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Do Deterrence and Social-Control Theories Predict Driving after Drinking 15 years after a DWI Conviction?

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Abstract

Objective—This study investigates the utility of deterrence and social-control theories for prospective prediction of driving-while-impaired (DWI) outcomes of first-time DWI offenders.

Method—The sample consisted of a subset of 544 convicted first-time DWI offenders (n = 337 females) who were interviewed 5 and 15 years after referral to a screening program in Bernalillo County, New Mexico. Variables collected at the 5-year (initial) interview were used in structural equation models to predict past 3-months, self-reported DWI at the 15-year follow-up (follow-up) interview. These variables represented domains defined by deterrence and social-control theories of DWI behavior, with one model corresponding to deterrence theory and one to social-control theory.

Results—Both models fit the data. DWI jail time was positively related to perceived enforcement, which was negatively but not significantly related to self-reported DWI. Neither jail time for DWI nor perceived likelihood of arrest was linearly related to self-reported DWI at follow-up. Interactions between jail time and prior DWI behavior indicated relatively weaker associations between initial and 15-year DWI for those reporting more jail time.

Conclusion—Our prospective study demonstrated that for this convicted DWI offender cohort, classic formulations of deterrence and social-control theories did not account for DWI. However, results suggest that punishment may decrease the likelihood of DWI recidivism.

Keywords

Driving while intoxicated; DWI; driving under the influence; DUI; deterrence; social-control; impaired driving; theory

1. Introduction

The principal approach to preventing alcohol-impaired driving is based on deterrence through law enforcement and the criminal justice system (Homel, 1988;Taxman and

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Piquero, 1998). Deterrence theory is based on the assumption that the perception of certain, swift, and severe punishment discourages people from illegal behavior. Deterrence theory assumes that law breaking is inversely proportional to the swiftness, certainty, and severity of punishment (Taxman and Piquero, 1998). It presupposes that humans are rational beings who are motivated primarily to avoid pain and seek pleasure, free to make choices and control behavior, knowledgeable regarding harmful behaviors, and deterred by fear of negative consequences. With respect to driving while impaired (DWI), they are aware of the laws and sanctions pertinent to this behavior (Vingilis, 1990). Ross (1985) argued that these assumptions may not be applicable across all drivers.

Deterrence of DWI behavior has been the focus of a number of empirical investigations and theoretical reviews. However, adequate tests of theoretical models to explain DWI recidivism are lacking (Nochajski and Stasiewicz, 2006). Despite this gap in empirical evidence demonstrating its practical utility, deterrence theory is the dominant ideology in law enforcement models to reduce DWI. Classic deterrence theory, based largely on assumptions regarding human behavior rather than empirical observations, ignores potential variability in responses to threat or experience of punishment, and does not consider potentially important concepts, such as the moral components described in social-control approaches (Berger and Snortum, 1986;Vingilis, 1990). The generalizability of research on deterrence theory is limited in that the subjects of most studies are not convicted offenders, but rather members of the general public or convenience samples of college students (Freeman et al., 2006).

Social-control theory, developed in the 1970s, expands the concept of deterrence to encompass social influences. According to this theory legal sanctions are only one mechanism that influences DWI behavior. Other “informal sanctions,” such as social stigma associated with committing the crime, perceived risk in committing the crime, and moral commitment to the law, are treated as factors discouraging criminal behavior. “Informal supports,” including criminal self-image, criminal propensity, criminal life organization, peer/family group support for the criminal behavior, and skills related to criminal behavior, are treated as factors that encourage illegal behavior. Strong societal bonds keep a person adherent to normative behavior (Hirschi, 1969), while attitudes of peers regarding DWI behavior (Vingilis, 1990) can operate either in conjunction with, or in opposition to these norms. Social-control theory, while incorporating many sources of potential social influence on illegal behavior, does not explicitly include punishment experience of peers and its potential effect on the index person’s risk perception.

There is little current research examining either deterrence or social-control theories of DWI behavior. In the present study we examine the applicability of deterrence and social-control theories to DWI recidivism by evaluating the persistence of impaired driving behavior among convicted first DWI offenders. We begin by briefly reviewing the literature on theories that may explain the relationship between punishment and DWI recidivism. We then examine assumptions of deterrence and social-control theories in predicting self-reported impaired driving among a sample of DWI offenders. Using data collected 5 years after convicted first DWI offenders were referred for screening, we evaluate the performance of statistical models based on deterrence and social-control theories in predicting self-reported DWI outcomes 10 years later.

1.1 Theoretical arguments regarding specific DWI deterrence

Gibbs (1968) defined general deterrence as the effect of law enforcement on the behavior of those in the general driving public who have not been punished for a crime, including those who have engaged in illegal behavior and those who have not. Specific deterrence, in contrast, refers to the effect of punishment on offenders specifically targeted for punishment,

including those who have already been punished (Ross and Nichols, 1990). Here, we focus on specific deterrence of impaired driving among people previously convicted of DWI.

