ORIGINAL RESEARCH

Avoiding DWI Among Bar-room Drinkers: Strategies and Predictors

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Abstract: We examined the prevalence and predictors of 11 strategies to avoid driving when feeling intoxicated among 561 bar-room patrons in two medium-sized Maryland communities. Logistic regression analyses identified demographic, behavioral, and attitudinal predictors of avoidance strategies and interactions among predictors. Overall, 89% reported one or more DWI avoidance actions in the past year, and 38% reported driving intoxicated during that time. Average frequencies of avoidance behavior and intoxicated driving increased significantly as drinking level increased. However, the higher the drinking level, the smaller the ratio of avoidance actions to DWI experiences, highlighting the vulnerability of heavy drinkers who had driven intoxicated.

Using a sober driver or one who allegedly drank less than the respondent were the most popular and frequent strategies, but paying for a cab, walking, and using a bus or free cab were relatively unpopular. Higher drinking levels predicted significantly higher odds of using avoidance approaches, as did intoxicated driving. Confidence in driving safely when intoxicated was positively related to drinking level and intoxicated driving, but it tended to predict lower odds of avoidance actions. Similarly, marital status, age, gender, and location influenced the odds of avoidance behaviors. Interventions should be strategically tailored to exploit or counter drinker predilections among avoidance options.

Keywords: bar-room patrons, DWI avoidance strategies, logistic predictor models, preventing DWI

Introduction

This study examines behaviors used to avoid driving when intoxicated, and predictors of avoidance, among a representative sample of bar-room patrons in Frederick and Hagerstown, Maryland. These communities were originally sites for a quasi-experimental study of a campaign to promote use of designated drivers and free safe rides (by cabs) to prevent alcohol-impaired driving. From 1996 through 1999, Frederick (population 58,427) served as the intervention community, and Hagerstown (population 70,158) as its control.[1] Several criteria guided their selection for the intervention study including availability of taxi service and potential generalizability of findings to similar communities in size and demographics.[2] However, analyses of multiple outcomes showed no significant effects of the campaign itself. Indices of possible effects included self-reported frequencies of intoxicated driving during the past 12 months, as assessed by annual bar surveys and community-level random-digit-dial telephone interviews, plus alcohol-related crashes and fatalities as examined through county-level time-series analyses.

Each year surveys were conducted in bar-rooms within each community to assess possible intervention effects on patrons' knowledge, attitudes, and behavior. During the fourth year, we added a new section to measure patrons' use of 11 strategies to avoid driving when they felt intoxicated, and these data are the focus of this article.

Studies of attempts by drinkers to avoid alcohol-impaired driving have generally focused on their use of designated drivers (eg,[3–8]), "safe" or free-ride programs (eg,[9–12]), and peers or significant others who presumably have consumed less alcohol than the focal drinker (eg,[13–16]). In addition, many researchers have examined roles that servers of alcohol can play in intervening with at-risk drinkers before or after they become too impaired to drive safely (eg,[17–21]). Still other studies have investigated ways vulnerable drinkers can be persuaded through education (eg,[22–27]), communication (eg,[28–35]), and publicly or privately enforced sanctions (eg,[36–40]) to engage in self-initiated behaviors to prevent themselves from driving drunk.

Yet, only a handful of studies have explored DWI avoidance preferences among adults or adolescents at elevated risk of drinking and driving. In Brown's study of personal self-regulatory strategies, used by a representative sample of 427 drinkers in Australia at "high risk of drunk driving",[41] limiting drinks to a predetermined number was the sole technique associated with a reduced likelihood of this risk. In contrast, respondents who used taxis, drank low-alcohol beer, or spontaneously decided to delay or avoid driving after drinking were more likely to acknowledge drunk driving.

In Kulick and Rosenberg's[42] study of 116 midwestern university students (mostly women), respondents attributed their drinking and driving to both situational and self-coping factors. Common reasons for not driving after recent drinking episodes included the availability of alternative transportation and opportunities to walk to one's destination. However, the perceived need to get to one's destination provided an excuse for driving after drinking, and strategies used to avoid the police included driving slower than usual and using back roads or side streets.

