Predicting Multiple DUI Offenders Using the Florida DRI, 2007-2008

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Abstract

Objective: Multiple DUI recidivists pose the greatest threat to the safety of American roadways. Using a dataset employing the Driver Risk Inventory (DRI), this article seeks to determine predictors of multiple DUI recidivism.

Methods: A Poisson regression analysis was used to predict number of self reported lifetime DUI arrests. Poisson regression allowed for the standardization of regression estimates by time, controlling for the fact that older individuals have a greater amount of time to accumulate DUI arrests. Nested-model testing allowed for determination of the contribution of each DRI scale to the model fit.

Results: The inclusion of each of the six behavioral scales in the DRI significantly predicted the expected count of lifetime DUI arrests. Offenders with greater percentile scores on alcohol risk, driver risk, drug risk, and stress risk had a greater number of expected lifetime DUI arrests than those with lower percentile scores. Those who met the DSM-IV substance abuse/dependency classification had a greater predicted amount of lifetime DUI arrests and those who were less truthful had a greater predicted number of lifetime DUI arrests. When controlling for stress coping, the relation between being male and having a greater expected count of DUI arrests lost statistical significance, suggesting that stress coping behaviors mediated the relationship between DUI recidivism and gender.

Conclusions: Properly identifying multiple DUI recidivists requires multi-dimensional behavioral scales that capture the heterogeneous nature of DUI offenders. Controlling for stress coping behaviors calls into question the traditional assumption that males have a greater risk of DUI recidivism.

Introduction

Of the entire population of drunken drivers, individuals who repeatedly drive under the influence of alcohol pose the greatest risk to public health. Approximately 35 to 40% of fatally injured drunk drivers have at least one previous arrest for driving while impaired (Lapham et al., 2000). Alcohol related fatalities account for around 40% of all traffic fatalities (Yi et al., 2006) and alcohol-related automotive accidents are estimated to cost state and federal government around $40 billion annually (Blincoe et al., 2002). Throughout the United States, around 35% of all DUI convictions are for drivers with at least one other DUI conviction within the previous 7 years (Schell et al., 2006). The cost of those who repeatedly drive under the influence of alcohol is great for all parties involved.

Effective prevention of drunk driving and, more importantly, repeated drunk driving, is a common goal for public health and law enforcement agencies. Most state law enforcement agencies screen DUI offenders to identify individuals who pose a safety hazard to both themselves and the public. Post-conviction DUI screening allows agencies to direct specific treatment options towards individuals who will benefit most from the various types of treatment options available. The continued testing and refinement of DUI risk assessment scales is an important step in reducing the number of drunken drivers on American roads.

This research employs a popular DUI/DWI offender assessment instrument, the Driver Risk Inventory (DRI; Behavior Data Systems, Ltd.) to examine individual characteristics that predict a self-reported count of lifetime DUI arrests in a sample of DUI offenders from the State of Florida between 2007 and 2008. In addition to

measurement of both demographic and criminal history characteristics that are important when identifying DUI recidivists, the DRI provides 6 standardized behavioral scales measuring alcohol use risk, drug use risk, driver risk, stress coping abilities, truthfulness and an alcohol abuse/dependency classification. The DRI is Florida's statewide DUI offender test and numerous other states mandate or require the DRI for their DUI/DWI offender testing. Measurements from the DRI are used to predict the average number of self-reported DUI arrests, using Poisson regression models specifically designed to handle the non-normality of count-type data.

Literature Review

The DUI recidivism literature abounds with the identification of individual characteristics that predict recidivism status. Taking account of the characteristics of individual offenders requires a multi-faceted approach that obtains information on the demographic, behavioral, and criminal history profiles of DUI offenders. Previous research supports the necessity of approaching DUI offenders as a heterogeneous group upon whom the use of simplified techniques to predict recidivism status will inevitably produce inaccurate results (Nochajski and Stasiewicz, 2006).

DUI Recidivism

Most commonly, recidivism is defined as having two or more DUI arrests. DUI relapse can be defined as driving under the influence of any amount of alcohol or drugs (Nochajski and Stasiewicz, 2006), but this definition is too narrow to be useful for the prevention of DUI recidivism. The differentiation between one-time DUI offenders and DUI recidivists, regardless of the number of lifetime DUI's is important, but the identification of those who have the greatest number of DUI's produces results that can

be used to identify those who pose the greatest risk to themselves and others. A DUI recidivist will be defined henceforth as having been arrested for 2 or more drunk driving offenses and the term multiple DUI recidivist will identify those with more than 2 DUI arrests. DUI recidivism will be used generally to refer to both groups throughout the article, referring to multiple DUI recidivists only when necessary.