Offenders who have been previously arrested or convicted are likely to repeat this behavior, with up to half eventually being re-arrested (Bakker et al., 2000;Centers for Disease Control and Prevention, 1994;Hedlund and McCartt, 2002;Lapham et al., 1997). Re-arrest rates are likely underestimates, as they do not include drivers who continue to re-offend but are not apprehended. For example, for every arrest, an impaired driver makes an estimated 50 to 200 trips that remain undetected (Beitel et al., 2000). Repeat offenders may be less influenced by the threat of re-arrest and accompanying sanctions than the general driving public (Beirness et al., 1997;Yu, 2000).

1.2 The role of criminal propensity

Theoretical models of deterrence differ in their assumptions regarding susceptibility to threat of punishment. Economic models (Becker, 1968) assume the individual variability in traits, such as propensity to commit crimes, does not affect receptivity to punishment. Modified deterrence models, like social-control theory, however, argue that the degree of deterrence depends on criminal propensity and other factors. While some individuals are highly responsive to the threat of punishment, those with a high crime propensity are relatively nonresponsive to this threat (Bertelli and Richardson, 2008;Meier, 1999). Bertelli and Richardson (2008) use data from the 2001 National Survey of Drinking and Driving Attitudes and Behavior (NSSDAB) to evaluate the effect of crime propensity on DWI deterrence. Based on answers of 6,002 respondents to questions regarding knowledge of the effects of alcohol on driving, history of driving after drinking, and perceptions of arrest risk, the investigators estimated a propensity for each individual to drive while impaired after drinking. Results indicate that state anti-DWI laws are most effective among those with lowest estimated propensities for driving after drinking. Perception of the likelihood of arrest and agreement with the drinking and driving laws were associated with reduced propensity for all respondents, but actual enforcement was not related to propensity to drive after drinking.

1.3 The role of punishment avoidance and vicarious experience

Another factor to consider when evaluating deterrence is avoidance of punishment for engaging in a behavior. DWI does not always lead to arrests, arrests may not be followed by convictions, and convictions may not result in punishment. If offenders “get away with it” often enough, they may discount the threat of punishment, because it is such a rare event (Stafford and Warr, 1993); (Freeman et al., 2006). A limitation of deterrence theory is that it does not explicitly consider the possibility that *not* being arrested for DWI may encourage DWI behavior more than punishment discourages it.

Stafford and Warr (1993) stress the powerful effects of the direct and vicarious, or indirect, experience of punishment avoidance on criminal activity. They argue that general deterrence should be reconceptualized as the deterrent effect of *indirect* experience with punishment and punishment avoidance. Specific deterrence should be defined as the effect of *direct* and *indirect* experience with punishment and punishment avoidance. Convicted DWI offenders may be influenced by the punishments others receive, the punishments they themselves receive, and their experiences (or what they see others have) of punishment avoidance, the combination of which blurs the distinction between general and specific deterrence among offenders.

Freeman et al. (2006) applied this reconceptualized deterrence theory to data from 166 repeat DWI offenders in a cross-sectional study of self-reported DWI behaviors. Their

results demonstrate that vicarious exposure to others who have been punished, or have avoided punishment, is not associated with impaired driving. However, perceptions of arrest certainty and severity are associated with impaired-driving offenses, and punishment avoidance is the most robust predictor of self-reported DWI. Another study surveyed 899 members of the public, university students, and people referred to a drug diversion program. In that analysis punishment avoidance and vicarious punishment avoidance predicts self-reported propensity to drive under the influence of drugs in the future (Watling et al., 2010). However, since only 12 of the subjects had ever been convicted of a drugged driving offence, their analysis did not include a measure of punishment.

1.4 Response to DWI laws as a function of crime propensity

In analyses of data from the NSSDAB, Houston and Richardson (2004) examined associations among DWI, perceptions of arrest and punishment costs, and knowledge of penalties for impaired driving. They divided respondents into three groups: nondrinking drivers, occasional drinking drivers, and frequent drinking drivers (Meier, 1999). Results show frequent drinking drivers perceive punishments for DWI offenses as harsher than do other groups. Frequent drinking drivers also perceive the probability of detection of impaired driving as lower than do other groups. Still, 30% of frequent drinking drivers responded that they would “almost certainly” or “very likely” be stopped if driving while impaired. Results suggested that media campaigns focusing on awareness might lack effectiveness for frequent drinking drivers, who are not as concerned as nondrinking drivers with societal anti-DWI norms but are more knowledgeable about existing DWI laws. Consistent with deterrence theory, however, drinking drivers who believe it likely that they will avoid an arrest for DWI are likely to continue the behavior.

The present study examines self-reported DWI behavior in light of information provided by convicted first DWI offenders 10 years previously. Information pertinent to each domain of deterrence and social-control theories was used to predict DWI behavior, using a structural equation modeling (SEM) approach.

2. Method

2.1 The Sample

The study population for this analysis was referred to the Lovelace Comprehensive Screening Program (Screening Program) between April 1989 and March 1992 following a first conviction for DWI. Subjects completed an interview 5 and 15 years after this referral. Subjects were selected for this study regardless of Screening Program completion or whether they were referred to treatment. The present analysis utilizes data obtained from the 5-year follow-up study (referred to here as the “initial interview”) to predict behavior reported at the 15-year follow-up (referred to here as the “follow-up interview”). The study was conducted to determine the prevalence of psychiatric disorders. We selected a cohort consisting of 1,208 consecutive female and 1,407 male referrals to the Screening Program. Males were frequency matched to females by screening date and ethnicity. Of these, 56 had died and we could not locate 497; we located 2,062 who were alive and interviewed 1,396 of them (Figure 1).

