use ranges from abstinence to dependence (Maisto and Saitz, 2003) and severity of alcohol use problems are related to the frequency of use, quantities consumed, and the outcomes of alcohol use. In addition to maladaptive alcohol use, poor driving habits and criminal history increase the risk of DUI recidivism. DUI recidivists tend to have poorer driving records than non-recidivists and are charged with more non-driving criminal offenses (Nochajski and Stasiewicz, 2006; Nochajski and Wieczorek, 2000; Peck, 1993). Poor driving habits place the individual at greater risk of being pulled over by law enforcement, and when paired with previous alcohol consumption, increase the likelihood of arrest for DUI. Criminal history indicates offenders' propensity to violate the law, which may

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be associated with maladaptive patterns of alcohol use and drunk driving.

Other behavioral characteristics such as drug use and stress coping have been linked with DUI recidivism, but have been represented less often in the literature. Drug use has been shown to account for a large proportion of persons reporting at least one conviction of driving while intoxicated (Albery et al., 2000) and Swedish DUI offenders who reported driving under the influence of drugs had twice the re-arrest rate of drunken drivers (Christophersen et al., 2002). Amounts of perceived stress and stress coping abilities have been related to driving under the influence (Bradstock et al., 1987). The DRI contains indicators of both drug use risk and stress risk and represent potentially important predictors of short-term DUI recidivism.

DUI offenders are a heterogeneous group with whom the use of simplified techniques to predict recidivism will produce inaccurate results (Nochajski and Stasiewicz, 2006). Assessing the capacity of the behavioral scales included in the DRI to identify short-term DUI recidivists will provide clinicians and law enforcement valuable information regarding the efficacy of this popular DUI/DWI screening instrument in identifying a high-risk population of DUI offenders.

2. Methods

2.1. Participants

This study employed data collected using the online DRI by the state of Florida between January 1st, 2008 and December 31st, 2009. Data were drawn from the online Florida DRI database held by Behavior Data Systems, Ltd., in cooperation with Florida's Bureau of Driver Education DUI Program. Florida mandates completion of the DRI for all DUI offenders. The DRI is mandated in other states including Missouri, Oklahoma, South Carolina, Nebraska, and New Hampshire. Offenders included in analysis were arrested for DUI regardless of whether they were formally charged for DUI or their case was plea-bargained to a reduced charge.

2.2. Measures

The DRI captures respondent level self reports of demographic characteristics, criminal history variables, and 140 responses used to develop 5 percentile scales including alcohol use risk, driving risk, drug use risk, stress risk, and dishonesty, in addition to substance abuse and dependence classifications derived from the DSM-IV. The DRI has been shown to have adequate concurrent validity for identifying alcohol use disorders or problem drinkers (Chang et al., 2002; Popkin et al., 1988), is able to distinguish between first and multiple DUI offenders (Leshowitz and Meyers, 1996), and all DRI scales show acceptable reliability ($\alpha > .80$; Chang et al., 2002; Popkin et al., 1988). Information on the DRI can be found on the Behavior Data Systems, Ltd. website: www.bdsltd.com and the test booklet can be viewed at www.online-testing.com.

2.2.1. DRI scales. The DRI scales measuring alcohol use risk, driving risk, drug use risk, stress risk, and dishonesty produce a percentile score for each offender's set of responses. Percentile scores between 0 and 39% represent low risk, percentile scores between 40 and 69% represent medium risk, scores between 70 and 89% represent problem risk, and those with percentile scores between the 90th and 99th percentile are identified as having a severe problem concerning the given scale. All DRI scales with a percentile score (alcohol risk, driver risk, drug risk, and stress risk) were coded as categorical variables according to these risk levels, with all regression models using the low risk category as reference.

The DRI alcohol risk scale identifies respondents' alcohol use behavior and severity of alcohol abuse. The DRI defines alcohol as beer, wine, and other liquors. Questions regarding alcohol use and abuse across the life course are incorporated into the alcohol risk scale, allowing differentiation between those with a history of alcohol abuse but who state they currently abstain from alcohol use, and those who currently abuse alcohol.

The DRI driver risk scale measures offenders' driving risk independent of substance use. This scale captures aggressiveness and attitude towards driving. Individuals with high driver risk percentile scores are identified as dangerous drivers who could benefit from driver education. The National Highway Traffic Administration reports that the DRI is the only major DUI/DWI test that measures driver risk (Popkin et al., 1988).

