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Alcohol-Impaired Driving and Perceived Risks of Legal Consequences

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Abstract

Background—Driving while impaired (DWI) is a threat to public health. Codified legal sanctions are a widely-implemented strategy to reduce DWI. However, it is unclear that sanctioning affects individual risk perceptions so as to deter alcohol-impaired driving.

Methods—Using survey data collected from individual drivers, police, and defense attorneys specializing in DWI in eight U.S. cities, we investigated whether risk perceptions about legal consequences for alcohol-impaired driving, both the risk of being stopped if driving while alcohol-impaired and receiving specific penalties following a DWI, deter alcohol-impaired driving. First, we analyzed how different drivers' risk perceptions about being pulled over and facing criminal sanctions related to their self-reported alcohol-impaired driving in the year following the interview at which risk perceptions were elicited. Second, using data from an experimental module in which individual's risk perceptions were randomly updated by the interview, we analyzed how each driver's beliefs about his or her own future alcohol-impaired driving responded to randomly-generated increases in the apprehension probability and sanction magnitude.

Results—Higher probabilities as estimated by the individuals of being pulled over corresponded to less alcohol-impaired driving in both analyses. Conversely, there was no statistical relationship between perceptions of criminal sanctions for DWI and alcohol-impaired driving with one exception—a small significant negative relationship between duration of jail time following a DWI conviction and alcohol-impaired driving.

Conclusions—Perceptions regarding the threat of being apprehended for alcohol-impaired driving were related to actual self-reported driving, while perceived sanctions following a DWI conviction for DWI generally were unrelated to either actual self-reported alcohol-impaired driving or the person's estimate of probability that s/he would drive while alcohol-impaired in the following year. Increasing certainty of apprehension by increasing police staffing and/or conducting sobriety checks is a more effective strategy for reducing alcohol-impaired driving than legislating increased penalties for DWI.

Keywords

Driving while impaired; risk perceptions; deterrence; sanctions; police

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INTRODUCTION

In 2015, alcohol-impaired drivers caused over 10,000 traffic fatalities in the U.S., comprising 20% of all traffic fatalities (National Highway Traffic Safety Administration, 2016). Drinking substantially increases drivers' accident risk, even at blood alcohol content (BAC) levels below the threshold of 0.08% that defines criminal driving while impaired (DWI) (Phillips et al., 2015). Over 110 million alcohol-impaired driving episodes occur annually (Bergen et al., 2011).

Society has traditionally relied on the legal system to achieve criminal deterrence. Attempts to deter alcohol-impaired driving have codified DWI as criminal behavior, enforcing laws, and legislating sanctions for convicted offenders. Sanctions include minimum fines, jail sentences, driver's license suspensions/revocations, and Secure Continuous Remote Alcohol Monitoring (SCRAM) and ignition interlock devices (Voas and Fisher, 2001; Lawrence, 2013). Studies examining how statutory sanctions relate to alcohol-involved accident rates and self-reported alcohol-impaired driving have yielded inconsistent results (Sloan et al., 1994; Whetten-Goldstein et al., 2000; Nagin and Pogarsky, 2001; Wagenaar et al., 2007; Wagenaar and Maldonado-Molina, 2007; Ahlin et al., 2011; Ferguson, 2012; Hansen, 2015; Kaufmann and Wiebe, 2016). In contrast, studies on enforcement have consistently found a relationship between increased enforcement and reductions in alcohol-impaired driving (Fell et al., 2014; Fell et al., 2015; Erickson et al., 2015; Sanem et al., 2015). Fell et al. (2014), for example, reported that a 10% increase in the DWI arrest rate corresponded to a 1% reduction in alcohol-involved accidents.

One explanation for the mixed results on sanction effectiveness may be that many studies have omitted risk perceptions. Sanctions act as deterrents to the extent that they influence an individual's risk perceptions (Erickson et al. 1977; Nagin, 1998; Pogarsky et al., 2004; Kleck et al., 2005).

There are many possible reasons risk perceptions might not align with sanctions in statutes. First, an individual may lack knowledge about statutory provisions for alcohol-impaired driving. Lack of knowledge of objective risks can lead to risk misperceptions (Sloan et al., 2013). Second, actual sanctioning practices may deviate from statutory guidelines because prosecutors and judges have substantial discretion in applying laws, including the use of plea bargains (Ross, 1982; Griffin et al., 2013; Bibas, 2016). Risk perceptions may more closely align with actual risks than with statutes if based on actual experiences of individuals themselves and others. Studies have shown that individuals lacking personal experience with the legal system tend to have higher risk estimates, but these adjust closer to objective risk realities as experience is gained (Horney and Marshal, 1992; Nagin, 1998; Dionne et al., 2007). Third, other influences such as individual differences in criminal propensity, preferences for certain types of sanctions over others, and situational factors shape risk perceptions (Nagin and Paternoster, 1993; Wood and May, 2003).

Another explanation for discrepant findings is that different studies have examined different dimensions of risk perceptions. Risk perceptions about consequences of criminal behavior may be differentiated into beliefs about the certainty of apprehension and the certainty,

severity, and swiftness of punishment (Gibbs, 1975). Certainty is comparatively more important than severity or swiftness in decision-making (Grogger, 1991; Lochner, 2007; Nagin, 2013). Prior studies on risk perceptions of alcohol-impaired driving have shown that certainty of apprehension and of punishment, i.e. sanctioning, have deterrent effects, while beliefs about sanction severity are less influential (Lanza-Kaduce, 1988; Nagin and Pogarsky, 2001; Dionne et al., 2007; Beck et al., 2009; Alonso et al., 2015).

This study used data from the Survey on Alcohol and Driving (SAD) and interviews with attorneys and law enforcement officers to evaluate how risk perceptions of apprehension and sanctions influenced self-reported alcohol-impaired driving. All interviews were conducted for our study. Other studies of risk perceptions and alcohol-impaired driving also utilized survey data, but mostly with smaller samples and samples limited to students at a given university (Lanza-Kaduce, 1988; Nagin and Paternoster, 1993; Nagin and Pogarsky, 2001; Yao et al., 2014). An exception is Dionne et al. (2007), a study based on a survey of 2,857 adult license-holders in Quebec.

Our study used a sample of over 1,000 potential adult drinker-drivers in eight U.S. cities spanning four geographically-dispersed states. These data were supplemented with data from interviews of defense attorneys practicing DWI law and law enforcement officers who were asked to report the probabilities of apprehension and sanctioning and sanction levels for DWI in the eight study cities. Since these attorneys were experienced in how the law was actually applied in these cities, the interviews elicited information on actual legal practices not simply data from statutes.

We employed two analytical approaches. First, we examined how different individuals' risk perceptions were related to their actual self-reported alcohol-impaired driving behaviors during the year after the risk perceptions were elicited. Second, using data from an experimental module in which individual's risk perceptions were randomly updated by the interview, we analyzed how each driver's beliefs about his or her own future alcohol-impaired driving responded to randomly-generated increases in the apprehension probability and sanction magnitude. We found that perceptions regarding the threat of being apprehended for alcohol-impaired driving were related to actual self-reported alcohol-impaired driving. Those who perceived a higher risk of being apprehended were less likely to drive while alcohol-impaired. However, perceived sanctions following a conviction for DWI generally were unrelated to either actual self-reported alcohol-impaired driving or the person's estimate of probability that s/he would drive while alcohol-impaired in the following year.

MATERIALS AND METHODS

Data Sources

Survey on Alcohol and Driving (SAD)—The SAD measured risk perceptions of legal consequences for alcohol-impaired driving and other outcomes in a population of potentially impaired drivers. Survey questions were modeled after similar previous surveys designed to measure risk perceptions. We identified potential alcohol-impaired drivers by screening for individuals who had both driven and consumed at least one drink within the last 30 days.