Ten years later we attempted to locate and interview the 1,396 individuals who took part in the initial study. The protocol used to recruit subjects included a series of letters, telephone calls, and home visits by staff bilingual in English and Spanish (Lapham and Skipper, 2011). This protocol was approved by an institutional review board. Participants provided written informed consent and were offered $100 to complete the interview. Of the 1,396 people selected for the follow-up interviews 905 were located, 391 were not located, 100 were

deceased and 716 were interviewed. Comparisons of those interviewed at follow-up to those originally selected who were not known to be deceased (N=2,459) revealed that males, Mexican nationals, those with an arrest warrant, those without telephones, and those who did not complete screening were under-represented in the follow-up sample (Table 1). The sample for the present analysis included 544 participants who provided complete information needed for the analysis.

2.2 Predictors measured at the initial interview

The initial interview queried information on basic demographics, histories of impaired driving and DWI arrests, consequences of DWI arrests, drinking consequences, perceived DWI law enforcement, social norms around DWI, social deviance, drinking-related guilt, and driving risk taking (see below), as well as symptoms of psychiatric disorders. Details of this study can be found in previously published papers (Lapham et al., 2000;Lapham et al., 2001;Lapham et al., 2011).

2.2.1 Self-reported DWI at the initial interview—Self-reported DWI was based on responses to the question: “In the past 3 months how many times did you drive a motor vehicle when you thought you might be over the legal blood alcohol limit for drunken driving (DWI)?” Because the distribution of scores on this item was severely skewed with a large preponderance of 0 values, we re-scored the item as a dichotomous yes/no indicator (any drinking and driving during the past 3 months vs. no drinking and driving during the past 3 months).

2.2.2 DWI consequences—A number of variables were examined to determine the final variable to be used in the models. These included the number of charges for DWI, number of DWI arrests, number of DWI convictions, jail time served as a result of a DWI arrest or conviction, number of license suspensions/revocations resulting from a DWI, and number of times ticketed or arrested for driving on a suspended or revoked license. The best measure of past DWI consequences stemming from the initial arrest, conviction, and any arrests and convictions that occurred in the 5 years after the first arrest was the log-transformed lifetime number of hours of self-reported jail time. The log of zero is undefinable. Therefore, to allow for log transformation of this variable, we added 1 hour to each person’s raw score. In the sample available for analysis at follow-up, values on this transformed measure ranged from 0 to 8.48.

2.2.3 Perceived enforcement—We examined several measures of the likelihood of detection before defining the construct of perceived enforcement. Two “likeliness of detection” variables were collected but were not related significantly to DWI behavior at follow-up. These were the subjects’ responses to the question, “If you were driving drunk but appeared sober (or in the second question, “appeared drunk”) how likely are you be arrested for DWI?” In the final model we used a five-item composite based on measures described in a study by Turrisi and Jaccard (1992). The perceived enforcement measure was derived from responses to a scenario in which participants were asked to imagine they were intoxicated and pulled over by a law enforcement officer, and then asked to provide their opinions about the consequences. They were asked, using a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), how much they agreed with the following statements: I would definitely have to attend a drunk driver program; I would definitely receive at least a $250 fine; it would be on my record forever; I would lose my driver’s license for a year; and I would probably have to go to jail. The potential and observed ranges of scores on this composite were from 1 to 5. Cronbach’s alpha for this composite was .65.

2.2.4 Deviance—We measured deviance using a summed composite of 14 items regarding tendencies to defy authority, break rules, and engage in antisocial behaviors (Lapham et al., 1996). Using four-point rating scales (0 = *never* or *not true*, 3 = *often* or *always true*), items asked about the frequency of engaging in rebellious behavior, rule breaking, and fighting, as well as attitudes toward laws and law enforcement officers (e.g., "I have had troubles because I don't follow rules," "I rebel against authority.") The potential range of scores was from 0 to 42; the observed range was from 0 to 30. Cronbach's alpha for this composite was .79

2.2.5 Drinking-related guilt—We used a three-item mean composite to assess whether and how often a participant felt guilty or ashamed of his or her drinking and behavior when drinking. Items were derived from measures described in Turrisi and Jaccard (1992) and Marowitz (1998). Two items ("Have you ever felt ashamed of what you said or did when drinking?," "Have you ever felt guilty or shameful because of drinking too much?") had response options ranging from *No* (0) to *Yes, more than four times* (3). One item ("Do you ever feel bad about your drinking?") had a dichotomous response scale (0 = *No*, 1 = *Yes*). The potential range of scores on the composite was from 0 to 2.33; the observed range was 0.33 to 2.33. Cronbach's alpha for this composite was .78.

2.2.6 Anti-DWI norms—We used a two-item mean composite to assess to what degree friends and family would think less of the participant if he or she were to be arrested for DWI ("In your opinion, if you were arrested for DWI how likely would it be that your friends would think less of you?"), with response options ranging from *very unlikely* (1) to *very likely* (4). The potential and observed ranges of scores on the composite were from 1 to 4. Cronbach's alpha for this composite was .73 (r = .59).