The DRI drug risk and stress risk scales provide measurement of behaviors that may lead to alcohol consumption and impaired driving. The DRI drug risk scale reports amount and severity of drug use. Drugs are defined in the DRI as marijuana, crack, cocaine, amphetamines, methamphetamines, barbiturates, and heroin. Similar to the alcohol risk scale, the DRI drug risk scale takes special precautionary measures to differentiate between current and recovering drug users. The DRI stress risk scale measures offenders' ability to cope effectively with stress, tension, and pressure.

The DSM-IV substance abuse and dependence classifications included in the DRI differentiate between offenders with non-pathological substance use behaviors and offenders with behaviors representing substance abuse and dependence (American Psychiatric Association, 2000). If a DUI/DWI offender admits to one of the four DSM-IV substance abuse criteria, the offender is classified as a substance abuser. If the respondent admits three of the seven DSM-IV substance dependence criteria, the offender is classified as substance dependent. In addition to behavioral components, the DSM-IV measure includes number of lifetime non-driving alcohol and drug arrests, as well as number of lifetime DUI arrests. Excluding offenders' reports of lifetime alcohol or drug related arrests, the DSM-IV substance abuse and dependence classifications are current diagnoses, meaning that the criteria needed to be identified with substance dependency or substance abuse must be met within the same 12-month period.

The dishonesty scale in the DRI identifies respondents who attempt to minimize problems and "fake good." Respondents who have dishonesty scale scores that fall between the 70th and 99th percentiles are recognized as having potential lapses in truthfulness and thus necessitate having the other DRI scales adjusted. This transformation produces truth-corrected risk scores that are more accurate than raw scores.

2.2.2. Demographic and criminal history variables. Both demographic and DUI specific variables were included to control for individual characteristics previously shown to predict DUI recidivism. Gender (0 = female, 1 = male), ethnicity (White, Black, and Hispanic, using White as the reference group), education (less than a high school degree, high school graduate/GED, some college, and college graduate/advanced degree, using high school graduate/GED as the reference group) and marital status (single, married, divorced, and separated/widowed, using single and the reference group) represent the demographic controls included in analyses.

Numerous variables were included to control for the respondent's propensity towards risky behaviors related to DUI. Offenders were asked if there was an accident associated with the current DUI arrest. The previous number of non-driving related alcohol arrests and non-driving drug arrests within the past five years account for alcohol and drug related encounters with law enforcement. Number of at fault auto accidents and number of traffic violations where points were assessed within five years of initial arrest control for driving history. Number of non-alcohol-or-drug related misdemeanors and felonies control for encounters with law enforcement at various levels of severity. These variables were dichotomized for inclusion in regression analyses (0 = no incident; 1 = one or more of given incident).

2.3. Sample selection and definition of recidivism

The Florida DRI requires entry of offenders' driver license numbers and provides the ability to identify individuals re-arrested for DUI following their initial DUI arrest. Individuals were identified as recidivists when two cases contained the same driver's license number but contained different DUI dates and unique values for DRI percentile scores.

Multiple constraints were placed on the sample to promote accuracy of subsequent analyses. The initial sample consisted of 31,338 DUI offenders. This sample included offenders whose initial DUI arrest date fell between January 1st, 2008 and December 31st, 2009 and who provided valid driver's license numbers. Individuals who did not provide valid measurements of age were excluded (those whose stated age did not match the difference between their birth date and test date; $n = 1922$). Offenders whose test date preceded their DUI arrest date were removed from the sample ($n = 320$) and duplicate cases, identified as a second DRI evaluation within 90 days of the initial evaluation without a corresponding second DUI arrest date, were excluded from analysis ($n = 391$). Due to the fact that no offenders reporting race/ethnicity other than White, Black or Hispanic were identified as recidivists, these individuals were removed from the sample ($n = 724$). Lastly, DUI offenders with missing data on covariates were removed ($n = 1335$), leaving a final analytic sample of $N = 26,646$.

2.4. Statistical analysis

Cox proportional hazards regression models were used to determine the risk of DUI recidivism across the measurement interval while adjusting for covariates. Individuals entered the dataset at the date of their first DUI arrest with failure time being defined at the date of their second DUI arrest, giving offenders identified earlier in the study a longer time to be charged with a subsequent DUI arrest than offenders identified later in the study. One-time offenders not found to have a second offense by December 31st, 2009 were considered censored. Time was measured in days with 730 days representing the maximum follow up time. On average, recidivists went 128 days between entering the data and receiving a second DUI arrest, where non-recidivists went 353 days between first arrest and censoring. The exact method of approximating rank order was used for ties and the assumption of proportional hazards was satisfied. All hazard models were completed with SAS version 9.2 (SAS Institute Inc., 2008).