In a statewide, randomized telephone survey of 1,534 youth (ages 15 to 20) in California (J. Grube, personal communication, July 17, 2009), respondents were asked how easy or difficult it would be to use public transportation, call a parent for a ride, call someone else for a ride, or use a designated driver to avoid alcohol-impaired driving. The proportion who selected "Very easy" varied from 42% for public transportation to 52% for calling someone other than a parent, and the combination of Very and Somewhat Easy ranged from 70% to 82%. When asked how many drinks a designated driver could have, 46% said "None", and 31% said "One". A similar study of 614 youth in the San Francisco Bay Area showed essentially the same result (J. Grube, personal communication, July 17, 2009).

Qualitative telephone interviews with a small subsample of the Bay-Area respondents assessed their reasons for driving after drinking or riding with an impaired driver[43] plus distal and proximate reasons for avoiding these experiences. The respondents feared repercussions if caught by the police, but believed that likelihood was very low. Apparently, most parents had offered to pick up their teenagers if asked, but most respondents would decline such offers, anticipating trouble with their parents and not wanting to be seen drunk. Coming home without the car presented another problem, but sleeping at the host's house was seen as an option. In general, the norm among these

teenagers was that drinking and driving was "okay", but they did "not actively push each other" to do so. Perhaps the most important barrier to change was their feeling of being "invincible", expressed as trust in their cautious driving skills when drunk, and their overall judgment.

In a U.S. telephone survey of 750 high-risk male young-adult drinkers, the presence of a wife or girlfriend predicted planned and successful avoidance of alcohol-impaired driving, while those who believed they could drive safely after heavy drinking were less likely to successfully avoid drinking and driving.[13,14] Related to avoidance behaviors are reasons convicted DWI offenders have given for why they continue to drink and drive. In qualitative interviews with 182 repeat offenders,[44] 46% said they thought they were "okay" to drive, or would be okay if they drove carefully; 21% did not think about it; 18.6% lacked control over themselves; and 14.4% lacked an available alternative driver (also see[45]).

Our study of DWI avoidance patterns and predictors adds new and unique information to what is already known. We deliberately studied bar-room patrons to increase the proportion of drinkers at elevated risk for impaired driving. We questioned bar-room drinkers on a peak weekend night in the very settings and time periods in which intoxication frequently occurs as a prelude to alcohol-impaired driving (eg,[46–50]). We did our best to avoid a convenience sample by choosing our bars randomly, screening every patron, and inviting every eligible customer to participate in the study. By including in the sampling frame all bars in that community and excluding patrons who lived elsewhere, we tried to maximize the generalizability of our findings to our two communities at large and analogous communities. We tried to minimize socially-desirable answers by excluding respondent names and other identifiers and presenting for consideration a full range of DWI avoidance strategies that had face validity, even if proof of effectiveness was weak or unavailable.

Although all of these "common sense" strategies were extracted from the DWI literature,[a] there have

been few if any comparisons of their prevalence among drinking populations at large or bar-room drinkers. Our data move beyond prevalence by identifying predictors of these avoidance behaviors and measuring their independent and interacting effects on use of specific strategies.

Methods
Sample selection
Before the first annual bar survey was conducted, in both towns all bars and restaurants with designated bar areas were invited to participate; 53% agreed, 26% refused, and 21% posed scheduling or contact problems (eg, reaching distant corporate owners). In the combined communities, 21 bars, 11 restaurants, and two large dance clubs participated.[2,51] A comparison of these bar-rooms with the nonparticipants showed no difference in the average age or number of patrons.[1,2] In Year 4, when the data on avoidance strategies were collected, respondents were distributed across 31 bars, and varied from 1 to 48 per bar.

All the Year-4 bar surveys were conducted on the same Saturday night in April 1999 during peak hours, consistent with data showing that "drinking-driving is primarily a nighttime, weekend phenomenon".[48] In each setting, multiple teams of research assistants approached and screened groups of customers. To be eligible to receive a questionnaire, customers had to be age 21 or older (the legal minimum drinking age), to have lived in the respective county for at least 12 months, to have driven a motor vehicle in the past 12 months, and to have consumed an alcoholic beverage at least once during that period for other than religious purposes. Customers who had already completed the survey elsewhere that evening were excluded. To limit pre-survey drinking, customers were approached when they first entered the establishment (just inside the entrance), and existing patrons were not permitted to participate, as was also true in our previous bar-room research (eg,[1,2,9,46,51]). These procedures and training of survey staff were strictly standardized across the two communities, and included a verbatim script of what the staff person should say to a prospective participant.[2,9]