2.2.7 Driving risk taking—We measured driving risk taking using a composite of two subscales. The first assessed feelings of power while driving ("When I drive at high speeds I feel powerful."). The second assessed hazardous or risky driving behaviors ("I dodge and weave through traffic.") (Lapham et al., 1996). The resulting composite had a potential range of scores from 0 to 27; the observed range was 0 to 20. Both subscales had Cronbach's alpha values of .83 and were strongly correlated with each other (r = .74).

2.2.8 *Hazardous alcohol use*—was a latent variable with 3 indicators: a 4-category drinking level variable (no use to heavy use) based on a 3-month measure of consumption (Standard Ethanol Content score); a log transformed quantity/frequency indicator; and a 3-item composite assessing recency and consistency of alcohol use (Scheier et al., 2008).

2.2.9 Self-reported DWI at follow-up interview—The outcome variable in the models presented here is self-reported DWI based on the same single-item measure used at the initial interview, as described above. We did not incorporate information related to deterrence theory gathered at the second interview because the purpose of the paper was to determine whether experiences occurring in the first 5 years following a first offense fits deterrence model in determining long-term outcomes.

3. Calculation

We evaluated the theories using a SEM approach in this sample of adults previously convicted of DWI. We collected measures relevant to deterrence and social-control theories of DWI recidivism 5 years after referral for screening following a first DWI conviction. The purpose of this study was to determine the extent to which offenders' experiences and perceptions following their first DWI, to a point in time 5 years later, affected or predicted their future behavior, in accordance with theoretical conceptions regarding control of DWI

behavior. Using this reasoning, if social controls/consequences experienced in the 5 years after a first DWI are the main factors influencing subsequent behavior, models based on theoretical constructs derived from these two dominant models should successfully predict DWI behavior 10 years later.

3.1. Statistical Methods

We examined relationships specified under deterrence and social-control models using manifest variable path modeling. Specifically, we examined the degree to which measures collected at the initial interview predicted past 3-month DWI behavior reported at the follow-up interview. As the outcome measure was dichotomous, we employed the weighted least squares means and variance adjusted (WLSMV) estimation procedure under Mplus 4.21 (Muthen and Muthen, 2008), which allows for proper estimation of parameter estimates and standard errors for the hypothesized structural relations. We also considered models in which DWI at follow-up was treated as a count variable and as ordered categorical variables with 6 and 7 categories (0, 1, 2, 3, 4, and 6 or more; and 0, 1, 2, 3, 4, 6, and 9 or more instances of DWI). Because of the overwhelming preponderance of 0s, the observed distribution of values did not correspond well to the Poisson distribution assumed under the count variable model. Findings from the ordinal outcome model did not differ appreciably from those of the much more parsimonious binary outcome model. Accordingly, results from the binary outcome models are presented here.

3.2. A two-model approach

The primary analyses consisted of estimating and comparing two SEMs for prospectively predicting DWI over a 10-year interval between the initial and follow-up interviews, with one model corresponding to deterrence theory and one to social-control theory. To allow for formal statistical comparison of the two models, we estimated a pair of properly nested SEMs such that both models included all variables from the more complex and inclusive social-control model. In estimating deterrence model, structural parameters (paths) between the DWI outcome and the four predictors specific to social-control model (guilt associated with alcohol use, driving risk taking, deviance, perceived anti-DWI norms) were fixed at zero. Then, in estimating social-control theory, these model constraints were relaxed, and these four parameters were freely estimated. This sequential estimation of nested models allowed for direct comparison of the fit of the two models via a scaled χ^2 difference test. Because the two theories make specific predictions regarding signs of the associations among variables, we evaluated all paths using one-tailed tests of significance.

4. Results

4.1 Sample characteristics and descriptive statistics

Of the 544 participants providing complete data, 62% (n = 337) were female (Table 2). Participants ranged in age from 33 to 82 years old at follow-up (M = 44.7 years, SD = 7.9 years). Almost half of participants (47%) identified themselves as Hispanic, and the majority (63%) had at least 1 year of post-high school education.

Sixty-two of participants (11%) reported DWI at least once during the 3 months prior to the follow-up interview. Among the participants reporting at least one instance of past 3-month DWI, slightly fewer than half (45%) reported only one instance, 16% reported two instances, and the remainder reported from 3 to 63 instances of DWI in the past 3 months. Only a small proportion of participants (7%) reported that they did not spend time in jail as result of DWI arrests. Half of participants reported spending a total of 1-6 hours in jail as a result of DWI arrests; 17% reported 7-12 hours of jail time; 8% reported 13-24 hours of jail time; 8% reported 26-72 hours of jail time, and 10% reported 74-4,800 total hours of jail

time as a result of DWI arrests. Means, standard deviations, and correlations for model variables are presented in Table 3.

4.2 Deterrence model

The deterrence model specified here includes direct and indirect paths from log lifetime DWI jail time, as reported at the initial interview, to past 3-month DWI reported at follow-up. As in the strictest formulation of deterrence theory, the sole mediator of the association between jail time and DWI was perceived enforcement of anti-DWI laws. To explore the potential moderating role of DWI jail time on the longitudinal relationship between self-reported DWI at the initial interview and DWI at follow-up, we added an interaction between DWI jail time and initial interview DWI, along with linear effects of initial interview DWI, to this basic deterrence model (Figure 2).