Properly identifying recidivists poses problems to the measurement and definition of DUI recidivism. Official driving records can be used to identify DUI recidivists, but numerous methodological issues reduce the efficacy of this type of identification (Nochajski and Stasiewicz, 2006). When using official driving records, possible recidivists are lost to attrition through death or moving out of the region where previous DUI's have been recorded. Also, DUI convictions remain on one's driving record for a variable amount of time between states and counties, reducing the number of individuals who can be identified as recidivists. In addition, inconsistent law enforcement strategies and policies produce variation in the number of drunk drivers arrested in a given location or over a given amount of time, reducing the comparability of recidivism status across locations and times. Finally, multiple recidivists represent an even tougher group to measure, increasing the likelihood of the above identification problems with each subsequent DUI arrest.

A common criticism of research on DUI recidivism has been that most instruments do not control for the truthfulness of the respondents (Chang et al., 2002; Popkin et al., 1988). Those experiencing alcohol-related problems may respond inaccurately in hopes of reducing the amount of rehabilitation they will receive (Nochajski and Stasiewicz, 2006; Vingilis, 1983). Research has shown that those with

one or more DUI offense are more likely to "fake good" or respond defensively than those with no DUI offenses (Caviaola et al., 2003). In addition, first time DUI offenders who did not recidivate over a period of 12 years were shown to answer more truthfully than those who did recidivate within the 12 years (Caviaola et al., 2007). Thus self-report of DUI recidivism can be a good measure of recidivism status, given the truthfulness of the respondent is taken into account. Using the truthfulness scale in the DRI to control for response bias will be considered later.

Demographics

Commonly used demographic indicators in the DRI include gender, age, ethnicity, marital status and education. Previous research agrees that males are more likely to be DUI recidivists than females and that older individuals are more likely to be recidivists (Caviaola et al., 2003; C'de Baca et al., 2002; Lapham et al., 2000; Peck et al., 1994). The relationship between ethnicity and recidivism status seems to be region-specific, where most repeat offenders in the Northeast, Northwest, Midwest, and South tend to be White, and the majority of DUI recidivists in the Southwest are Hispanic or Native American (Chang et al., 1996; Nochajski and Stasiewicz, 2006). Regarding marital status, those who are single, divorced, separated, or widowed are more likely to be DUI recidivists than are those who are married (C'de Baca et al., 2002; Nochajski and Stasiewicz, 2006). Finally, those with lower than a college education are more likely to be repeat DUI offenders than those with a college education (Nochajski and Stasiewicz, 2006; Nochajski et al., 1994).

Behavioral Factors

Alcohol use problems are the behavioral characteristics most proximally associated with 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. Those considered problem drinkers consume risky amounts of alcohol and may or may not be experiencing problems associated with alcohol use, but have not been officially diagnosed with an alcohol use disorder (Maisto and Saitz, 2003). The Diagnostic and Statistical Manual of Mental Disorders is the most common tool used to classify an alcohol use disorder (DSM IV; APA, 1994).

Drug use is another behavioral characteristic associated with DUI recidivism, although drug use has been far less utilized to explain DUI recidivism. Drug use has been shown to account for a large proportion of persons reporting at least one driving while intoxicated conviction (Albery et al., 2000). Marijuana use has been shown to be related to self report driving under the influence (Ames et al. 2002) and Swedish DUI offenders who reported driving under the influence of drugs has twice the re-arrest rate of drunken drivers (Christophersen et al., 2002).

Little previous research has explored the relationship between stress coping and DUI recidivism. Amounts of perceived stress and stress coping abilities have been found to be related to driving under the influence (Bradstock et al., 1984). Repeat DUI offenders have been shown to have higher scores on measures of hostility, sensation seeking, poor emotional adjustment, assertiveness, mania, and depression compared to first time offenders (McMillen et al., 1992). Depression has been positively related to

self-predicted probability of relapse (Dill et al., 2007). Inability to cope with stress may influence one's likelihood of problem drinking and driving under the influence.