Respondents were adults aged 18–81 from eight cities: Raleigh and Hickory, North Carolina (NC); Philadelphia and Wilkes-Barre, Pennsylvania (PA); Seattle and Yakima, Washington (WA); and Milwaukee and La Crosse, Wisconsin (WI). These four states were selected to provide variation in DWI arrest rates, criminal laws pertaining to DWI, alcohol consumption, and demographic composition. Within each state, further variation was introduced by surveying persons from a large and a small city. The longitudinal nature of the SAD allowed us to measure actual self-reported alcohol-impaired driving behavior in interviews conducted a year after risk perceptions were elicited.

Battelle Memorial Institute conducted the SAD in three waves from late 2009 to early 2012. The first wave of SAD interviews was conducted by telephone. This wave elicited information on socio-demographic characteristics, alcohol-related behaviors, health, cognition, impulsivity, and other types of information. After screening, 1,634 persons completed the first wave. The second and third waves were conducted by Computer Assisted Self-Administered Interviews (CASI). The second wave (CASI-I) elicited subjective beliefs about respondents' future alcohol-impaired driving and current legal consequences for DWI. The third wave (CASI-II) was administered a year after CASI-I. This wave repeated selected batteries of questions from CASI-I and also asked respondents to report their number of actual alcohol-impaired driving episodes since the CASI-I interview. The CASI-I and CASI-II interviewed 1,359 and 1,187 persons, respectively. Both CASI waves contained experimental questions which allowed us to analyze how randomly increased probabilities and increased levels of different sanctions related to the respondents' beliefs that they would engage in alcohol-impaired driving in the following year.

Law Enforcement Officer Interviews—In 2010, research assistants at Duke University surveyed law enforcement officers employed by municipal police, state highway patrol, and county sheriff departments in seven of the eight study cities. Philadelphia law enforcement agencies declined to participate. Ninety-two law enforcement officers representing 11 different agencies were interviewed. Officers were asked to estimate the probability of being apprehended when driving alcohol-impaired in their jurisdiction. We expected officers to have expert knowledge of how impaired driving laws were enforced. Questions about apprehension were phrased analogously to their counterparts in the SAD.

Attorney Interviews—The same research assistants also conducted interviews of defense attorneys practicing DWI law in the eight cities. We screened attorneys who regularly practiced DWI law by interviewing those representing 12+ DWI cases in the previous year, yielding 62 interviews. Attorneys were asked to provide information about their legal practices and to estimate the probabilities and levels of specific sanctions being imposed following a conviction for DWI. As in interviews with law enforcement, questions about sanctions were phrased analogously to SAD questions to facilitate comparison. All questionnaires were reviewed approved by Duke University's Institutional Review Board (IRB) and the SAD by Battelle's IRB as well.

Sample Construction

Three analysis samples were constructed from SAD data. The construction of these samples was determined by how respondents answered selected survey questions. Because the way a question is framed may affect the response (Lumsdaine and Exterkate, 2013), the SAD elicited risk perceptions using questions phrased in the third and then in the second person. To illustrate, respondents were first asked: "What is the percent chance that a person would receive a fine after being convicted of DWI?" In the analogous second person question, "a person" was replaced with "you." All respondents were asked about risk perceptions using third-person language, but only respondents who said there was some chance they would be pulled over for suspected alcohol-impaired driving in the next year were asked questions in the second person.

The first and largest analysis sample, hereafter Sample L, consisted of individuals who provided risk perceptions of legal consequences in response to all third person questions (N=1,079). The second analysis sample, Sample M, consisted of individuals responding to all second person questions about risk perceptions. Since almost half of CASI-I respondents said there was no chance they would be apprehended for alcohol-impaired driving in the next year, Sample M was thus substantially smaller (N=537). The module of experimental questions that asked respondents to estimate their subjective probability of future alcohol-impaired driving in response to randomly-increased apprehension probabilities and sanction levels was posed exclusively in the second person, and hence only administered to individuals in Sample M. The third analysis sample, Sample S, consisted of individuals who answered experimental questions in both CASI waves (N=444). The observational unit in the analysis based on Sample S was each individual's response. Each individual provided an estimate in both waves, for a total of 888 observations– two per respondent.

Empirical Specification

We specified three dependent variables. First, a count variable measured the number of self-reported alcohol-impaired driving episodes (phrased as driving "after having had too much to drink") in the year between CASI-I and II. Respondents reported their number of episodes using response categories of 0, 1, 2, 3–4, and >4 times. We coded responses of 3–4 as 3.5 and >4 as 7. The open-ended category represented 5.4% and 9.9% of responses in Samples L and M, respectively. The second dependent variable was a binary for *any* alcohol-impaired driving between the two CASI waves. The third dependent variable, used in Sample S regressions, was an individual's estimate of the probability of driving alcohol-impaired at least once in the year following the CASI-I survey given a randomly-increased apprehension probability or sanction level.

Key explanatory variables were risk perceptions of five legal consequences for alcohol-impaired driving: apprehension probability; expected values of the following four sanctions--fines (in $100s), jail sentences (in weeks), driver's license suspensions/ revocations, and SCRAM/ignition interlock devices (in months). The way these variables were defined differed. In the first analysis, where we examined how different respondents' risk perceptions were related to their self-reported alcohol-impaired driving, the key explanatory variables were for the respondent's perceptions of apprehension probability and

of four sanctions, elicited at the CASI-I interviews. The SAD asked each respondent what probability and level of a given sanction s/he perceived. In the analysis, we multiplied the probability and corresponding sanction level to obtain the expected value of that sanction. Regressions based on Sample L used third-person questions for these explanatory variables, while regressions based on Sample M used second-person questions.

In the second analysis, where we examined how an individual's estimated probability of future alcohol-impaired driving changed in response to experimentally-varied apprehension risks and sanction levels, the key explanatory variables were five experimentally-varied legal consequences. We only varied sanction levels, not sanction probabilities', so the four sanction covariates in regressions based on Sample S were sanction levels and not expected sanction values. A respondent's risk perceptions elicited at CASI-I were multiplied by randomly-generated values greater than one to yield new legal consequences of alcohol-impaired-driving. In both CASI waves, multipliers were selected independently for each respondent and each legal consequence. We asked respondents about one legal consequence at a time, e.g. "If the fine for DWI were $550, what is the percent chance you would drive after drinking too much in the next year?" By doing so, we implicitly directed respondents to update their perceptions of that variable while holding other variables constant.

While the focus of this study was on risk perceptions of legal consequences for alcohol-impaired driving, we controlled for risk perceptions of one non-legal outcome: increased accident risk. Specifically, the SAD asked: "If you drank 4 drinks and then drove home, what would be the odds (compared with not having had any alcohol at all) of getting into an accident?" Response choices were: no increase in odds; odds increase 25% or less; odds increase 26–50%; odds increase 51–100%; and odds increase > 100%. We assigned values of 0.0, 0.125, 0.380, 0.755, and 1.50, respectively, to these response categories. This question was posed in the second person but not the third, and it was not part of the battery of questions that randomly generated new values. An explanatory variable based on this question was included in regressions based on Samples L and Sample M, but not in the analysis based on Sample S.