The deterrence model with the interaction effect fit the data well (comparative fit index [CFI] = 0.999, root mean square error of approximation [RMSEA] = 0.016, WLSMV scaled χ^2 (6) = 6.83, p =0.34). Lifetime DWI jail time was positively related to perceived enforcement (p = 0.001), which in turn was negatively but not significantly, related to DWI at follow-up. The direct path from 'lifetime DWI jail time' to 'DWI at follow-up' was not significant, but DWI at the initial interview was positively related to DWI at follow-up ($p <$ 0.002). This association was qualified by a significant interaction between initial interview DWI and DWI jail time (p = 0.001), the form of which we describe below.

4.3 Social-control model

To determine if the psychosocial factors that distinguish social-control theory from deterrence theory provided additional explanatory power, we estimated a more inclusive model paralleling the deterrence model described above, but with the addition (freeing) of paths between social-control theory predictors and DWI at follow-up. The social-control model with the lifetime DWI jail time x initial interview DWI interaction (Figure 3) showed excellent model fit (CFI = 1.000, RMSEA = 0.000, WLSMV scaled χ^2 (3) = 2.93, p = 0.40), but yielded no improvement in fit over the deterrence model (scaled $\Delta\chi^2$ (3) = 3.78, p = 0.29). This is consistent with the lack of significant associations between the social-control model predictors measured at the initial interview and DWI measured at follow-up. Lifetime DWI jail time was positively related to perceived enforcement (p = 0.009) which, in turn, was negatively but not significantly, related to DWI at follow-up. The direct path from lifetime DWI jail time to DWI at follow-up was not significant, but the path from initial interview DWI to DWI at follow-up was positive and significant (p = 0.015). As in the deterrence model results, this significant association was qualified by a significant interaction between initial interview DWI and DWI jail time in predicting DWI at follow-up (p = 0.006).

4.4 Interaction of lifetime DWI jail time and initial DWI in predicting 15-year DWI

We probed the form of the interaction detected in the SEMs via logistic regression models using techniques outlined by Aiken and West (1991). We evaluated the association between initial interview DWI and follow-up DWI at a low level of jail time (10^{th} percentile) and at a high level of jail time (90^{th} percentile), while controlling for all other model predictors. For those reporting relatively little jail time, the association between initial interview DWI and DWI at follow-up was positive and significant (b = 0.327, p = 0.042), but for those reporting the highest levels of jail time, the association was negative and nonsignificant (b = -0.454, p = 0.198).

5. Discussion

5.1 Actual punishment versus perception of enforcement as a deterrent

Our findings suggest that the drinking and driving behaviors of DWI offenders may be less influenced by the perception of enforcement than suggested by deterrence and social-control theories. Deterrence and social-control theories form the bases for contemporary law enforcement models to reduce DWI. Strict law enforcement is our main weapon in the struggle to reduce deaths from impaired driving (Center for Disease Control and Prevention, 2009). We found, as previously suggested might be the case, that deterrence theory's emphasis on perceived enforcement did not fully explain behavior among frequent offenders (Houston and Richardson, 2004;Meier, 1999).

Punishment, as indexed by time spent in jail in connection with DWI, was significantly and positively associated with perceived likelihood of enforcement. We chose jail time because it constitutes the most severe, and likely the most memorable, consequence of a DWI conviction. The fact that perception of risk was not significantly associated with DWI outcomes in either model may imply that perceptions of risk do not drive DWI behavior in this high-risk population. The enforcement process that results in punishment is less than perfect, and no one is more aware of this than chronically-impaired drivers. The significant interaction between jail time and DWI at the initial interview in predicting long-term DWI suggests that the actual experience of punishment does have a deterrent effect on DWI recidivism. Those who reported offending at relatively high levels at the initial interview, but experienced relatively little punishment (i.e. jail time), continued to offend at relatively high levels at the follow-up interview. This association, however, was not seen among individuals who received relatively high levels of punishment. For these individuals the association between levels of offending at the initial interview and at follow-up was essentially zero.

5.2 Social-control model

We also tested an expanded version of the deterrence model that incorporated four constructs from social-control theory: guilt related to the DWI arrest, anti-DWI peer group norms, driving risk taking, and deviance. None of these variables showed significant associations with the outcome, and adding this combination of variables did not result in improved overall model fit. In our social-control model, attitudes of peers and family members regarding DWI behavior were not associated with DWI outcome, but the model did not include the DWI behavior of significant others.

5.3 Limitations of the theoretical models

Neither deterrence nor social-control theory explicitly accounts for how an offender's observations of peers' experiences with DWI behavior and punishment might affect perceptions of his or her own risk (Stafford and Warr, 1993). As such, our assessment of DWI-related social norms might be incomplete. Another missing component from deterrence and social-control theories is the offenders' perceptions of the justice of their punishment. Punishments considered excessive may cause the offender to be defiant and self-righteous, having the unwanted effect of negating the positive impact of the sanctions imposed (Sherman, 2009). We recommend that models developed to predict re-offense among convicted DWI offenders should be expanded to include measures related to the behavior and consequences experienced by offenders' peers and the offenders' judgments regarding the fairness of their punishments.