Driving Behavior and Criminal History

DUI recidivists tend to have poorer driving records than non-recidivists (Peck et al., 1993). Repeat DUI offenders are more likely to have both a greater amount of traffic violations and have been involved in a greater number of automobile crashes than one time DUI offenders (Nochajski and Wieczorek, 2000; Nochajski and Stasiewicz, 2006). These findings have been supported with longitudinal research, showing that DUI offenders have worse driving records both before and after their first DUI arrest (Caviaola et al., 2007).

Risky driving behavior seems to be associated with DUI recidivism, although few studies focus upon the link between driving behavior and alcohol use. Aggressive drivers report more traffic violations and a higher frequency of driving under the influence than those with less risky driving profiles (Malta et al., 2005). Donovan and colleagues (1985) have shown that bad drivers and DUI offenders have similar behavioral and personality characteristics. Those with a poor driving history and those who repeatedly drive aggressively are likely more visible to law enforcement, increasing the probability of being pulled over and subsequently arrested for DUI (Nochajski and Stasiewicz, 2006).

In addition to driving behavior, criminal history for non-driving/DUI related offenses has been shown to differentiate between single offenders and DUI recidivists (Peck et al. 1993). Criminal behavior has been linked to DUI recidivism (Nochajski et al., 1993; Nochajski et al., 1997; Nochajski and Stasiewicz, 2006) and represents an important indicator of risky behavior.

Methods

This study employs data collected using the DRI by the state of Florida between January 1st, 2007 and December 31st, 2008. In addition to measurement of characteristics that predict DUI recidivism such as gender, ethnicity, education, and blood alcohol content at time of arrest, the DRI contains 6 scales measuring alcohol use risk, driving risk, drug use risk, stress coping risk, a truthfulness percentile score and finally a substance abuse/dependency classification derived from the DSM-IV. Previous reviews of DUI screening instruments advocate that the DRI has adequate concurrent validity for identifying alcohol use disorders or problem drinkers (Chang et al., 2002; Popkin, et al., 1988). The DRI has been also been shown to distinguish between first- and multiple-DUI offenders (Leshowitz and Meyers, 1996). All DRI scales have been shown to have acceptable reliability ($\alpha > .80$; Chang et al., 2002; Popkin, et al, 1988). Further information on the DRI can be found on the Behavior Data Systems, Ltd. website, www.bdsltd.com. The test booklet and answer sheet containing the original questions from which the DRI scales are developed can be viewed at www.online-testing.com.

DRI Scale Interpretation

The DRI scales that measure alcohol use risk, driving risk, drug use risk, stress coping risk, and truthfulness construct a percentile score for the respondent's unique set of responses. The given percentile score corresponds to the percentage of scores that fall below the given value in the frequency distribution of that scale. Percentile scores between 0 and 39% represent a low risk, percentile scores between 40 to 69% represent a medium risk, scores between 70 and 89% represent a problem risk and those with percentile scores between the 90th and 99th percentile are identified as having a severe

problem concerning the given scale topic (Behavior Data Systems, 2007). The sixth DRI scale is the substance abuse/dependency classification scale based on DSM-IV classification criteria. The substance abuse/dependency classification is a binary measure of whether the respondent does or does not meet the substance abuse/dependency criteria outlined in the DSM-IV.

The alcohol scale in the DRI measures the respondent's alcohol use behavior and severity of abuse. The DRI defines alcohol as beer, wine, and other liquors. Questions regarding alcohol use and abuse across the lifecourse are incorporated into the alcohol risk scale, allowing differentiation between those with a history of alcohol abuse but who state that they currently abstain from alcohol use, and those who currently abuse alcohol. An elevated alcohol risk percentile score (70th to 80th percentile) indicates an emerging drinking problem where scores in the 90th to 99th percentile identify established and serious drinking problems.

The DRI driver risk scale is designed to identify aggressive, irresponsible or careless drivers. Respondents with elevated driver risk scores (70th to 89th percentile) identify problem prone drivers who would likely benefit from driving improvement programs and respondents with the highest percentile scores (90th to 99th) are dangerous drivers who pose a threat to public safety while driving. The National Highway Traffic Administration states that the DRI is the only major DUI/DWI test that measures driver risk (Popkins et al., 1988)

The DRI drug risk scale measures the offender's drug use and severity of drug use. Drugs are defined in the DRI as marijuana, ice, crack, cocaine, amphetamines, barbiturates and heroin. Similar to the alcohol risk scale, the DRI drug risk scale takes

special precautionary measures to differentiate between current drug users and recovering drug users. An elevated drug risk scale score (70th to 89th percentile) identifies those with emerging drug problems and those with drug risk score identified as a severe problem (90th to 99th percentile) identifies repeated drug users and drug abuse.