We also controlled for these respondent attributes: (1) demographic characteristics-- age, gender, non-white race, marital status, educational attainment, and household income (in $1,000), (2) risk-taking behaviors, (3) alcohol addiction, (4) optimism bias, and (5) decision-making. Measures of risky behavior were the respondent's expected probability of being pulled over for speeding 15+ miles/hour over the limit in the next year, and self-reported use of hard drugs. We measured alcohol addiction with the CAGE questionnaire. The CAGE is based on affirmative responses to these questions: "Did you more than once want to stop or cut down on your drinking?" (C) "Have people annoyed you by criticizing your drinking?" (A) "Have you ever felt bad or guilty about your drinking?" (G) "Have you ever had a drink first thing in the morning to steady your nerves or get rid or hangover (eye-opener)?" (E). We included binary variables for 2 and 3–4 affirmative responses to the CAGE questions, with the omitted reference group being 0–1 affirmative responses.

Optimism bias can lead individuals to underestimate the legal consequences of alcohol-impaired driving. Our study measured optimism bias using a binary variable indicating whether the respondent thought s/he was a better driver than others.

Decision-making covariates included measures of cognition, self-control, and impulsivity. Cognition was measured using the Health and Retirement Study's Telephone Interview for Cognitive Status (TICS). Values for this cognition index ranged from 0 to 13, with higher values indicating better cognition. A binary variable for lack of self-control indicated if respondents thought it was "somewhat difficult," "very difficult," or "impossible" versus "not difficult," the omitted reference group, to limit their drinking when needing to drive home from some place where drinks are being served. Impulsivity was measured by responses to 12 statements about impulsive behavior, using a five-point scale ranging from "strongly agree" to "strongly disagree." The impulsivity index scale varied from 12 to 60, with higher values indicating greater impulsivity, and was based on an instrument from Loewenstein et al., (2001).

Estimation

In the first of our two analytic approaches, we estimated the relationship between actual self-reported alcohol-impaired driving behavior in the year between CASI waves and baseline risk perceptions of legal consequences elicited in CASI-I. This was a cross-sectional analysis; so the results reflect *between-person* differences in risk perceptions and behavior. It is possible that risk perceptions are endogenous to the extent, for example, that individuals who do not want to engage in alcohol-impaired driving report that legal consequences are high. If so, the parameter estimates on the risk perception covariates would be negatively biased. By contrast, the second analysis examined how an individual's estimated probability of his or her future alcohol-impaired driving changed when we varied legal consequences. This analysis was based on *within-person* variation in risk perceptions and behavior. While the second analysis had the advantage of addressing endogeneity because it was based on an experiment, it suffered from the possible disadvantage that respondents may not have updated their beliefs in response to hypotheticals, particularly if they regarded the hypotheticals to be unrealistic. To the extent this is so, the parameter estimates would be biased toward zero.

To examine the relationship between self-reported alcohol-impaired driving in the year after CASI-I and risk perceptions of legal consequences for DWI, the first of our analyses estimated parameters of:

$$\mathrm{DD}_i=\beta_0+\beta_1\mathrm{Apprehension\_Prob}_i+\beta_2\mathrm{Expected\_Sanction}_i+\beta_3\mathrm{Accident\_Prob}_i+\beta_4 Z_i+u_i \quad (1)$$

where *i* indexes individual respondents. *DD* is alternatively a binary variable for *any* actual alcohol-impaired driving in the year between the CASI waves, or a variable for the number of alcohol-impaired driving episodes. *Apprehension_Prob* represents the perceived risk of

being apprehended during alcohol-impaired driving. *Expected_Sanction* stands for expected values of four sanctions the respondent anticipated following a DWI conviction. *Accident_Prob* represents the perceived increase in the odds of being involved in an accident during alcohol-impaired driving. These three variables were based on CASI-I responses. Z_i is the set of covariates for respondent attributes, based on responses posed to respondents in telephone interviews about a month before the CASI-I interviews were conducted. When *DD* was a binary, we used logit analysis; these results are presented as marginal effects with associated standard errors. When *DD* was continuous, we used using ordinary least squares.

Our second analysis examined how randomly-generated increases in legal consequences influenced respondent's own subjective probabilities of driving while impaired in the following year. The empirical specification was:

$$\mathrm{DD_{ijk}}=\gamma_0+\gamma_1\mathrm{Legal\_Consequence_{jki}}+\gamma_2 Z_\mathrm{i}+\varepsilon_\mathrm{ijk} \quad (2)$$

where *DD* is the respondent's subjective probability of driving while impaired during the next year, elicited in the CASI-I (j=1) or CASI-II (j=2), and conditional on the randomly-generated *Legal_Consequence* (k=1…5) specified in the interviews. Z_i again signifies respondent attributes. The five legal consequences were apprehension probability, fine amount, jail sentence length, length of license suspension/revocation, and length of time ordered by a court to use a SCRAM or ignition interlock device. In analysis based on eq. (2) we pooled data from the CASI-I and CASI-II waves. Thus, data on each respondent appeared twice. We accounted for sample clustering using a Huber-White correction.

For the legal consequence of apprehension probability, we estimated parameter estimates of equation (2) with OLS, fixed effects (FE), and random effects (RE). To determine whether FE or RE was more appropriate, we used a Hausman test. The null hypothesis was that the assumptions of RE were violated. If the null hypothesis is rejected, RE is preferable to FE, and conversely.

RESULTS

Descriptive Statistics

On average, SAD respondents reported 1.1 alcohol-impaired driving episodes during the year after the CASI-I interview; slightly over a third reported at least 1 episode (Table 1, Sample L). The mean perception of apprehension risk was a 10% chance of being pulled over when driving impaired. The mean expected sanctions if convicted of DWI were a fine of $902, 2.5 weeks in jail, 10.5 months license suspension, and 4.4 months using a SCRAM device. These respondents estimated a 53% increase in the probability of an accident when driving alcohol-impaired compared to driving sober.

Respondents' mean age was 43.2 years. Slightly more than half of the respondents were female, slightly less than half married. Most (0.83) were white. Mean educational attainment in the SAD was higher than the national average at 15.7 years (about 33% of the adult U.S. population holds a bachelor's degree), as was average household income at nearly $79,000

(national median income was $55,775 in 2015; Ryan and Bauman, 2016). Thirteen percent were hard drug users; most were not alcohol-addicted. Ten percent of respondents lacked self-control. The mean impulsivity index was 29.5 on a scale from 12 to 60, suggesting respondents were generally less impulsive. Compared to results for non-drinkers who responded to the 2010 Behavioral Risk Factor Surveillance System (BRFSS) survey, respondents to the SAD were more highly educated and more affluent on average. However, their drinking and driving behavior was similar to BRFSS.

About half of respondents estimated a probability greater than zero that they would be apprehended when driving alcohol-impaired in the next year (N=537, Sample M). They reported a mean of 1.8 alcohol-impaired driving episodes during the year between waves; more than half (0.57) reported any episode. These individuals were asked questions about legal consequences in the second and the third person. They perceived that *their own* probability of being apprehended when driving alcohol-impaired was 0.18 on average, twice as high as their perceived risk of “a person” being apprehended (0.09). Their expected sanctions were generally lower when elicited in the second person than the third, but not by much. Mean expected sanctions elicited in the third person were similar in magnitude between Sample L and Sample M.

Perceived Legal Consequences for DWI and Alcohol-Impaired Driving Between Waves

We found a negative and statistically significant relationship between the perceived probability of apprehension for DWI and self-reported alcohol-impaired driving (Table 2). From Sample L, for which risk perceptions were elicited with questions phrased in the third person, a 0.1 increase in the perceived probability of apprehension for driving impaired corresponded to a decrease in the probability of any alcohol-impaired driving by 0.024 (col. 1) and a decrease of 0.071 in the number of next-year impaired driving episodes (col. 3). Among the expected sanctions following a first-time DWI conviction, the only statistically significant relationship in regressions based on Sample L was between expected jail and the number of alcohol-impaired driving episodes (col. 3). The coefficient implies that lengthening the expected jail sentence (an increase in the probability of receiving any jail time, an increase in duration of jail time, or a combination of both) by one week would decrease the number of episodes by only 0.006/year. A 0.1 increase in the probability of an accident corresponded to lower probability of alcohol-impaired driving, 0.013, and to 0.059 fewer alcohol-impaired driving episodes during the year. Many of the results on the respondent attributes were both plausible and statistically significant at conventional levels.