Table 1
Descriptive statistics of Floridian DUI offenders, January 1st, 2008 to December 31st, 2009.

	%	Mean	SD
Age		35.64	12.52
Male	71.72		0.45
White	75.69		0.43
Black	7.74		0.27
Hispanic	16.16		0.37
Less than HS degree	11.01		0.31
High school degree	43.02		0.50
Some college	24.42		0.43
College graduate	21.56		0.41
Single	57.29		0.49
Married	20.63		0.40
Divorced	16.16		0.37
Separated/widowed	5.69		0.23
Accident in arrest	19.21		0.39
# alcohol arrests (% with 1 or more)	(8.65)	0.12	0.48
# drug arrests (% with 1 or more)	(6.83)	0.09	0.42
# at-fault traffic acc. (% with 1 or more)	(20.39)	0.26	0.58
Points assessed (% with 1 or more)	(47.46)	1.02	1.58
Misdemeanor (% with 1 or more)	(18.31)	0.28	0.74
Felony (% with 1 or more)	(8.47)	0.12	0.49
Alcohol risk percentile		63.60	20.36
Low risk (0–39%)	19.77		
Medium risk (40–69%)	42.77		
Problem risk (70–89%)	22.33		
Severe risk (90–99%)	15.13		
Driver risk percentile		57.11	20.33
Low risk (0–39%)	39.53		
Medium risk (40–69%)	32.61		
Problem risk (70–89%)	15.00		
Severe risk (90–99%)	12.86		
Drug risk percentile		25.14	35.66
Low risk (0–39%)	68.97		
Medium risk (40–69%)	12.93		
Problem risk (70–89%)	6.27		
Severe risk (90–99%)	11.82		
Stress risk percentile		46.88	29.85
Low risk (0–39%)	41.15		
Medium risk (40–69%)	32.74		
Problem risk (70–89%)	15.65		
Severe risk (90–99%)	10.46		
DSM-IV classification			
Substance abuse classification	43.89		0.50
Substance dependency classification	16.69		0.37

Note: N = 26,646.

Follow-up analyses were used to further examine the ability of the DRI to identify short-term DUI recidivists. Receiver operating characteristic (ROC) curves were used to test the ability of the DRI subscales to discriminate between DUI recidivists and non-recidivists. The ROC curve analysis was completed using PASW Statistics 18, release version 18.0.1 (SPSS, Inc., 2009). Additionally, values for each DRI scale were compared between recidivists and non-recidivists, using independent sample *t*-tests to identify significant differences in continuous scales, and chi-square tests to identify significant relationships between recidivist identification and the DSM-IV substance abuse and dependence classifications.

3. Results

3.1. Descriptive statistics

Of the 26,646 Floridians arrested for DUI between January 1st, 2008 and December 31st, 2009, 90 offenders were identified as DUI recidivists (.34%) and 26,556 observations were censored (99.66%). Table 1 presents descriptive statistics for the complete sample of Floridian DUI offenders, and Table 2 presents the distribution of those identified as DUI recidivists across the DRI scale risk levels and DSM-IV classifications.

Examining the DRI scales and DSM-IV classifications central to this study, the average DUI offender had an alcohol risk in the 64th percentile, and around 37% of all offenders assessed were classified with either problem or severe alcohol use risk. The average driver

Table 2
Percentage distributions of DRI and DSM-IV classifications among Floridian DUI recidivists, January 1st, 2008 to December 31st, 2009.