The stress coping risk scale found in the DRI measures the offender's ability to cope effectively with stress, tension and pressure. Stress coping risk percentile scores in the problem risk range (70th to 89th percentile) identifies individuals who would benefit from stress management intervention programs where those with percentile scores in the 90th to 99th percentile represent a severe stress risk problem and should be referred to a mental health specialist for further evaluation.

The truthfulness scale in the DRI identifies how truthful the respondent was when taking the DRI and can be used to recognize those who attempt to "fake good". DRI truthfulness scale scores at or below the 89th percentile suggest that all other DRI scale measurements were completed in a truthful manner and should be reviewed accordingly. Respondents who have truthfulness scales scores that fall between to 70th and 89th percentile are recognized as having potential lapses in truthfulness and thus necessitate having the other DRI scales truth corrected. This transformation produces DRI-scales that are less biased than if they were not truth corrected. Offenders who have a truthfulness percentile score at or above the 90th percentile are defined as being un-truthful. Responses from individuals with a truthfulness percentile score of 90% or above must be interpreted with extreme caution since the responses given by these individuals are likely biased by minimizing problems or not clearly understanding the questions presented in the DRI.

The substance abuse/dependency scale found in the DRI differentiates between offenders with behaviors representing substance abuse and substance dependency and offenders with non-pathological substance use behaviors. The DRI substance abuse/dependency scale is constructed in accordance with the Diagnostic and Statistical Manual Disorders version 4 classification criteria. When a DUI/DWI offender admits to one of the four DSM-IV abuse symptoms, the offender is classified in the substance abuse category. When the respondent admits three of the seven DSM-IV dependency symptoms, the offender is classified in the substance dependency category. Where the DRI alcohol and drug risk scales measure the severity of alcohol and drug use, the DRI substance abuse/dependency scale differentiates between those who abuse alcohol and/or are alcohol dependent and non-pathological substance users. The DRI substance abuse/dependency scale usually incorporates the number of lifetime DUI's into its construction, but for the purposes of this project where self-reported number of DUI's is the outcome variable, self-reported number of lifetime DUI's has been removed from the substance abuse/dependency scale.

Sample Selection

Data were drawn from the online Florida DRI database held by Behavior Data Systems, Ltd. The initial sample consisted of 75,505 DUI offenders. Multiple constraints were placed on the sample to promote accuracy of subsequent analyses. Duplicate cases were identified by matching offenders on static demographic characteristics as well as percentile scores. Cases identified as duplicates were removed from the sample. Offenders who reported having been arrested for DUI before January 1st, 2006 were removed. Thus only offenders who were arrested within one year of possible DRI

assessment were included. Subjects were included in analysis if their test date fell between the dates specified above and who provided valid measurements of age. The DRI requests both the birth-date and age of offender, thus those whose reported age did not match the age calculated by the difference between the test date and their reported birth-date were excluded from analysis. This inclusion criterion was selected under the assumption that those who report an invalid age likely also introduce error into the sample by incorrectly responding to other variables. Once these constraints were placed on the original sample, 30,557 cases remain.

Statistical Analysis

The outcome variable of interest in this project is the number of self-reported lifetime DUI arrests. A Poisson regression model is designed to handle count data and basically predicts the rate of response to increase or decrease in counts (Gardener et al., 1995). Count data are highly non-normal and require special estimation techniques. Poisson regression also allows for the standardization of regression coefficients for varying time spans (Allison, 1999). Older individuals have a greater amount of time to accumulate DUI arrests, thus age is used as an indicator of amount of time exposed to the possibility of receiving a DUI. Although a regression coefficient will not be produced for age when standardizing for years of exposure, standardizing the Poisson regression coefficients to mirror equal lengths of time where DUI arrest is possible allows for a more accurate identification of the unique demographic, behavioral and criminal history characteristics that predict multiple DUI recidivism.

Variables

All descriptive statistics are displayed in table 1 and self-reported number of lifetime DUI's is graphically represented in exhibit 1. To meet the requirements of multivariate regression analysis, all categorical variables were recoded into dummy variables. For ethnicity, dummy variables were created for White, Black, Hispanic, and an "other" category that combined offenders who reported being Asian, American Indian, or "other" ethnicity. White was used as the reference group in the Poisson regression models. Similarly, marital status was re-coded into variables representing being single, married, divorced or widowed, and finally "other". Those who responded as single were used as the reference group in the Poisson regression models. Continuous variables were mean centered to reduce modeling issues introduced by collinearity.