Using the restricted sample (Sample M) and covariates for legal consequences based on second-person risk perceptions, the implied reduction from a 0.1 increase in apprehension risk was 0.025 for the probability of any impaired driving (col. 2) and a reduction of 0.11 episodes per year (col. 4). As with Sample L, the only statistically significant results among expected sanctions were for jail. Lengthening jail by a week corresponded to a 0.012 lower chance of any alcohol-impaired driving and 0.029 fewer impaired driving episodes/year. Although statistically significant, the 0.12 reduction was small relative to the Sample M mean of 1.77 episodes per year. The relationship between increased accident probability and measures of alcohol-impaired driving was statistically insignificant for any episode, but

significant for number of episodes, and in both cases larger in magnitude than the effect of any expected sanction.

Subjective Probability of Driving Alcohol-Impaired Given a Randomly Increased DWI Apprehension Probability

When we randomly increased the perceived probability of being apprehended for alcohol-impaired driving, higher apprehension risks were consistently and significantly related to lower estimated probabilities of driving impaired in the future (Table 3). We estimated five alternative specifications to gauge robustness of results. Respondent attributes were either included or excluded and we estimated specifications with fixed and random effects. Results were statistically significant robust to all specifications and estimation methods. Although magnitudes varied, coefficients for apprehension probability were consistent with their counterparts in Table 2 (cols. 1, 2). The parameter estimates from an ordinary least squares regression not controlling for respondent attributes (col. 1) implied that a 0.1 increase in the probability of being pulled over would lead to a 0.034 decrease in an individual's self-reported subjective probability of driving impaired in the next year. After accounting for respondent attributes, the decrease would be 0.030 (col. 2). In a specification with fixed effects the implied reduction fell to 0.013 (col. 3). Based on a Hausman test, fixed effects are preferred to random effects. The coefficients were larger (in absolute value) when respondent attributes were included than when excluded (compare results in cols. 1 versus 2, and 4 versus 5). This is likely because the hypothetical new apprehension probability posed to respondents was randomly increased from their CASI-I estimates, not independently drawn from a range of values of 0 to 1.

Subjective Probability of Driving Alcohol-Impaired Given a Randomly Increased Sanction Level

When sanction levels were randomly increased, we found no statistically significant changes in respondents' probabilities of any alcohol-impaired driving in the following year (Table 4). Results for all sanctions except license suspension were statistically insignificant, and this result had a counterintuitive positive sign. The low upper bounds of the 95% confidence intervals further imply these results are unimportant from the vantage point of public policy. None of the changes within a 95% confidence interval exceeded 0.1%. The result for jail was inconsistent with the corresponding result in Table 2. Results for respondent attribute covariates (included in all Table 4 regressions but not shown), however, were consistent with Table 2 results. Females and married persons tended to have lower subjective probabilities of alcohol-impaired driving in the next year. Hard drug users had higher subjective probabilities.

Perceived Risks of Alcohol-Impaired Driving Between Drivers and Experts

To explore some possible explanations for our analysis results, we compared drivers' risk perceptions to what law enforcement officers and attorneys said were the actual risks of legal consequences. When we compared drivers' mean perceived risk of apprehension for alcohol-impaired driving to that of law enforcement officers (Fig. 1), both groups' estimates were far higher than the actual risk of apprehension, which prior studies have calculated as nearly approaching zero (e.g., Dionne et al, 2007). The 95% confidence intervals for both groups

overlapped, suggesting their estimates did not differ significantly (Fig. 1). We expected drivers' second-person estimates to be higher, since all of the individuals who provided estimates of apprehension risk in the second person gave a non-zero chance they would be apprehended for alcohol-impaired driving in the year after CASI-1. We found a statistically significant difference in driver's perceived apprehension risks for themselves (second-person) versus the general population of alcohol-impaired drivers (third-person), with the latter almost *twice* as high as the former. This result suggests that drinking and driving behavior is attributable to an incorrect perception of the probability of being pulled over. These probabilities were higher when the question was phrased in the second than in the third person, indicating that respondents thought they were at greater risk of being pulled over than were members of the public in general if they drove while alcohol-impaired.

There was less consistency in responses for the probability that penalties would be imposed following a first-time DWI conviction (Fig. 2, Panels A-D). Here, we compared responses from SAD respondents to attorneys representing DWI defendants. We used attorneys' estimates of penalties for a *first* DWI conviction because the vast majority of SAD respondents had no prior DWI convictions. The greater variation in actual sentencing than in minimum statutory penalties (shown under each panel) reflects the latitude judges have in weighing aggravating and mitigating factors.

All attorneys indicated that a person would be fined and have their driver's license suspended or revoked following a DWI conviction in accordance with statutory penalties. SAD respondents were less certain that these penalties would be imposed, especially license suspension.

There was more variation in probabilities of receiving jail time. Attorneys in North Carolina gave a low probability of jail being imposed post-conviction, even though jail is a statutorily-mandated penalty for a first DWI conviction there. SAD respondents tended to assign higher probabilities to the probability of receiving jail time than attorneys did.

There was more variation in responses to questions about penalty amounts conditional on a penalty being imposed for both attorneys and drivers (Panels E-H). In general, there were no statistically significant differences in responses of attorneys and SAD respondents or between responses from SAD phrased in third- or second-person. Mean penalties tended to be at or mostly above the minimum statutory penalties for a first DWI conviction. SAD respondents' risk perceptions of sanction probability were frequently significantly different from attorney estimates (Panels A-D). Drivers were less certain that fines and license suspensions would be imposed, more certain of SCRAM use, and more or less certain about jail depending on the state. However, driver risk perceptions elicited in the second and third person were very similar, suggesting question framing did not have much of an impact on risk perceptions about the certainty of sanctioning. Drivers' 95% confidence intervals of perceived sanction levels (Panels E-H) were much wider than those of sanction probability estimates, suggesting that beliefs about the severity of sanctions are less consistent in the driving population. In particular, drivers believed that the jail sentence faced upon DWI conviction was much longer than what attorneys reported. Persons who thought there was some chance of being pulled over if they were to drive while alcohol-impaired, i.e., those

who provided second-person risk perceptions, estimated a lower average jail sentence for themselves than for the general population.

DISCUSSION

Our study revealed three important findings. First, both our cross-sectional and experimental analyses indicated that an individual's perceived risk of apprehension is negatively related to both actual and subjective measures of alcohol-impaired driving. This implies that increasing perceived apprehension risk, such as by deploying law enforcement more visibly on roads, would likely reduce rates of impaired driving. Second, perceptions of more severe sanctions conditional on a DWI conviction did not generally correspond to less alcohol-impaired driving. Results from our cross-sectional analysis implied that longer expected jail terms might deter this behavior, but our experimental analysis contradicted this result. We found no evidence for a link between alcohol-impaired driving and risk perceptions of fines, license revocation, or use of SCRAM devices. Third, potential drinker-drivers as represented in the SAD are imperfectly but generally knowledgeable about sanctions for alcohol-impaired driving. Many of their risk perceptions concerning sanctions probabilities and levels were not significantly different from what the law enforcement and defense attorneys we interviewed observed in practice. Thus, it is unlikely that the deterrent ineffectiveness of sanctions observed in our analyses stems from a lack of driver knowledge about DWI law enforcement.