	% within category
Alcohol risk percentile	
Low risk (0–39%)	8.89
Medium risk (40–69%)	42.22
Problem risk (70–89%)	32.22
Severe risk (90–99%)	16.67
Driver risk percentile	
Low risk (0–39%)	16.67
Medium risk (40–69%)	42.22
Problem risk (70–89%)	26.67
Severe risk (90–99%)	14.44
Drug risk percentile	
Low risk (0–39%)	58.89
Medium risk (40–69%)	15.56
Problem risk (70–89%)	8.89
Severe risk (90–99%)	16.67
Stress risk percentile	
Low risk (0–39%)	53.33
Medium risk (40–69%)	23.33
Problem risk (70–89%)	13.33
Severe risk (90–99%)	10.00
DSM-IV classification	
Substance abuse	56.67
Substance dependency	25.56

Note: n = 90.

risk percentile score was around 57 with the majority of offenders (72%) being classified as low or medium driving risk. The average drug risk percentile score was 25 and more than 80% of offenders were classified as low or medium drug use risk. Finally, the mean stress risk percentile score was 47 and the majority of offenders (74%) were classified as low or medium stress risk. Around 44% of offenders met the DSM-IV substance abuse classification where around 17% met the DSM-IV substance dependence classification.

Table 2 presents the percentage of individuals identified as DUI recidivists across each of the DRI scale cut points and the DSM-IV classifications. The majority of rapid DUI recidivists were classified as medium or problem risk on both the DRI alcohol risk and driver risk scales. For the DRI drug risk and stress risk scales, more than 70% of DUI recidivists were identified as low or medium risk, with the majority being classified as low risk. Fifty-seven percent of DUI recidivists were identified as substance abusers, and around 26% of DUI recidivists were classified as substance dependent according to the DSM-IV criteria.

3.2. Cox regression results

Cox regression models were estimated to assess the capacity of the DRI risk scales and the DSM-IV substance dependency and abuse classifications to predict the risk of being identified as a DUI recidivist. All regression models included controls for offenders' age, education, marital status, and all criminal history variables. Controlling for demographics and criminal history variables, each of the DRI risk scales and the DSM-IV abuse and dependency classifications were included independently to assess the predictive capacity of each scale (Models 1 through 6). Finally, all DRI scales and DSM-IV classifications were combined (while controlling for demographics and criminal history) to assess which measures included in the DRI were the strongest predictors of rapid DUI recidivism (Model 7). Table 3 contains the estimates from each model (presented as hazard ratios), corresponding significance values, 95% confidence intervals, as well as likelihood ratio chi-square tests for each model.

For the demographic and criminal history variables used as controls in all models, only felony criminal history was significantly associated with the risk of DUI recidivism. Having reported one

Table 3
Cox proportional hazards regression estimates.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	HR	>95% CI	HR	>95% CI	HR	>95% CI	HR	>95% CI	HR	>95% CI	HR	>95% CI	HR	>95% CI
Alcohol scale														
Medium risk	2.12	0.98–4.58											1.68	0.77–3.66
Problem risk	3.21**	1.45–7.11											2.06†	0.91–4.66
Severe risk	2.44*	1.02–5.86											1.30	0.49–3.46
Driver scale														
Medium risk			3.17***	1.68–5.98									2.42**	1.26–4.64
Problem risk			4.32***	2.21–8.48									2.99**	1.48–6.08
Severe risk			2.70*	1.26–5.80									1.95	0.82–4.64
Drug scale														
Medium risk					1.30	0.70–2.43							0.92	0.49–1.75
Problem risk					1.54	0.71–3.33							1.05	0.47–2.37
Severe risk					1.48	0.81–2.72							1.13	0.53–2.42
Stress scale														
Medium risk							0.54*	0.32–0.90					0.62†	0.36–1.07
Problem risk							0.65	0.34–1.23					0.84	0.43–1.64
Severe risk							0.70	0.34–1.43					0.90	0.43–1.91
DSM-IV classifications														
Substance abuse									1.59*	1.04–2.42			1.95*	1.07–3.58
Substance dependency											1.65*	1.01–2.69	2.13*	1.01–4.50
χ^2 (df)	30.56 (20)		41.95* (20)		22.82 (20)									

Note: N = 26,646. Medium risk (40th to 69th percentile), problem risk (70th to 89th percentile), severe risk (90th to 99th percentile). Low risk (0–39.9%) used as reference. All models included controls for age, education, marital status, and all criminal history variables.

* $p < .05$.
** $p < .01$.
*** $p < .001$.
† $p < .10$.

or more felony arrest within five years preceding assessment was associated with a significantly greater risk of being identified as a DUI recidivist in all models presented in Table 3 (for example, in Model 7, those reporting one or more felony arrest were 1.86 times more likely to be identified as a DUI recidivist than those not reporting felony arrests (HR = 1.86, $p < .05$)). These results are not included in Table 3 but are available upon request.