Dependent Variable

Self-reported number of lifetime DUI arrests was the dependent variable in all analyses. Rather than coding this variable as a dichotomous variable identifying between one-time DUI offenders and multiple-offenders, number of lifetime DUI's was analyzed in its original metric. By employing Poisson regression to this variable, this analysis differentiates between number of lifetime DUI's for those reporting anywhere from zero to nine lifetime DUI's.

Independent Variables

Both demographic and DUI specific variables were included in the regression models to control for individual characteristics that have been shown to predict DUI recidivism. Gender, ethnicity, education and marital status represent the demographic controls included in the analysis. Numerous variables were included in analysis to control

for the respondent's propensity towards risky behaviors that are related to driving under the influence. Both the previous number of non-driving related alcohol arrests and non-driving drug arrests within the past five years account for the subject's alcohol and drug related encounters with law enforcement. Number of at-fault auto accidents and number of traffic violations where points were assessed within the past five years control for the individual's driving history. Number of non-alcohol-or-drug related misdemeanors and felonies control for encounters with law enforcement at various levels of severity. All DRI scales which report a percentile score (alcohol risk, driver risk, drug risk, stress coping risk, and truthfulness) were divided by 10 so regression estimates correspond to a 10% change in the given scale rather than a 1% change, giving the interpretation of these scales increased applicability.

<div align="center">Results</div>

All statistical analysis were generated using SAS software, Version 9 of the SAS System for Windows (© 2008, SAS Institute Inc.). Following initial discussion of the descriptive statistics, results from the Poisson regression models are presented.

Descriptive Statistics

Descriptive statistics are presented in table 1.Sixty-nine percent of the sample included in analysis was male and the average age of the sample was around 37 years old. Regarding ethnicity, around 62% of the sample was White, 11% Black, 22% Hispanic and around 5% of offenders were coded as ethnicity of "other". The average education of the sample was slightly above a high school degree. For marital status, 55% of respondents reported being single while 22% reported being married, 16% reported being divorced and around 6% were coded as separated or widowed.

Thirteen percent of the sample reported no DUI arrests, 62% reported one DUI arrest, 19% reported two DUI arrests, and 6% reported three or more DUI arrests (analysis available on request). More than 90% or respondents reported having zero non-driving alcohol related arrests five years previous to assessment and nearly 93% reported no non-driving drug related arrests five years previous to assessment (analysis available on request). Around 60% reported no traffic violations where points were assessed five years before assessment. Nearly 81% of subjects reported no at-fault driving accidents five years prior to assessment, 82% reported having no misdemeanor arrests that were not alcohol or drug related and 91% reported having no felony arrests that were not alcohol or drug related.

Table 1 about here

Poisson Regression

Numerous Poisson regression models were estimated to assess the capacity of the alcohol risk, driver risk, drug risk, stress coping risk, truthfulness percentile scores and finally the substance abuse/dependency classification to predict multiple DUI recidivists. First, a restricted model that included only the subject's demographic, driving and criminal history related variables was initially estimated. Next, a model including the alcohol risk percentile, in addition to all variables included in the restricted model, was estimated to test whether the alcohol risk percentile added predictive capacity to the model. Each DRI scale was added to the model in a similar fashion with the final model including all variables included in analysis. This type of nested model building allows for statistical tests of the goodness of fit that each additional variable provides to the predictive model. The X^2 likelihood-ratio test allows determination of the best fitting

model and provides information to the predictive capacity added by each added variable. The -2 Log-Likelihood value for each model, and the X^2 difference between sequential models for degrees of freedom used is presented at the bottom of Table 2.

Parameter Estimates

Starting with the restricted model that includes only the respondent's demographic and DUI related variables (Model 1, Table 2), inferences about the personal characteristics that predict DUI recidivism can begin to take shape. All variables excluding having reported an accident with the arrest and number of reported non-drug or alcohol related felonies were statistically significant. For males, the expected log count compared to females was .07 while holding other variables constant in the model, meaning that men had around 7% more DUI arrests than did females (exp(.07)=1.07). Subjects who were of Black, Hispanic, or of "other" ethnicity had an expected log count of DUI arrests lower than Whites. Those with more education had a lower expected log count of DUI arrests, holding other variables constant in the model. Those who were married, divorced or who reported being separated or widowed had a lower expected log count of DUI arrests as compared to those who reported being single. Offenders who had a greater number of non-driving alcohol arrests, a greater number of at-fault accidents, a greater number of traffic violations where points were assessed, and those reporting a greater number of non-alcohol or drug related misdemeanor arrests had a significantly higher expected log count of DUI arrests. Interestingly, those who reported a higher number of non-driving related drug arrests five years previous to assessment had significantly lower expected log counts of DUI arrests, holding other variables constant.