The severity of an individual's alcohol-related problems also may moderate efficacy of treatment and deterrence approaches (Nichols, 1990). Deterrence theory assumes that

humans are rational beings and their behavior results from rational decisions based on perceived risks and benefits. However, alcohol is known to impair rational judgment and relax inhibitions (Hobbs et al., 1996;Tabakoff et al., 1986;Wallgren and Barry, 1971). A person who is under the influence of alcohol is not rational and may not be capable of weighing the pros and cons of his or her decisions. Moreover, symptoms that define alcohol dependence include loss of control over drinking and drinking more than one had intended (American Psychiatric Association, 1994). Once alcohol-dependent drivers begin drinking, they may not be able to control either the amount of alcohol they consume or their subsequent driving behavior. This is evidenced by an analysis using a sample of 521 DWI offenders, showing that the measure they used to define alcohol-related problems was the best predictor of recidivism (Yu, 2000). Furthermore, Yu and colleagues (2006) found that individuals with severe alcohol addiction were less likely deterred by sanctions they had received than those without severe addiction.

Another study suggests that punishment may have less deterrence effect on recidivism than treatment. Motor vehicle department administration records from Maryland were examined to determine the relationship between sentencing conditions for first time and repeat offenders and reconviction rates (Taxman and Piquero, 1998). In that study, rehabilitation sentences appear to reduce recidivism more than punishment. These findings suggest that models predicting DWI recidivism must include measures of alcohol problem severity and that treatment services received should be factored into predictive models. However, we did not include the receipt of treatment services in our models because a previous analysis in this sample revealed that treatment was not related to future DWI.

Another issue when modeling deterrence theory in a real world setting is that celerity, the prompt initiation of consequences or punishments, while an important component of deterrence theory, is difficult to achieve. A study conducted among a group of recidivist DWI offenders found that although offenders viewed punishments as severe, they found them to be neither swift nor certain (Freeman et al., 2006). Wagenaar and Maldonado-Molina (2007) studied driver's license suspension policies in 46 states in the U.S., comparing administrative sanctions, under which the driver's license is confiscated at the time of DWI arrest, with judicial license revocation, which occurs after significant delays. They found that alcohol-related fatal crashes are reduced in states with administrative sanctions and concluded that celerity of the implementation of a driver's license sanction is an important predictor of recidivism. Delayed driver's license suspension and other postponements in experiencing consequences necessitated by judicial processing of offenders, in addition to administrative errors, case dismissals, and plea bargaining, may contribute to an offender's perception that while arrests may happen, they may not lead to severe consequences. Such perceptions may account for the finding that legal and nonlegal sanctions are not very useful for predicting intentions to drive after drinking (Freeman et al., 2006). It may also help to explain why the "perception of law enforcement" variable in our model did not predict future DWI behavior.

5.4 Study limitations

In this study core elements of our deterrence and social-control models were unrelated to DWI recidivism. Our models demonstrate that the best predictor of DWI at follow-up behavior is past DWI behavior, a relationship that is universally recognized (Marowitz, 1998;Yu and Williford, 1995). This linear association, qualified by a significant interaction with jail time served, likely reflects the shared influences that underlie DWI behavior at the two time points. This finding, in conjunction with the others reported here, also suggests that other domains not clearly elucidated or identified as independent risk factors in the models are in operation.

Alternative explanations for the lackluster performance of these models are potential inaccuracy of the respondents' reports of DWI and lack of construct validity for the other measures used in the analyses. Because DWI is a socially stigmatized behavior, a study limitation is that subjects may have underreported their frequency of driving after drinking. We did not include experiences that occurred in the 10-year interval between the two interviews because the study's objective was to examine the predictive validity of information collected at the initial interview. These experiences may have influenced DWI behavior at follow-up.

Other limitations of our study are that the outcome measure was restricted to alcohol-impaired driving, and we did not ask subjects about their perceptions regarding the celerity or severity of the consequences they experienced following their DWI conviction(s). Furthermore, jail time over the lifetime for DWI is not a full measure of the consequences a DWI may have for an individual. Finally, although the authors did not identify any specific factors that might bias study results, our study had a high attrition rate. Our sample consists primarily of first offenders who do not typically receive prison time for their offense. Therefore, our sample may not be representative of all DWI offenders.

6. Conclusions

The findings presented here do not conform to standard conceptualizations of deterrence and social-control theories of DWI behavior. Both models showed good overall fit to the data, but core model paths were not significant, in that neither jail time as a punishment for DWI nor perceived likelihood of legal sanctions was related to DWI behavior at follow-up. The significant interactions between punishment and previous DWI behavior in predicting later DWI behavior, however, suggest that serving time in jail reduces the likelihood of DWI recidivism. Our study found that punishment exerts a greater effect on subsequent DWI behavior than perceived enforcement. This is consistent with the argument that experiencing the penalties associated with a DWI conviction may be a more significant predictor of future behavior than the mere perception that enforcement is likely (Houston and Richardson, 2004). Future research that further evaluates theoretical models and their individual components is needed to identify the most promising methods for deterring previously-convicted DWI offenders.

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Highlights

- Deterrence and social-control theories are applied to DWI behavior.
- DWI 15-year outcomes were predicted by interviews conducted 10 years earlier.
- Narrow versions of theoretical models did not predict DWI behavior.
- Jail time moderates the association between prior DWI and current DWI behavior.