Model 1 introduced the alcohol risk percentile classifications to controls for demographics and criminal history, and Model 2 tested the ability of the driver risk scale classifications to identify DUI recidivists. Offenders classified as having problem alcohol use risk were 3.21 times more likely to be identified as a DUI recidivist than those identified with low alcohol use risk (HR = 3.21, $p < .01$), and offenders identified with severe alcohol use risk were 2.44 times more likely to be identified as a DUI recidivist than the reference group (HR = 2.44, $p < .05$). Regarding the driver risk scale, offenders identified with medium, problem, or severe driver risk were all significantly more likely to be identified as DUI recidivists than those classified with low driver risk. Compared to offenders with low driver risk, those with medium risk were 3.17 times more likely to be identified as a DUI recidivist (HR = 3.17, $p < .001$), those classified with problem driver risk were 4.32 times more likely to be identified as DUI recidivists (HR = 4.32, $p < .001$), and finally, those with severe driver risk were 2.70 times more likely to be identified as a recidivist (HR = 2.70, $p < .05$).

Model 3 introduced the drug risk percentile to the set of control variables, and Model 4 tested the ability of the DRI stress risk scale to identify recidivists. The drug risk classifications did not corresponded to a significantly different likelihood of DUI recidivism. For the stress risk scale, only those identified as having a medium stress risk were significantly different than those with low stress risk, and these individuals were found to be .46 times less likely to be identified as a DUI recidivist than those with low stress risk (HR = 0.54, $p < .05$).

Models 5 and 6 tested the predictive utility of the DRI specifications of the DSM-IV substance abuse and dependence classifications. When controlling for demographic and criminal history variables, those classified with substance abuse behaviors were 1.59 times more likely to be identified as a DUI recidivist than those not classified with substance abuse behaviors (HR = 1.59, $p < .05$). Model 6 included the DSM-IV substance dependence classification to the demographic and criminal history control variables, and those classified as substance dependent were 1.65 times likely to be identified as a DUI recidivist than those who were not classified as substance dependent (HR = 1.65, $p < .05$).

Model 7 included classifications derived from all four DRI scales, the DSM-IV substance abuse and substance dependence classifications, in addition to controls for demographic characteristics and criminal history. In the final model, only the driver risk scale and the DSM-IV substance abuse and substance dependence indicators remained significant predictors of rapid DUI recidivism. Including controls for all variables of interest, offenders with medium driver risk were 2.42 times more likely (HR = 2.42, $p < .01$), and those with problem driver risk were 2.99 times more likely (HR = 2.98, $p < .01$), to be identified as rapid recidivists than those with low driver risk, respectively. In the full model, those classified by DSM-IV standards as a substance abuser were 1.95 times as likely as being identified as a DUI recidivist (HR = 1.95, $p < .05$), and those identified as substance dependent were 2.13 times more likely to be identified as a recidivist (HR = 2.13, $p < .05$), than offenders not identified by these classifications.

3.3. Follow-up analyses

ROC curve results revealed that the driver risk scale, alcohol risk scale, drug risk scale, and DSM-IV substance abuse classification
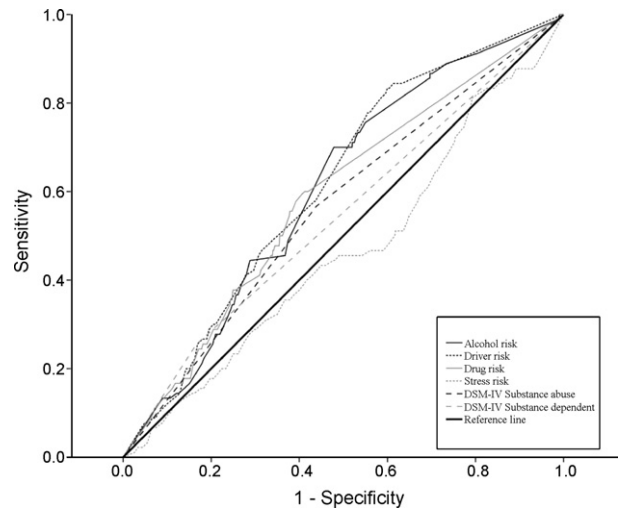

Fig. 1. Receiver operating characteristic (ROC) curves for DRI risk scales and DSM-IV classifications.

Table 4
Area under the curve (AUC) for each DRI scale and DSM-IV classification.