Model 2 includes all variables present in Model 1 but adds percentile scores from the alcohol risk scale. The alcohol risk percentile score is a statistically significant predictor of the expected log counts of DUI arrests. The addition of the alcohol risk scale to the previous model produces a significantly better fitting model (X^2 diff= 512, df=1, p<.001). For these data, the expected change in log count for a 10% above average increase in the alcohol risk percentile was .06, meaning that for every 10 percentile increase above average on the alcohol risk scale, the expected log count of DUI arrests increased by 6% (exp(.06)=1.06).

Table 2 about here

Model 3 adds the driver risk percentile to the previous model, again producing a model that predicted the log count of DUI arrests more accurately than model 2 (X^2 diff= 15, df=1, p<.001). A 10% increase above average in the driver risk percentile score corresponds to a .01 increase in the log count of DUI arrests. In other words, for every 10% increase in driver risk percentile score above average, there is a 1 % increase in the log count of DUI arrests (exp (.01) =1.001). For a 20 percentile above average increase in driver risk, the expected log count of DUI arrests increased by around 2%, holding other variables in the model constant. Based upon the value of the estimate for the driver risk percentile and the relatively small improvement of model fit from model 2 to model 3, it seems that the driver risk percentile does not predict multiple DUI recidivism as well as the other scales provided by the DRI.

Model 4 controls for all variables in model 3 as well as adds the drug risk percentile. The inclusion of the drug risk percentile produces a better fitting model than model 3 (X^2 diff= 48, df=1, p<.001). For every 10% above average increase in a

respondent's drug risk percentile score, there is a .02 unit increase in the log count of DUI arrests. This translates into a expected log count of DUI arrests 2% greater for every 10 percentile increase in drug risk above average (exp (.02) =1.02).

Model 5 added the stress coping risk percentile score to model 4, again producing a significantly better fitting model (X^2 diff= 140, df=1, $p<.001$). Holding all other variables in the model constant, with each 10% above average increase in the stress coping risk percentile there is a .04 increase in the log count of DUI arrests. This means that every 10% above average percentile increase in stress coping risk corresponds to an 4.1% greater expected log count of lifetime DUI arrests (exp (.04) =1.04). For a 20 percentile above average increase in stress risk, the expected log count of DUI arrests increases by about 8%. With the inclusion of the stress risk percentile, the relationship between the log count of DUI arrests and being male decreased to non-significance. The nature of Poisson regression coefficients do not allow for formal mediation analysis, but the fact that the inclusion of the stress risk scale into the model reduced the relationship between gender and expected log count of DUI arrests to non-significance indicates that stress coping beliefs and behavior may be key to understanding the gendered nature of DUI recidivism.

Model 6 adds the truthfulness percentile score to all variables tested in model 5. Once again, the inclusion of the truthfulness percentile score produces a better fitting model than model 5 which did not include the truthfulness percentile (X^2 diff= 66, df=1, $p<.001$). For every 10% increase above average in the truthfulness scale, there is a .02 expected log count decrease in the number of DUI arrests. For every 10% increase above average in the truthfulness percentile, there is a 2% decrease in the expected log count of

DUI arrests (exp (-.02) =.980). Basically, those who are more truthful have a lower number of DUI arrests. All other coefficients remained unchanged with the inclusion of the truthfulness scale.

Model 7 represents the final and best fitting model developed to predict multiple DUI recidivism. The inclusion of the substance abuse/dependency classification produced a better fitting model than that represented by model 6 (X^2 diff= 111, df=1, $p<.001$). Those who met the substance abuse/dependency classification had a log count of lifetime DUI's 21% higher (exp (.194) =1.21) than those who did not meet the substance abuse/dependency classification criteria.