Once informed consent had been obtained, participants were asked to complete their (anonymous)

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[a]A similar list of avoidance strategies was used in a set of telephone interviews with a cross-section of residents from these communities; so we knew the options were comprehensible. In the bar questionnaire, we also gave respondents an opportunity to mention other strategies they had used.

questionnaires promptly, to place them in a sealed envelope before they left the bar, and return them to the survey administrator. As an incentive, they received $5 vouchers that could be exchanged for food or nonalcoholic beverages at each respective establishment. To reduce the number of intoxicated patrons, we made certain (with few exceptions) that we concluded our surveys before midnight.

Approximately 2,300 customers were approached; 64.5% completed the screening questions; 55.4% of those screened were deemed eligible; and 83.6% of those eligible completed the surveys. The major reason for ineligibility was not living in the relevant county. No attempt was made to chase customers who bypassed busy screeners or to convert the few who declined screening, because management specified that customers not be pursued after entry. It appeared that most missed patrons were simply in a hurry to enter the establishments.[1]

A total of 687 patrons returned their questionnaires. The questions about avoidance of impaired driving, located toward the end of the survey, asked how many times the respondent had used each of 11 possible avoidance strategies. For unknown reasons, 126 respondents did not answer any of these avoidance questions, but 561 (81.8%) provided information concerning at least one strategy.[b] Their response patterns suggested they simply ignored other strategies they had not used. Yet, we could not assume that the 126 respondents who ignored all 11 avoidance behaviors did so because they had not used any. Our analysis is, therefore, limited to the 561 respondents who provided some data (341 from Frederick and 220 from Hagerstown). For these respondents, we assumed that missing answers indicated nonuse of that strategy. The count of total avoidance actions included open-ended "Other, specify" answers from 21 respondents, but these specific strategies were not coded. Because 17 respondents reported unreasonably high values for "number of times" they used one or more strategies, those values were recoded to 1.

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[b]When we compared the 126 and 561 respondents, site was the only significant discriminator among our full set of potential predictors. In Hagerstown, 26.2% of respondents ignored the avoidance questions compared to 12.3% for Frederick, and these nonresponders also answered fewer other relevant questions.

Focal variables

Our three central behavioral variables included:

Avoidance

Defined as behaviors undertaken during the past 12 months "to avoid driving when [you] felt intoxicated" or "thought you might become intoxicated". For each avoidance strategy presented, respondents reported the number of times it was used, including zero. We also calculated the total number of avoidance actions across all 11 strategies, referred to as "any" (some) avoidance. As an additional index, we computed the proportion who had used a DWI avoidance approach at least once in the past year divided by the proportion who had driven intoxicated at least once during that time. Similarly, we divided the frequency of avoidance actions by the frequency of DWI experiences. We anticipated that these Avoidance/DWI ratios would be more informative and clinically meaningful than the frequency of avoidance behavior itself.

The 11 specific avoidance strategies were as follows (in the exact words and order they were presented to the respondents): Taken a bus; received a free cab ride; paid for a cab; stayed until effects of alcohol wore off; had someone else drive who had not been drinking (which we refer to as using a "sober driver"); had someone else drive who had less to drink than you did; left your car and walked home; stayed over night; drank less than you planned to; chose not to drink when you planned to; and stayed home when you had plans to go out. In addition, the list included two questions which asked: "Something else? (Please write in)".

Drinking level

Divided into light/infrequent, moderate, and heavy based on Cahalan and colleagues' Quantity-Frequency-Variability (QFV) Index.[52] To create these three categories, the Cahalan index asks respondents about their drinking levels in general as opposed to drinking within the 12-month time frame we used for avoidance actions and intoxicated driving. The index uses a formula that simultaneously considers the quantity (by number of standardized drinks), frequency (by day or week or month), and variability (by proportion of time) to measure the respondent's consumption of alcoholic beverages. It has often been used to identify individuals most at-risk

for hazardous drinking, who obviously should be the targets of preventive interventions. In our earlier work, we used the Cahalan index to determine if riskier drinkers were using designated drivers[2] or safe (free-cab) rides[9] to avoid DWI, and to what extent.