	Area under curve	95% Confidence interval
Alcohol risk pct.	.608[***]	.56–.66
Driver risk pct.	.616[***]	.57–.67
Drug risk pct.	.587[**]	.53–.65
Stress risk pct.	.465	.40–.53
Substance abuse classification	.564[*]	.51–.62
Substance dependence classification	.544	.48–.61

Note: N = 26,646.
[*] $p < .05$.
[**] $p < .01$.
[***] $p < .001$.

provided significantly more accurate identification of DUI recidivists than chance, though according to commonly accepted AUC thresholds, each of these measures provided poor discrimination between offenders and non-offenders (Hosmer and Lemeshow, 2000). The results of the ROC analysis are shown in Fig. 1. The AUC estimates presented in Table 4 reveal that the DRI driver risk percentile was the measure best equipped to correctly identify a randomly chosen DUI-recidivist (positive) higher than a randomly chosen non-DUI recidivist (negative). Significant predictive validity was found for the driver risk scale (AUC = .62, $p < .001$), alcohol risk scale (AUC = .61, $p < .001$), drug risk scale (AUC = .59, $p < .01$), and substance abuse classification (AUC = .56; $p < .05$). Table 5 includes results from independent sample t-tests for differences between values on the DRI alcohol risk, driver risk, drug risk, and stress risk scales between recidivists and non-recidivists. Individuals identified as recidivists had significantly higher alcohol risk percentile scores ($p < .001$), driver risk percentile scores ($p < .001$), and drug

Table 5
Results of independent sample t-tests of DRI scales by recidivism status.

	Recidivism status		t	df
	Non-recidivist	Recidivist		
Alcohol	63.59(20.38)	70.94(17.87)	−3.42[***]	26,644
Driver	57.12(20.38)	65.08(19.07)	−3.70[***]	26,644
Drug risk	25.18(35.70)	35.20(37.67)	−2.66[**]	26,644
Stress risk	46.82(29.86)	43.29(43.29)	1.12	26,644

Note: N = 26,646; Standard deviations appear in parentheses below means.
[**] $p < .01$.
[***] $p < .001$.

Table 6
Chi-square tests of DSM-IV classifications by recidivism status.

	Met substance abuse classification		χ^2	Φ
	No	Yes		
Non-recidivist	14913 (2.4)	11643 (−2.4)	5.99[*]	0.02
Recidivist	39 (−2.4)	51 (2.4)		
	Met substance dependency classification		χ^2	Φ
	No	Yes		
Non-recidivist	22,132 (2.3)	4424 (−2.3)	5.11[*]	0.01
Recidivist	67 (−2.3)	23 (2.3)		

Note: $N = 26,646$; **$p < .01$; ***$p < .001$. Adjusted standardized residuals appear in parentheses below group frequencies.

[*] $p < .05$.

risk percentile scores ($p < .01$) than non-recidivists, respectively. The effect size d for all significant differences were approximately between .3 and .4, representing small to medium effect sizes.

Finally, Table 6 includes results of chi-square tests investigating the relationship between recidivism status and the DSM-IV substance abuse and substance dependence classifications. Significant relationships were found between recidivism status and the DSM-IV substance abuse and substance dependence classifications (DSM-IV substance abuse classification $\chi^2 = 18.43$, $p < .001$; DSM-IV substance dependency classification $\chi^2 = 5.11$, $p < .05$).

4. Conclusion

This study applied measures included in the DRI screening instrument to the identification of rapid DUI recidivism in a large sample of Floridian DUI offenders. Results indicated that the DRI's driver risk scale and the DSM-IV substance abuse and dependence classifications included in the DRI provide accurate identification of DUI recidivists, and this held true regardless of offenders' demographic profile and criminal history. Given the short interval of the study and offenders' continuous entry into the Florida DRI database, the DRI provided useful identification of rapid DUI recidivists.

A relatively small number of DUI offenders were identified as DUI recidivists. Over the two years of observation, only 90 of the 26,646 offenders tested with the DRI were identified as DUI recidivists. The design of the study restricted the amount of time that offenders could potentially be re-arrested for DUI, with the average time to re-arrest being less than 5 months. Only those DUI offenders displaying rapid DUI recidivism were identified in this study. Also, the use of official records to identify recidivists is likely to underestimate the number of re-arrests for DUI due to emigration and variation in local law-enforcement policies (Nochajski and Stasiewicz, 2006; Schell et al., 2006). Given these qualities, this study examined the efficacy of the DRI to identify DUI recidivists in a relatively difficult setting.