Discussion

The final model represents the combination of variables contained in the DRI that best predicts the number of DUI arrests experienced by the 2007-2008 Florida sample. In the final model, those who were White, single and had less education displayed an increased risk of having a greater expected log count of DUI arrests than those without these characteristics. Regarding the variables that represent the respondent's experience with DUI related problematic behavior, the number of non-driving alcohol arrests, number of at-fault accidents and number of traffic violations where points were assessed were significantly positively related to number of lifetime DUI's. Those reporting an accident in the given arrest had an expected log count of DUI arrests lower than those who did not report an accident in the arrest, indicating those with multiple DUI's are less likely to have been involved in accident in their previous arrest. This makes sense in the context that those who experience accidents in their DUI arrest are likely to suffer greater severity in terms of both judicial reprimands and physical injury.

The single most interesting finding stemming from this research is the fact that the relationship between gender and expected log count of DUI arrests becomes statistically non-significant when controlling for the individual's stress risk profile. The DUI recidivism literature is replete with evidence that males are more likely to be DUI recidivists than are females. The statistical testing of mediation requires regression estimates unlike those produced in Poisson regression, thus disallowing further examination of the complex relationship between gender, stress and DUI recidivism. It is likely that when accounting for stress coping abilities, the relationship between gender and DUI recidivism becomes non-significant due to the different nature of stress coping between men and women. The positive association between being male and DUI recidivism is likely strengthened by the fact that stress coping behavior for men is likely associated with greater alcohol use as a stress coping mechanism in men but not in women (Cooper et al., 1992).

Generally, these results reiterate the importance of using advanced measurement scales that attempt to accurately capture behavioral aspects of the offender that are related to DUI recidivism. By testing the impact of various behavioral characteristics of DUI offenders and using statistical methods that properly define the offender as a potential multiple DUI recidivist, this work provides an argument for the value of properly addressing the heterogeneous profiles of DUI offenders in the United States. In addition, the results of this work can be used by public health and law enforcement agencies to identify offenders who potentially pose the greatest threat to the safety of American roads.

Limitations and Future Directions

This study is the first in a series of publications projected to continue over a decade. With assistance from the State of Florida and Behavior Data Systems, baseline data from the population of Florida DUI/DWI offenders and follow-up data taken each year will be used to track individual DUI/DWI trajectories over a ten year period. Data collection will employ a multiple-cohort design, where every subsequent year of information collected on DUI offenders will be used to both identify individuals who are already in the database (DUI recidivists) as well as provide baseline data for the cohort of DUI offenders measured in the following year. All unmatched cases for a given data collection year will be used for the following year's matching process. Cox proportional hazard modeling will be used to identify predictors of DUI recidivism in the analysis. The longitudinal design will allow for increased causal inference as well as permit the use of time varying covariates (changing criminal history for example) into the predictive model. By using longitudinal methods to track DUI recidivism over a decade, a more robust and nuanced appreciation of the characteristics of DUI recidivists will be developed.

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Table 1. Descriptive Statistics

	N	Min	Max	Mean	S.D.
# of Lifetime DUI Arrests	30481	0	9	1.2	0.78
Male	30557	0	1	0.69	0.46
Age	30557	15	78	36.71	12.71
White	30557	0	1	0.62	0.49
Black	30557	0	1	0.11	0.31
Hispanic	30557	0	1	0.22	0.41
Other Race	30207	0	1	0.05	0.21
Education	30557	1	4	2.53	0.97
Single	30557	0	1	0.55	0.5
Married	30557	0	1	0.22	0.42
Divorced	30557	0	1	0.16	0.37
Separated/Widowed	30347	0	1	0.06	0.23
Accident in Arrest	30442	0	1	0.19	0.39
# of Non-Driving Alcohol Arrests	30445	0	8	0.13	0.49
# of Non-Driving Drug Arrests	30446	0	8	0.1	0.4
# of At-Fault Accidents	29830	0	9	0.24	0.55
# of Traffic Violations with Points Assessed	30312	0	20	0.93	1.57
# of Non-Drug-Alcohol Misdemeanors	30398	0	9	0.28	0.74
# of Non-Drug-Alcohol Felonies	30550	0	8	0.12	0.49
Truthfulness Percentile Score	30550	0	99	54.98	26.02
Alcohol Risk Percentile Score	30550	0	99	63.83	21.06
Driver Risk Percentile Score	30550	0	99	57.71	20.88
Drug Risk Percentile Score	30550	0	99	73.5	36.32
Stress Coping Risk Percentile Score	30557	0	99	48.02	29.72
Substance Abuse/Dependency Classification	30481	0	1	0.61	0.49