The effects of drinking level were tested in two ways: by an overall F-test that measured the average effect of all three drinking levels, and by two contrasts that compared effects of heavy versus light/infrequent drinking and heavy versus moderate drinking.

Driving intoxicated

Defined as driving after drinking during the past 12 months when the respondent "felt intoxicated". We compared respondents who had not driven intoxicated with those who had done so at least once, and we used total frequencies as both independent and dependent variables.

In addition to our three central behavioral variables, we included the following attitudinal and demographic factors: Driving confidence when feeling intoxicated (scored on a certainty scale from 0 to 10), Race, Gender, Marital Status, Household Income (in $10,000 increments from <$5,000 to >$85,000), Age, Site (Frederick or Hagerstown), and DUI/DWI arrests.

Imputation

To create a complete data set for analysis, we used the procedure described by Judkins and colleagues[53] to impute missing values for many variables that served as predictors of avoidance behavior, covariates, or measures of drinking contexts. For our most important predictors of avoidance strategies (drinking level and times drove when feeling intoxicated), only 4.5% and 2.0% of the values were imputed. For our demographic variables, the imputed proportions ranged from 1% for gender to 6% for income. Although imputation adds uncertainty to statistical estimates that is not reflected in the standard errors and *P*-values, it can add precision by increasing sample size, and all analyses involve the same set of respondents. Since the proportions of imputed values were small and results using the imputed and unimputed variables were similar, we used the imputed variables.

Statistical analyses

We analyzed the data by assuming respondents were clustered within a random selection of bars, because those from the same bar are probably more alike than a random sample of bar patrons.[54,55] For consistency, we used the SAS SurveyLogistic procedure and the associated chi-square value to derive all *P*-values for predicting categorical data (eg, gender, site, and marital status) and the SAS SurveyReg procedure and the associated F statistic for all *P*-values predicting continuous variables (eg, age and confidence).

Initially, we conducted descriptive analyses to determine relationships among our major behavioral, attitudinal, and demographic variables. Because these analyses clearly demonstrated that drinking level, driving when feeling intoxicated, and some demographic and attitudinal factors were directly or indirectly related to avoidance behaviors, we conducted multivariate logistic regression analyses to measure how much each factor affected the avoidance behaviors when all potential predictors were included in the predictive model as main effects. In the initial models, neither race nor income was a statistically significant predictor of avoidance behavior; so they were not considered further. In phase two of the regression analysis, the remaining main effects were used to predict *any* avoidance behavior and each specific avoidance strategy. Results are presented in terms of *P*-values and odds ratios (OR's).

In the third phase, we used stepwise logistic regression to identify significant interactions among the main effects. Three interactions were identified, each for a different avoidance approach, and they remained significant when adjusted for clustering, using the SurveyLogistic procedure. Because the number of significant interactions was small and their inclusion did not seriously affect the parameters for main effects not included in the interaction, we did not add the interactions to the common model of main effects used to examine predictors of avoidance, but we describe the two interactions most relevant to prevention.

Findings
Background characteristics
Our sample of 561 respondents contained somewhat more men than women (54% vs. 46%), and almost everyone (95%) considered themselves to be White. Approximately 22% reported total annual household incomes of $25,000 or less; 47% reported incomes from $25,000 to $55,000; 19% from $55,000 to

$85,000; and 12% greater than $85,000. Only 33% of the sample were married; 4.6% were living with a partner; approximately 45% were single; and 18% were divorced, separated, or widowed. The ages ranged from 21 to 80 and averaged 33.6 years with a median of 31.9.

A few statistically significant relationships occurred among these demographic factors, primarily involving income. Men had a somewhat higher average household income than women; those who were married or partnered had household incomes considerably higher than incomes of the "single group" (ie, the combination of single, separated, divorced, and widowed respondents); drinkers in Hagerstown had somewhat lower incomes than those in Frederick; and age was positively related to average household income. Furthermore, the married/partnered group were on average about 3 years older than the single group; and a slightly lower proportion of men than women described themselves as White.