Several previous studies also found no evidence of a relationship between sanction risk perceptions and alcohol-impaired driving (Sen, 2001; Levitt and Porter, 2001). While one might argue that null results arise from inconsistent statutory applications or a lack of knowledge among drivers, our interviews of attorneys suggest these are unlikely explanations. The lack of a deterrent effect tied to risk perceptions of sanction *levels*, at least, should not be surprising given prior evidence that severity of punishment is less important than certainty of punishment or of apprehension in decisions about whether or not to engage in criminal activity.

Other studies found similar evidence for the effect of perceived apprehension risks Bertelli and Richardson (2008) found a negative relationship between drinkers' perceived probabilities of being pulled over and of being arrested (two measures of apprehension) and their likelihood of alcohol-impaired driving. While estimates of the objective probability of being pulled over while driving impaired are rare, other studies have measured the objective arrest risk at less than one percent (Ross, 1992; Levitt & Porter, 2001; Dionne et al., 2007). Only nine respondents to the SAD reported a DWI arrest relative to 1,143 self-reported alcohol-impaired driving episodes during the year following the CASI-I interviews, implying a 0.78% DWI arrest rate. The probabilities of being pulled over elicited from both law enforcement officers and SAD respondents were around 0.10–0.20. The difference in objective DWI arrest rates and our elicited mean subjective probabilities of being pulled over suggest the share of arrests of stops is 0.1 to 0.2, roughly in accordance with Zador et al. (2000) research which estimated that only one in six stops for suspected DWI result in an arrest.

The discrepancy between our cross sectional and experimental results on jail may be explained by the difference in the analytical approaches. The cross-sectional parameter estimates may be negatively biased due to endogeneity of risk perceptions, as noted above. Even so, it is noteworthy that among the penalties we only obtained statistically significant results on sanction levels for jail, but the implied changes in alcohol-impaired driving from lengthening jail terms were quite modest. With the experimental analysis, by contrast, the individual's risk perceptions were updated randomly. In the experiment, however, due to lack of exposure to penalties at the hypothetical levels or other factors, respondents may not have updated their beliefs in accordance with the questions. If so, there is a bias toward the null hypothesis of no relationship. Although each is independent, the approaches are complementary in that they yield different potential biases.

Our study has several important strengths. First, in the cross-sectional analysis, we assessed relationships between alcohol-impaired driving measured for the year after the probabilities of the legal consequences of driving while impaired were elicited from drivers. The cross-sectional analysis assessed alcohol-impaired driving at both the extensive (any alcohol-impaired driving in a year) and intensive margins (number of alcohol-impaired driving episodes/year). We controlled for other factors likely to affect alcohol-impaired driving. Second, we also assessed how randomized percentage increases in penalties conditional on a first conviction on a DWI charge related to probabilities of engaging in alcohol-impaired driving at all during the next year, and we compared results from this analysis based on an experiment with those from the cross-sectional analysis. Third, the interview data were obtained from several geographically-dispersed sites and from a broad age range rather than from a single locality and from college students as in some previous studies.

We acknowledge several study limitations. We elicited projections of future alcohol-impaired driving in response to randomly-generated changes in sanction levels, but these randomly-generated changes were applied to the individuals' own risk perceptions from the CASI-I interviews. Thus, some individual-specific element remained even after multiplication by a randomly-generated increase. Self-reporting is not an ideal way to measure behaviors, which are self-incriminating and even illegal. However, after assuring respondent confidentiality, many of our respondents admitted to alcohol-impaired driving, suggesting that underreporting is not a major concern. In a previous study using SAD, we documented that individuals' forecasted probabilities of alcohol-impaired driving were strongly associated with actual alcohol-impaired driving in the following year (Sloan et al., 2013). Additionally, we did not investigate how beliefs about apprehension and sanctions might be interrelated; Jacobs and Piquero (2013) suggested that changes in sanction threats might influence changes in the perceived certainty of apprehension, but little research has been conducted on this. Finally, with one exception, our study focused on the legal consequences of alcohol-impaired driving. Other studies have shown that non-legal consequences are equally important factors (Nagin and Pogarsky, 2001; Alonso et al., 2015).

Increasing the certainty of apprehension by increasing police staffing and/or conducing sobriety checks is a more effective strategy for reducing alcohol-impaired driving than legislating increased penalties for DWI. Increasing law enforcement staffing or activity is likely to be more expensive than changing legal sanctions, such as raising minimum fines or

imposing longer periods of license suspensions. But research also supports the effectiveness of strategically deploying officers to maximize their visibility, such as by conducting routine sobriety checkpoints in high-traffic areas (Durlauf and Nagin, 2011; Ferguson, 2012; Nagin, 2013), and costs associated with changes in this type of strategy may be lower. The benefits versus the costs of different strategies to encourage higher perceived apprehension risks should be assessed, an investigation, which our study did not undertake.

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References

Ahlin EM, Zador PL, Rauch WJ, Howard JM, Duncan GD. First-time DWI offenders are at risk of recidivating regardless of sanctions imposed. Journal of Criminal Justice. 2011; 39:137–142. [PubMed: 21603059]

Alonso F, Pastor JC, Montoro L, Esteban C. Driving under the influence of alcohol: Frequency, reasons, perceived risk and punishment. Substance Abuse Teatment Prevention and Policy. 2015; 10:1.

Beck KH, Fell JC, Yan AF. A comparison of drivers with high versus low perceived risk of being caught and arrested for driving under the influence of alcohol. Traffic Injury Prevention. 2009; 10:312–319. [PubMed: 19593706]

Bergen G, Shults RA, Rudd RA. Vital signs: Alcohol-impaired driving among adults-United States, 2010 (Reprinted from MMWR, vol 60, pg 1351–1356, 2011). JAMA-Journal of the American Medical Association. 2011; 306:2208–2210.

Bertelli AM, Richardson LE. The behavioral impact of drinking and driving laws. Policy Studies Journal. 2008; 36:545–569.

Bibas S. Designing plea bargaining from the ground up: Accuracy and fairness without trials as backstops. William & Mary Law Review. 2016; 57:1055–1081.

Dionne G, Fluet C, Desjardins D. Predicted risk perception and risk-taking behavior: the Case of Impaired Driving. Journal of Risk and Uncertainty. 2007; 35:237–264.

Durlauf SN, Nagin DS. Imprisonment and crime: Can both be reduced? Criminology & Public Policy. 2011; 10:13–54.

Erickson DJ, Farbakhsh K, Toomey TL, Lenk KM, Jones-Webb R, Nelson TF. Enforcement of alcohol-impaired driving laws in the United nStates: A national survey of state and local agencies. Traffic Injury Prevention. 2015; 16:533–539. [PubMed: 25802970]

Erickson ML, Gibbs JP, Jensen GF. The deterrence doctrine and the perceived certainty of legal punishments. American Sociological Review. 1977; 42:305–317. [PubMed: 860865]

Fell JC, Waehrer G, Voas RB, Auld-Owens A, Carr K, Pell K. Effects of enforcement intensity on alcohol impaired driving crashes. Accident Analysis and Prevention. 2014; 73:181–186. [PubMed: 25240134]

Fell JC, Waehrer G, Voas RB, Auld-Owens A, Carr K, Pell K. Relationship of impaired-driving enforcement intensity to drinking and driving on the roads. Alcoholism-Clinical and Experimental Research. 2015; 39:84–92.

Ferguson SA. Alcohol-impaired driving in the United States: contributors to the problem and effective countermeasures. Traffic Injury Prevention. 2012; 13:427–441. [PubMed: 22931172]

Gibbs, JP. Crime, punishment, and deterrence. New York: Elsevier; 1975.