Table 2: Poisson regression estimates

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	B	(S.E.)	B	(S.E.)	B	(S.E.)	B	(S.E.)	B	(S.E.)	B	(S.E.)	B	(S.E.)
Intercept	-3.30***	(.01)	-3.29***	(.01)	-3.30***	(.01)	-3.30***	(.01)	-3.29***	(.01)	-3.30***	(.01)	-3.40***	(.01)
Male	0.07***	(.01)	0.03**	(.01)	0.03**	(.01)	0.03**	(.01)	0.02	(.01)	0.02	(.01)	0.01	(.01)
Black	-0.20***	(.02)	-0.17***	(.02)	-0.17***	(.02)	-0.17***	(.02)	-0.18***	(.02)	-0.17***	(.02)	-0.17***	(.02)
Hispanic	-0.12***	(.01)	-0.10***	(.01)	-0.10***	(.01)	-0.09***	(.01)	-0.10***	(.01)	-0.09***	(.01)	-0.08***	(.01)
Other Race	-0.06*	(.03)	-0.04	(.03)	-0.05	(.03)	-0.04	(.03)	-0.03	(.03)	-0.01	(.03)	-0.01	(.03)
Education	-0.04***	(.01)	-0.03***	(.01)	-0.03***	(.01)	-0.03***	(.01)	-0.04***	(.01)	-0.04***	(.01)	-0.04***	(.01)
Married	-0.21***	(.01)	-0.23***	(.01)	-0.23***	(.01)	-0.23***	(.01)	-0.22***	(.01)	-0.22***	(.01)	-0.22***	(.01)
Divorced	-0.18***	(.01)	-0.20***	(.01)	-0.20***	(.01)	-0.20***	(.01)	-0.19***	(.01)	-0.19***	(.01)	-0.19***	(.01)
Separated/Widowed	-0.29***	(.02)	-0.30***	(.02)	-0.30***	(.02)	-0.29***	(.02)	-0.27***	(.02)	-0.27***	(.02)	-0.27***	(.02)
Accident in Arrest	-0.02	(.01)	-0.04**	(.01)	-0.04**	(.01)	-0.04**	(.01)	-0.04**	(.01)	-0.04**	(.01)	-0.04**	(.01)
N.D. Alcohol Arrest	0.11***	(.01)	0.07***	(.01)	0.07***	(.01)	0.07***	(.01)	0.07***	(.01)	0.07***	(.01)	0.06***	(.01)
N.D. Drug Arrest	-0.04*	(.01)	-0.03*	(.01)	-0.04*	(.01)	0.01	(.02)	-0.01	(.02)	-0.02	(.02)	-0.03	(.02)
At-Fault Accidents	0.07***	(.01)	0.06***	(.01)	0.05***	(.01)	0.05***	(.01)	0.05***	(.01)	0.04***	(.01)	0.03**	(.01)
Points Assessed	0.03***	(.)	0.03***	(.)	0.03***	(.)	0.03***	(.)	0.02***	(.)	0.02***	(.)	0.02***	(.)
Misdemeanor	0.03***	(.01)	0.03***	(.01)	0.03***	(.01)	0.03***	(.01)	0.03***	(.01)	0.03***	(.01)	0.02***	(.01)
Felony	-0.01	(.01)	-0.02	(.01)	-0.02	(.01)	-0.02	(.01)	-0.02	(.01)	-0.02	(.01)	-0.02	(.01)
Alcohol Risk Pct.			0.06***	(.)	0.05***	(.)	0.06***	(.)	0.06***	(.)	0.06***	(.)	0.05***	(.)
Driver Risk Pct.					0.01***	(.)	0.02***	(.)	0.03***	(.)	0.03***	(.)	0.04***	(.)
Drug Risk Pct.							0.02***	(.)	0.01***	(.)	0.01***	(.)	0.01***	(.)
Stress Risk Pct.									0.04***	(.)	0.04***	(.)	0.04***	(.)
Truth Pct.											-0.02***	(.)	-0.01***	(.)
Abuse/Dependency													0.19***	(.01)
-2 L.L. (df)	-28101	(15)	-27589	(16)	-27574	(17)	-27526	(18)	-27386	(19)	-27320	(20)	-27209	(21)
Absolute X^2 diff			512***		15***		48***		140***		66***		111***	

Note: n=29,076; *p<.05; **p<.01; ***p<.001; (.) S.E. <.001.