Several other background variables assessed by the bar survey are conceptually relevant. A total of 85 respondents (15.2%) reported that they had been arrested for DUI/DWI at least once in their lifetimes, among whom 23 had been arrested in the past 12 months. The average confidence in being able to drive safely when feeling intoxicated was 3.62 on the certainty scale of 0 to 10;[c] 32.6% reported zero confidence compared to 18% whose levels were 8, 9, or 10. In response to the four-question CAGE screening test for alcohol problems, 67.6% scored 0 by answering "No" to every item, 17.8% scored 1, and 14.6% scored 2 or more (including 1.8% who scored 4).

When asked how often they drank in specified locations during the past 12 months, almost all the respondents (96%) chose "drinking establishments such as bars, taverns, restaurants, or private clubs" where they drank on average about 35 times a year; 81% drank at home, on average somewhat less than once a week; 80% drank in other people's homes, including at private parties, on average slightly more than once a month; and 35% drank in "Other" unspecified locations, on average about once a month.

When asked what type of transportation they used "to go out tonight", 49% said they drove themselves; 28% rode "with a driver who had not been drinking;" 9% rode "with a driver who had been drinking alcohol;" 8% walked; and less than 2% took a bus or cab. Regarding how they planned to get home or to wherever they were staying, 42% said they would drive themselves; 21% would ride with a driver who had not been drinking; 12% would ride with a driver who had been drinking; 10% would walk; less than 5% would take a bus, cab, or free cab; and 6% were not sure how they would get home.

Drinking levels, driving while intoxicated, and avoidance behavior

Among the 561 bar-room patrons, 38% reported that during the past 12 months they had driven at least once when feeling intoxicated,[d] and 89% reported using a DWI avoidance approach at least once during that time. According to our categorical drinking-level index,[52] 25.5% were light/infrequent drinkers; 29.4% were moderate drinkers; and 45.1% were heavy drinkers (Table 1).

Level of drinking was positively and consistently related to the proportion who acknowledged driving when feeling intoxicated (DWI) during the past year.

Table 1. Relationships among drinking level, any avoidance action, and any DWI experience.

Behavior	Drinking level			
	All levels	Light/ infrequent	Moderate	Heavy
	N = 561	N = 143 25.5%*	N = 165 29.4%	N = 253 45.1%
Any avoidance action	88.8%	77.6%	92.7%	92.5%
Any DWI experience	38.0%	10.5%	33.9%	56.1%
Avoidance/ DWI ratio	2.34	7.40	2.73	1.65

*This percentage represents the proportion of the entire sample of barroom patrons in this drinking-level category.

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[c]Zero meant "You are certain you *cannot* drive safely when you feel intoxicated;" 10 meant "You are certain you *can* drive safely;" and 5 meant "You are not leaning one way or the other".

[d]In the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions, 8.7% was the highest proportion of any age group 21 and older who reported driving after having too much to drink during the past 12 months.[56] Thus, our bar-room patrons were definitely at increased risk for DWI.

Self-reports of DWI increased from 10.5% of light/infrequent drinkers, to 33.9% of moderate drinkers, and 56.1% of heavy drinkers, $P < 0.0001$. Level of drinking was also positively related to having used an avoidance approach. Although the proportion of avoidance users was the same for moderate and heavy drinkers, that proportion was much lower for light/infrequent drinkers (92.7% and 92.5% vs. 77.6%, $P < 0.0001$). Moreover, having driven intoxicated during the past year was positively related to using *some* avoidance approach during that period (see Table 2). Thus, 94.4% of the DWI respondents had used an avoidance strategy compared to 85.3% of non-DWI respondents, $P = 0021$.

When we stratified the sample in terms of whether they had or had not driven intoxicated (Table 2), among the DWI drivers, drinking level had essentially no effect on the proportion who reported using some avoidance strategy. That proportion ranged from 93% to 95% regardless of the drivers' drinking level. Among the non-DWI drivers, however, drinking level was positively and significantly related to avoidance behavior. The proportion who used some avoidance approach increased from 75.8% among light/infrequent drinkers to 92.7% among moderate drinkers, and then it decreased slightly to 89.2% among heavy drinkers ($P < 0.0001$).

Perhaps more important, our ratio of taking any avoidance action during the past year compared to driving intoxicated at least once was significantly and inversely related to drinking level. As depicted in Table 1, that ratio declined from 7.40 for light/infrequent drinkers, to 2.73 for moderate drinkers and 1.65 for heavy drinkers. Because almost half the sample were heavy drinkers, the ratio was 2.34 for everyone combined.