Griffin CL, Sloan FA, Eldred LM. Corrections for racial disparities in law enforcement. William & Mary Law Review. 2013; 55:1365–1427.

Grogger J. Certainty vs. severity of punishment. Economic Inquiry. 1991; 29:297–309.

Hansen B. Punishment and Deterrence: Evidence from drunk driving. American Economic Review. 2015; 105:1581–1617.

Horney J, Marshall IH. Risk perceptions among serious offenders: The role of crime and punishment. Criminology. 1992; 30:575–594.

Jacobs B, Piquero AR. Boundary-crossing in perceptual deterrence: Investigating the linkages between sanction severity, sanction certainty, and offending. International Journal of Offender Therapy and Comparative Criminology. 2013; 57:792–812. [PubMed: 22556383]

Kaufman EJ, Wiebe DJ. Impact of state ignition interlock laws on alcohol-involved crash deaths in the United States. American Journal of Public Health. 2016; 106:865–871. [PubMed: 26985604]

Kleck G, Sever B, Li S, Gertz M. The missing link in general deterrence research. Criminology. 2005; 43:623–659.

Lanza-Kaduce L. Perceptual deterrence and drinking and driving among college students. Criminology. 1988; 26:321–341.

Lawrence A. Trends in sentencing and corrections: State legislation, in Series Trends in Sentencing and Corrections: State Legislation, National Conference of State Legislatures. 2013

Levitt SD, Porter J. How dangerous are drinking drivers? Journal of Political Economy. 2001; 109:1198–1237.

Lochner L. Individual perceptions of the criminal justice system. American Economic Review. 2007; 97:444–460.

Loewenstein, G., Weber, R., Flory, J., Manuck, S., Muldoon, M. Dimensions of time discounting, in Series Dimensions of time discounting. Conference on survey research on household expectations and preferences; Ann Arbor, MI. 2001.

Lumsdaine RL, Exterkate A. How survey design affects self-assessed health responses in the Survey of Health, Ageing, and Retirement in Europe (SHARE). European Economic Review. 2013; 63:299–307.

Nagin DS. Criminal deterrence research at the outset of the twenty-first century. Crime and Justice: A Review of Research. 1998; 23:1–42.

Nagin DS. Deterrence in the twenty-first century, in Crime and Justice in America, 1975–2025. 2013; 42:199–263.

Nagin DS, Paternoster R. Enduring individual differences and rational choice theories of crime. Law & Society Review. 1993; 27:467–496.

Nagin DS, Pogarsky G. Integrating celerity, impulsivity, and extra-legal sanction threats into a model of general deterrence: Theory and evidence. Criminology. 2001; 39:865–891.

National Highway Traffic Safety Administration. 2015 Motor vehicle crashes: Overview, Vol. 2016, Traffic Safety Facts Research Note. 2016:1–9.

Phillips DP, Sousa ALR, Moshfegh RT. Official blame for drivers with very low blood alcohol content: there is no safe combination of drinking and driving. Injury Prevention. 2015; 21:E28–E35. [PubMed: 24397929]

Pogarsky G, Piquero AR, Paternoster R. Modeling change in perceptions about sanction threats: The neglected linkage in deterrence theory. Journal of Quantitative Criminology. 2004; 20:343–369.

Ross, HL. Deterring the drinking driver: Legal policy and social control, Lexington Books. Lexington: Massachusetts; 1982.

Ross, HL. Confronting drunk driving: Social policy for saving lives. New Haven, CT: Yale University Press; 1992.

Ryan, CL., Bauman, K. Educational attainment in the United States: 2015, Current Population Reports. Washington, DC: US Census Bureau; 2016. p. 20-578.

Sanem JR, Erickson DJ, Rutledge PC, Lenk KM, Nelson TF, Jones-Webb R, Toomey TL. Association between alcohol-impaired driving enforcement-related strategies and alcohol-impaired driving. Accident Analysis and Prevention. 2015; 78:104–109. [PubMed: 25756846]

Sen A. Do stricter penalties deter drinking and driving? An empirical investigation of canadian impaired driving laws. Canadian Journal of Economics-Revue Canadienne D Economique. 2001; 34:149–164.

Sloan FA, Eldred LM, Guo T, Xu Y. Are people overoptimistic about the effects of heavy drinking? Journal of Risk and Uncertainty. 2013; 47:93–127. [PubMed: 24058265]

Sloan FA, Reilly BA, Schenzler C. Effects of prices, civil and criminal sanctions, and law-enforcement on alcohol-related mortality. Journal of Studies on Alcohol. 1994; 55:454–465. [PubMed: 7934053]

Voas RB, Fisher DA. Court procedures for handling intoxicated drivers. Alcohol Research & Health. 2001; 25:32–42. [PubMed: 11496964]

Wagenaar AC, Maldonado-Molina MM. Effects of drivers' license suspension policies on alcohol-related crash involvement: Long-term follow-up in forty-six states. Alcoholism-Clinical and Experimental Research. 2007; 31:1399–1406.

Wagenaar AC, Maldonado-Molina MM, Erickson DJ, Ma L, Tobler AL, Komro KA. General deterrence effects of U.S. statutory DUI fine and jail penalties: Long-term follow-up in 32 states. Accident Analysis and Prevention. 2007; 39:982–994. [PubMed: 17854574]

Weisburd D, Einat T, Kowalski M. The miracle of the cells: An experimental study of interventions to increase payment of court-ordered financial obligations. Criminology & Public Policy. 2008; 7:9–36.

Whetten-Goldstein K, Sloan FA, Stout E, Liang L. Civil liability, criminal law, and other policies and alcohol-related motor vehicle fatalities in the United States: 1984–1995. Accident Analysis and Prevention. 2000; 32:723–733. [PubMed: 10994599]

Wood PB, May DC. Racial differences in perceptions of the severity of sanctions: A comparison of prison with alternatives. Justice Quarterly. 2003; 20:605–631.

Yao J, Johnson MB, Beck KH. Predicting DUI decisions in different legal environments: Investigating deterrence with a conjoint experiment. Traffic Injury Prevention. 2014; 15:213–221. [PubMed: 24372492]

Zador, PL., Krawchuk, SA., Moore, B. Drinking and driving trips, stops by the police, and arrests: analyses of the 1995 National Survey of Drinking and Driving Attitudes and Behavior. Washington, DC: National Highway Traffic Safety Administration; 2000. (DOT HS 809 184)