The DRI driver risk scale was the strongest and most consistent predictor of DUI recidivism, supporting other findings that poor driving habits increase the risk of DUI arrest (Nochajski and Stasiewicz, 2006; Nochajski and Wieczorek, 2000; Peck, 1993). While this study used actual arrest records to identify recidivists, the DRI driver risk scale has been positively associated with offenders' self report number of lifetime DUI arrests (Bishop, 2011). These findings indicate that while intoxication is a necessary element of being re-arrested for DUI, offenders' driving habits are more critical to being identified as a rapid DUI recidivist. The predictive capacity of the DRI driver risk scale suggests that this measure provides a

useful diagnostic tool that can complement the substance-related measures in the DRI when screening offenders as potential DUI recidivists.

The DSM-IV substance abuse and dependence classifications included in the DRI provided identification of short-term DUI offenders, but with some inconsistencies across analyses. In the final model, those classified as substance dependent had a greater risk of being identified as a DUI recidivist than those identified as a substance abuser, though the difference between the classifications was small. The ROC analysis revealed that only the DSM-IV substance abuse classification provided adequate sensitivity in identifying recidivists. It is intuitive that substance dependence places the individual at a greater risk of DUI recidivism than does substance abuse, as consistent and compulsive use of alcohol places the individual at a high risk of driving while impaired. Also, those identified with both substance abuse and dependence are classified only as substance dependent according to DSM-IV criteria, labeling the highest risk individuals as substance dependent. While the DSM-IV classifications provided useful identification of rapid DUI offenders, the relatively small and inconsistent effects of these classifications supports the conclusion that factors other than alcohol use may be the most insightful indicators of who will repeatedly drive under the influence of alcohol or other drugs.

In models testing the predictive capacity of each DRI scale separately, both the DRI's alcohol and driver risk scales proved significant identifiers of DUI recidivism. In the final model testing the predictive capacity of the DRI behavioral scales and DSM-IV classifications, only the DRI driver risk scale and the DSM-IV substance abuse and dependence classifications provided accurate identification of short-term DUI recidivists. When tested in a multivariate setting with the DSM-IV classifications that include elements of addiction and substance-related personal and legal problems, the broader array of consumptive and behavioral measures included in the DRI alcohol use scale were unable to accurately identify rapid DUI recidivists. In contrast, the sensitivity analysis revealed that the DRI alcohol risk scale had predictive capacity similar to other DUI offender screening instruments (Anderson et al., 2000; C'de Baca et al., 2002).

In addition to providing an alcohol risk scale with sensitivity similar to other popular DUI offender screening instruments, the DRI includes the driver risk scale that served as an important predictor of rapid DUI recidivism. The DSM-IV substance abuse and dependence scales included in the DRI also served to identify rapid DUI recidivists. The scales and classifications included in the DRI can be useful for clinicians and law enforcement agencies in developing personalized intervention goals that can help reduce the risk of rapid DUI recidivism.

4.1. Limitations and future directions

The design of this study provided a very short interval in which to identify DUI recidivists. To investigate the potential of the DRI to identify DUI recidivists over longer amounts of time, this study will be renewed annually to include new cohorts of DUI offenders into the original Florida DRI database. By incorporating new cohorts of DUI offenders into the Florida DRI database with over a decade of follow up, this unique dataset will provide a tool for the identification of both short-term DUI recidivists as well as DUI offenders whose second DUI arrest may occur up to a decade after initial arrest.

the State of Florida Bureau of Driver Education Program and was responsible for the development of the Driver Risk Inventory (DRI) and online data storage. Behavior Data Systems had no input to the analysis and interpretation of the data, in the writing of the report, nor in the decision regarding where or when to submit the paper for publication.

Contributors

Nicholas Bishop is the only contributing author and completely agrees to the submission.

Conflict of interest

There exists a possible conflict of interest in the funding of this project. This manuscript is the product of a consulting contract between myself, Nicholas Bishop, and the developer of the DRI, Behavior Data Systems, Ltd. Behavior Data Systems, Ltd. contracted myself to complete a research project using the state of Florida's DRI testing dataset from 2008 to 2009. Behavior Data Systems, Ltd. or representatives of the state of Florida in no way suggested nor informed the research design or the methods employed. These statements can be confirmed by Behavior Data Systems, Ltd. who can be contacted at +1 602 266 8227 or at bds@bdsltd.com.

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