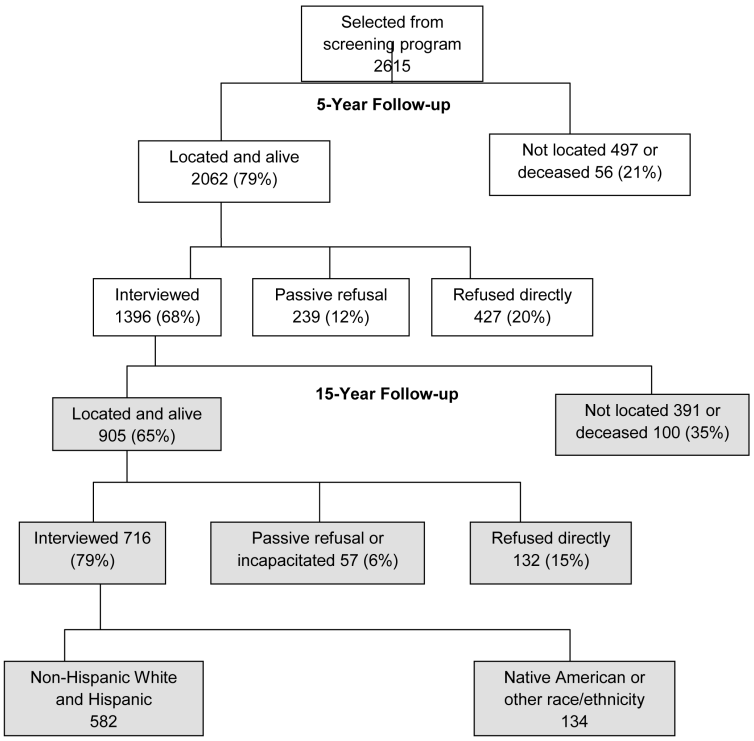

Figure 1.
Study flow diagram of those selected for DWI study.

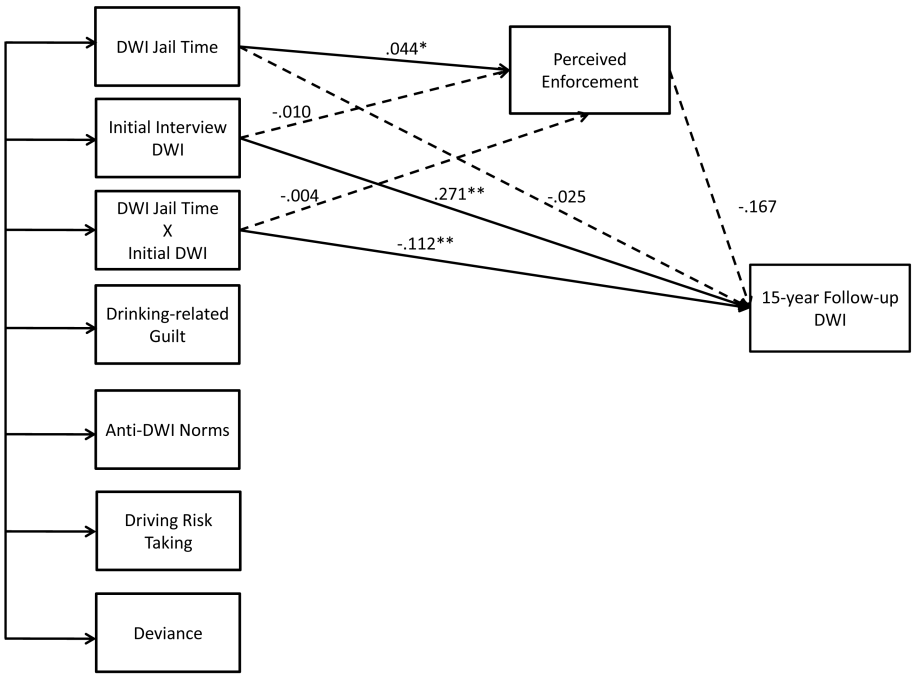

Figure 2.

Deterrence model with unstandardized parameter estimates. Significant paths represented by solid arrows. DWI = Driving while impaired. * p<.05, ** p<.01