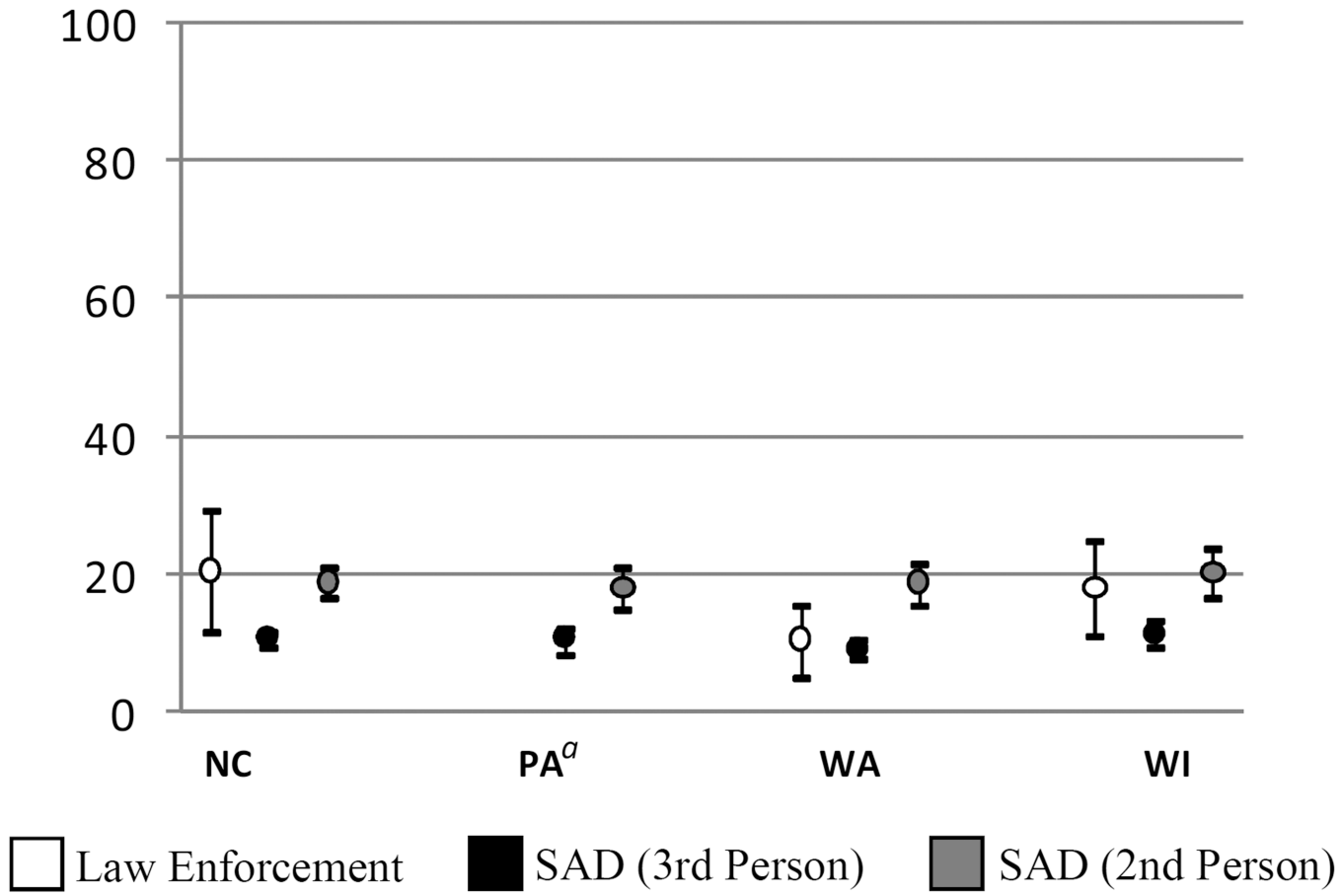

Figure 1.

Estimated probability (in %) of being pulled over after having too much to drink among law enforcement and SAD respondents.

Circles represent mean response; whiskers represent 95% confidence interval.

[a] Responses from Philadelphia law enforcement are omitted because only two officers from the Wilkes-Barre area consented to surveys.

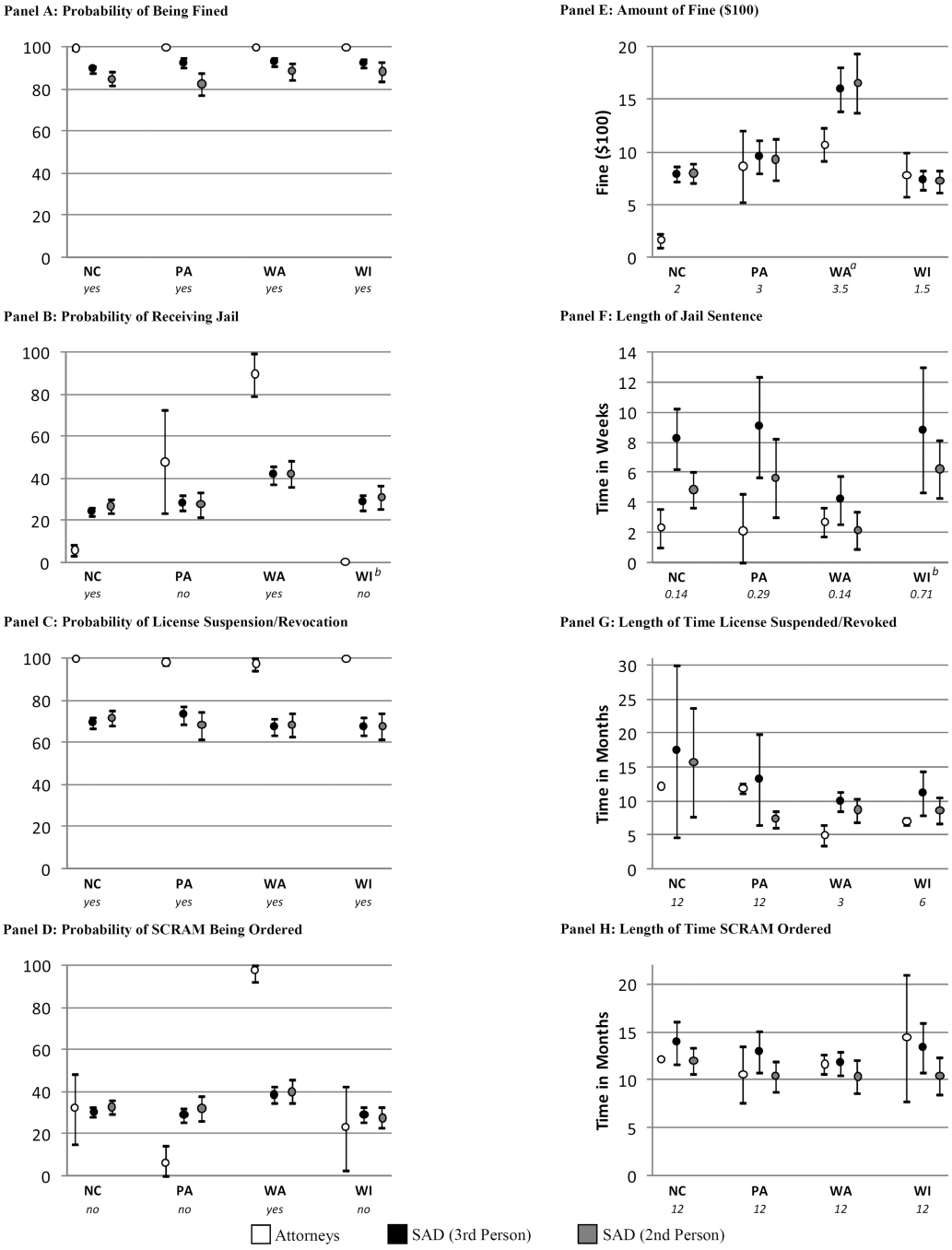

Figure 2.

Beliefs about sanctions for a first DWI conviction among attorneys and SAD respondents. The text beneath state names indicates whether the penalty is mandatory upon conviction (panels A–D) and the minimum value of the penalty when imposed, in y-axis units (panels E–H).

[a] Washington imposes a “financial penalty” of $865.50. This includes five components, one of which is a $350 fine.

[b] At the time of our survey (2010), first-time DWI convictions in Wisconsin were a civil offense and therefore did not receive a jail sentence.