Attitudinal, demographic, and drinking-driving relationships

Confidence in driving safely when intoxicated was positively associated with drinking level. The average confidence score increased from 2.08 for light/infrequent drinkers to 3.65 for moderate drinkers and 4.47 for heavy drinkers ($P < 0.0001$). Furthermore, DWI respondents had a much higher average confidence score (5.34) than non-DWI respondents (2.57), $P < 0.0001$.

A much larger proportion of men than women (58.4% vs. 29.3%) were heavy drinkers ($P < 0.0001$), and a considerably larger proportion of men than women (43.9% vs. 30.9%) reported driving intoxicated ($P = 0.0036$). In addition, men had a higher average score on driving confidence when intoxicated than women (also see[46]), 4.13 vs. 3.12, $P = 0.0064$.

Age was inversely associated with drinking level. The average age of respondents decreased from 36.04 to 33.44 to 32.31 as their level of drinking increased ($P < 0.01$). Similarly, those who experienced intoxicated driving were younger on average (31.69) than those who had not (34.76), $P = 0.001$, and age was inversely associated with confidence in driving safely when intoxicated ($P < 0.02$). Younger drivers had higher confidence than older ones.

A much lower proportion of those who were married or living with a partner (26.54%) had driven intoxicated than "single" drivers (44.86%), $P < 0.0001$. Moreover, the married/partner group reported lower confidence than the single group in driving safely when intoxicated ($P < 0.01$).

Although average household income was inversely associated with drinking level ($P < 0.05$), average incomes for all three drinking levels were within the $35,000 to $45,000 category.

Table 2. Proportion of drivers who used any avoidance approach: by drinking level and whether drove intoxicated past 12 months.

Any avoidance strategy			Drinking level														
			All levels N = 561 DWI				Light/infrequent N = 143 DWI				Moderate N = 165 DWI				Heavy N = 253 DWI			
	All		Yes		No		Yes		No		Yes		No		Yes		No	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Yes	498	88.8	201	94.4	297	85.3	14	93.3	97	75.8	52	92.9	101	92.7	135	95.1	99	89.2
No	63	11.2	12	5.6	51	14.7	1	6.7	31	24.2	4	7.1	8	7.3	7	4.9	12	10.8

Drinkers from Hagerstown had somewhat higher driving confidence when intoxicated than drinkers from Frederick ($P < 0.02$).

Specific avoidance approaches

Descriptive relationships. The next set of analyses focused on the 11 specific DWI avoidance approaches rather than "avoidance" in general. Table 3 displays the number and percent of the total sample who used each approach at least once in the past year, cross-tabulated by drinking level and whether they had driven intoxicated during the year. The most prevalent strategy was using a "sober driver", endorsed by 60%. Second in popularity was having someone drive who had drunk less than the respondent, endorsed by 43%. In descending order: 42% drank less than planned; 39% stayed overnight; 38% did not drink even though they planned to; 37% stayed until the alcohol effects wore off; 35% stayed home

even though they planned to go out; 25% paid for a cab; 20% walked home; and a small proportion took a free cab (8%) or a bus (5%).

For all 11 avoidance approaches, the proportion who had used that strategy at least once increased as drinking level increased, and 10 of these increases were significant. Drivers who drank lightly or infrequently were always the least likely to have used the specified approach, and for 8 strategies heavy drinkers were the most likely to have done so. For 10 avoidance strategies, a larger percentage of DWI than non-DWI drivers used it at least once, and 7 of these differences reached significance. Only using a free cab showed a smaller proportion of DWI than non-DWI users, which was not significant.

Logistic regression predictor models. Using a common set of main effects, we examined the extent to which 7 behavioral and demographic variables predicted each of the 11 avoidance strategies, generat-

Table 3. Number and percentage of drivers who used specific avoidance approaches: by drinking level and whether drove intoxicated.