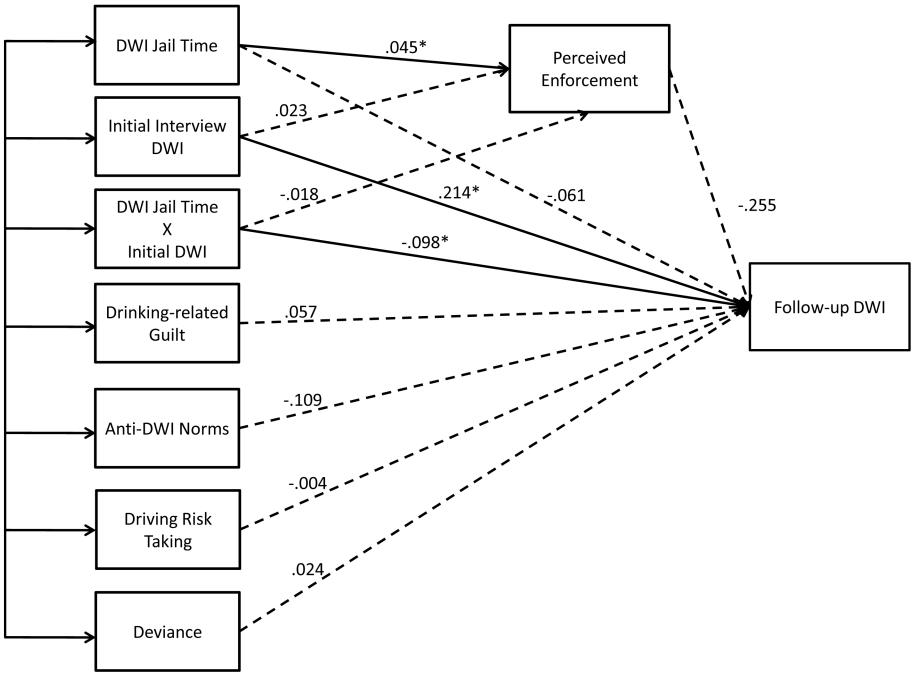

Figure 3.
Social-control model with unstandardized parameter estimates. Significant paths represented by solid arrows. DWI = Driving while impaired. * p<.05, ** p<.01

Table 1

Participant characteristics as a percentage of those selected from the original sample, who were not known to be deceased at the time of the 15-year follow-up.

Variable	Selected from Screening Referrals	Interviewed at 15-year follow-up	p-value
	N	N (%)	
Gender			
Male	1,322	285 (22)	<0.001
Female	1,137	431 (38)	
Age at screening			
<31	1,517	457 (30)	0.16
31+	942	259 (27)	
Ethnicity			
Non-Hispanic White	924	267 (29)	<0.001
Hispanic	982	305 (31)	
Native American	292	96 (33)	
Mexican National[a]	123	10 (8)	
Other	138	38 (28)	
Arrest warrant			
No	2,224	668 (30)	0.002
Yes	235	48 (20)	
Telephone			
No	281	59 (21)	0.002
Yes	2,178	657 (30)	
Arrest BAC			
<0.15	865	250 (29)	0.92
0.15 or more	1,239	365 (29)	
Unknown	355	101 (28)	
Alcohol diagnosis at screening			
No	1,189	365 (31)	0.08
Yes	731	214 (29)	
Unknown	539	137 (25)	
Screening category			
Not Complete	463	112 (24)	0.03
Complete and Not Referred to treatment	965	299 (31)	
Complete and Referred to treatment	1,031	305 (30)	

[a] Significantly different, $p < 0.05$ from the other ethnicity categories

Table 2

Sample characteristics.

Characteristic at the initial interview	Female N = 337	Male N = 207	Total N=544
	N (%)	N (%)	N (%)
Age			
26-35	21 (6.2)	19 (9.2)	40 (7.4)
36-45	178 (52.8)	111 (53.6)	289 (53.1)
46-55	100 (29.7)	56 (27.1)	156 (28.7)
56+	38 (11.3)	21 (10.1)	59 (10.8)
Race/Ethnicity			
Non-Hispanic white	105 (31.2)	77(37.2)	182(33.5)
Hispanic	171 (50.7)	87(42.0)	258(47.4)
Native American	59 (17.5)	41(19.8)	100(18.4)
Other	2 (0.6)	2 (1.0)	4 (0.7)
Years of education			
<12 years	44 (13.1)	24(11.6)	68(12.5)
12 years	83 (24.6)	50(24.2)	133(24.4)
>12 years	210 (62.3)	133(64.3)	343(63.1)
Lifetime jail time resulting from DWI[a]			
None	29 (8.6)	12(5.8)	41(7.5)
1-23 hours	253 (75.1)	126(60.9)	379(69.7)
1-3 days	36 (10.7)	35(16.9)	71(13.1)
4-30 days	14 (4.2)	23(11.1)	37(6.8)
31+ days	5 (1.5)	11(5.3)	16(2.9)
DWI[a] episodes past 90 days			
None	302 (89.6)	180(87.0)	482(88.6)
1-4	31 (9.2)	20(9.7)	51(9.4)
5+	4 (1.2)	7 (3.4)	11(2.0)

[a]DWI = Driving while impaired

Table 3

Correlations, means, and standard deviations for model variables (N=544)

Variable	1	2	3	4	5	6	7	8
1. Lifetime DWI[c] jail time	-	.13[b]	0.09[a]	0.07	0.31[b]	0.16[b]	0.10[a]	−0.09[a]
2. Initial Interview DWI[c]		-	−0.04	−0.03	0.20[b]	0.17[b]	0.14[b]	0.04
3. Perceived enforcement			-	0.04	−0.00	0.05	−0.06	−0.10[a]
4. Anti-DWI[c] norms				-	0.00	0.14[b]	0.02	−0.08[a]
5. Deviance					-	0.29[b]	0.67[b]	0.09[a]
6. Drinking-related guilt						-	0.28[b]	0.11[b]
7. Driving risk taking							-	0.07
8. Follow-up DWI[c]								-
Mean	2.26	0.60	4.32	2.15	8.82	0.98	4.56	0.11
Standard Deviation	1.52	2.58	0.67	1.01	5.72	0.77	3.82	0.32

[a] 2-tailed $p < .05$

[b] 2-tailed $p < .01$

[c] DWI = Driving while impaired