Table 1

Descriptive Statistics

VARIABLES	Sample L†		Sample M†	
	Mean	Std. Dev.	Mean	Std. Dev.
Any alcohol-impaired driving episode next year	0.36	0.48	0.57	0.50
Number of alcohol-impaired driving episodes next year	1.06	1.82	1.77	2.15
Legal Consequences of DWI: 2nd Person				
Apprehension probability when driving impaired			0.18	0.20
Fine ($100)			9.07	11.22
Jail (weeks)			1.85	6.89
License suspension/revocation (months)			9.85	54.74
SCRAM device (months)			4.12	7.19
Legal Consequences of DWI: 3rd Person				
Apprehension probability when driving impaired	0.10	0.14	0.09	0.13
Fine ($100)	9.02	11.11	9.77	12.24
Jail (weeks)	2.52	13.57	2.34	15.70
License suspension/revocation (months)	10.52	84.07	12.02	114.24
SCRAM device (months)	4.40	7.69	4.21	5.86
Extralegal Consequences of DWI				
Increase in accident probability when driving impaired	0.53	0.42	0.43	0.38
Demographics				
Age	43.20	12.67	41.36	11.86
Female	0.56	0.50	0.46	0.50
Non-white	0.17	0.37	0.14	0.35
Married	0.46	0.50	0.42	0.49
Education (years)	15.66	1.91	15.60	1.91
Household income ($1,000)	78.72	63.06	77.43	62.02
Risk-Taking Behaviors				
Expected speeding apprehension probability	0.09	0.14	0.11	0.15
Hard drug user	0.13	0.34	0.19	0.39
Alcohol addiction				
CAGE<2	0.63	0.48	0.56	0.50
CAGE=2	0.21	0.41	0.26	0.44
CAGE=3/4	0.16	0.36	0.18	0.39
Optimism bias				

VARIABLES	Sample L†		Sample M†	
	Mean	Std. Dev.	Mean	Std. Dev.
Self-Assessed better driver	0.74	0.44	0.73	0.45
Decision-making				
Cognition index	12.02	1.26	12.01	1.25
Lack self-control	0.10	0.29	0.14	0.35
Impulsivity index	29.54	6.57	30.48	6.79
Observations	1,079		537	

** p<0.01,

* p<0.05

† Sample L is comprised of all SAD respondents. Sample M is a subsample of SAD respondents who estimated a non-zero probability that they would be pulled over for suspected DWI in the year between survey waves.

Abbreviations: Driving While Intoxicated = DWI, CAGE Questionnaire = CAGE, Secure Continous Remote Alcohol Monitoring = SCRAM.

Table 2

Individual's Actual Alcohol-Impaired Driving in Year After CASI-I

	Any Alcohol-Impaired Driving		Number of Alcohol-Impaired Driving	
	Sample L	Sample M	Sample L	Sample M
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Legal Consequences for DWI[†]				
Apprehension probability when driving impaired	−0.238*	−0.251*	−0.709*	−1.149*
	(0.118)	(0.114)	(0.341)	(0.485)
Fine ($100)	0.000	0.001	0.004	0.011
	(0.001)	(0.002)	(0.005)	(0.010)
Jail (weeks)	−0.003	−0.012*	−0.006**	−0.029**
	(0.002)	(0.005)	(0.002)	(0.011)
License suspension/revocation (months)	0.000	0.000	−0.000	0.002
	(0.000)	(0.000)	(0.000)	(0.001)
SCRAM device (months)	0.002	0.004	0.003	0.013
	(0.002)	(0.004)	(0.006)	(0.013)
Extralegal Consequences				
Increase in accident probability when driving impaired	−0.129**	−0.046	−0.585**	−0.624**
	(0.035)	(0.053)	(0.108)	(0.207)
Respondent Attributes				
Age	−0.004**	−0.004*	−0.007	−0.006
	(0.001)	(0.002)	(0.005)	(0.008)
Female	−0.144**	−0.106*	−0.634**	−0.627**
	(0.027)	(0.043)	(0.113)	(0.189)
Non-white	−0.036	−0.120*	−0.267*	−0.455*
	(0.038)	(0.057)	(0.122)	(0.232)
Married	−0.096**	−0.145**	−0.368**	−0.617**
	(0.031)	(0.044)	(0.121)	(0.211)
Education (years)	−0.018*	−0.025*	−0.033	−0.060
	(0.008)	(0.011)	(0.031)	(0.051)
Household income ($1,000)	0.001*	0.001*	0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Expected speeding apprehension probability	−0.032	0.082	0.319	0.903
	(0.097)	(0.157)	(0.385)	(0.638)
Hard drug user	0.112**	0.068	0.575**	0.513*
	(0.041)	(0.058)	(0.192)	(0.253)
CAGE=2	0.084**	0.126**	0.295*	0.360
	(0.032)	(0.046)	(0.133)	(0.200)

	Any Alcohol-Impaired Driving		Number of Alcohol-Impaired Driving	
	Sample L	Sample M	Sample L	Sample M
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
CAGE=3/4	0.074	0.135 *	0.533 **	0.772 **
	(0.040)	(0.057)	(0.191)	(0.268)
Self-assessed better driver	0.046	0.106 *	0.215	0.420 *
	(0.032)	(0.045)	(0.113)	(0.186)
Cognition index	0.007	0.012	0.031	0.068
	(0.012)	(0.017)	(0.036)	(0.063)
Lack self-control	0.187 **	0.168 **	0.751 **	0.694 *
	(0.045)	(0.064)	(0.224)	(0.276)
Impulsivity index	0.007 **	0.005	0.026 **	0.023
	(0.002)	(0.003)	(0.009)	(0.015)
Constant			1.088	1.480
			(0.703)	(1.133)
Observations	1,079	537	1,079	537
R-squared			0.184	0.193

Robust standard errors in parentheses. Marginal effects reported.

** p<0.01,

* p<0.05

† In the Sample L regressions, estimates for legal consequences of DWI were elicited in the third-person (what is the expected sanction for *a person*?). In the Sample M regressions, estimates were elicited in the second-person (what is the expected sanction for *you*?).

Abbreviations: Driving While Intoxicated = DWI, CAGE Questionnaire = CAGE, Secure Continous Remote Alcohol Monitoring = SCRAM, CASI = Computer Assisted Self-Administered Interviews

Table 3

Individual's Perceived Probability of Driving Alcohol-Impaired Next Year Given a Randomly Increased Apprehension Probability

	Probability of Driving Alcohol-Impaired				
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Apprehension probability when driving impaired	−0.340**	−0.298**	−0.134*	−0.279**	−0.250**
	(0.044)	(0.042)	(0.059)	(0.041)	(0.039)
Regression Model	OLS	OLS	FE	RE	RE
Respondent Attributes Included (Y/N)	Yes	No	No	Yes	No
Hausman Test Statistic†				9.01**	5.44*
Observations	888	888	888	888	888
R-squared	0.118	0.048	0.009		

Based on Sample S. Robust standard errors in parentheses.

** p<0.01,

* p<0.05

† The Hausman test statistic compares the random effects model in the given column to the fixed effects model reported in col (3).

Abbreviations: Ordinary Least Squares = OLS, Fixed Effects = FE, Random Effects = RE.

Table 4

Individual's Perceived Probability of Driving Alcohol-Impaired Next Year Given a Randomly Increased Sanction Level

	Probability of Alcohol-Impaired Driving			
	Fine	**Jail**	**License Suspension/ Revocation**	**SCRAM Device**
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Randomly Increased Sanction Level				
Fine ($100)	−0.00045			
	(0.00048)			
Jail (weeks)		0.00041		
		(0.00041)		
License suspension/revocation (months)			0.00024**	
			(0.00002)	
SCRAM device (months)				−0.00004
				(0.00004)
Observations	818	674	800	718
R-squared	0.069	0.057	0.082	0.055

Based on Sample S. Robust standard errors in parentheses.

** p<0.01,

* p<0.05

Results are clustered at the individual level. All regressions control for respondent attributes.

Abbreviations: Secure Continous Remote Alcohol Monitoring = SCRAM.