Avoidance strategy		All	Drinking level				Drove when felt intoxicated		
			Light/ infrequent	Moderate	Heavy	P-value	Yes	No	P-value
	N	561	143	165	253		213	348	
Any strategy	N used	498	111	153	234	<0.0001	201	297	0.0021
	%	88.8	77.6	92.7	92.5		94.4	85.3	
Bus	N used	30	3	7	20	0.0419	17	13	0.0066
	%	5.3	2.1	4.2	7.9		8.0	3.7	
Free cab	N used	44	3	10	31	0.0005	14	30	0.3102
	%	7.8	2.1	6.1	12.3		6.6	8.6	
Paid cab	N used	139	10	34	95	<0.0001	58	81	0.3930
	%	24.8	7.0	20.6	37.5		27.2	23.3	
Stayed wore off	N used	207	35	72	100	0.0107	103	104	<0.0001
	%	36.9	24.5	43.6	39.5		48.4	29.9	
Sober driver	N used	335	69	103	163	0.0002	142	193	0.0310
	%	59.7	48.3	62.4	64.4		66.7	55.5	
Drink driver*	N used	240	29	73	138	<0.0001	131	109	<0.0001
	%	42.8	20.3	44.2	54.5		61.5	31.3	
Walked	N used	111	15	26	70	<0.0001	50	61	0.1221
	%	19.8	10.5	15.8	27.7		23.5	17.5	
Stayed night	N used	216	34	55	127	<0.0001	112	104	<0.0001
	%	38.5	23.8	33.3	50.2		52.6	29.9	
Drank less	N used	234	40	80	114	<0.0001	113	121	< 0.0001
	%	41.7	28.0	48.5	45.1		53.1	34.8	
Did not drink	N used	212	44	75	93	0.0006	88	124	0.2002
	%	37.8	30.8	45.5	36.8		41.3	35.6	
Stayed home	N used	195	41	58	96	0.1259	85	110	0.0342
	%	34.8	28.7	35.2	37.9		39.9	31.6	

Note: *Drink driver refers to a driver who drank less than the respondent.

ing odds ratios to measure direction and size of the predictor's effect and P-values to measure their significance. In our earlier regression models, each of these variables was a significant predictor of one or more avoidance strategies. One predictor, drinking level, is a three-level categorical variable represented in the model by two dummy variables that denote contrasts between heavy drinkers and either light/infrequent or moderate drinkers. Table 4 shows the odds ratios and P-values for the two contrasts plus the P-values for effects of the three-level drinking variable. In column one, the Overall P-value indicates for each avoidance approach whether the combination of seven predictor variables in our final model predicted use of that strategy significantly better (more precisely) than predicting from only the mean of that strategy. Because all our Overall P-values were highly significant, our analysis focused on determining what combination of the predictor variables provided the best prediction of each avoidance strategy.

Drinking level was clearly the most important predictor of avoidance strategies. For all 11 avoidance approaches and any avoidance approach, estimated use by heavy drinkers was greater than for light/infrequent drinkers. Significant differences occurred for seven of these strategies plus any avoidance, and the odds ratios varied from 1.44 to 9.87. For eight strategies, the odds for use among heavy drinkers was also higher than among moderate drinkers, including four significant differences, and none of the lower odds among heavy than moderate drinkers reached significance.

Table 4. Odds ratios and significance levels* for relationships between predictor variables and specific avoidance strategies.**

Strategy used	Overall *P*-value	3 Levels of drinking	Heavy vs. light	Heavy vs. moderate	DWI	Site	Gender	Confidence level	Marital status	Age
Any strategy	<0.0001	<0.0001	3.15 0.0004	0.85 0.6970	2.33 0.0594	0.71 0.3351	0.93 0.8047	0.65 0.0510	0.69 0.2245	0.96 0.7572
Bus	0.0111	0.1561	3.12 0.0700	1.70 0.2473	1.65 0.1600	0.64 0.0917	1.13 0.6933	0.86 0.4571	0.83 0.6346	0.90 0.6054
Free cab	<0.0001	0.0011	8.62 0.0006	2.50 0.0111	0.38 0.0028	0.72 0.2187	1.04 0.9151	1.05 0.8250	0.45 0.0459	0.92 0.7269
Paid cab	<0.0001	<0.0001	9.87 <0.0001	2.34 0.0002	0.76 0.2457	0.93 0.7976	1.56 0.0379	0.67 0.0123	0.58 0.0305	1.11 0.4214
Stayed wore off	<0.0001	0.0752	1.48 0.1464	0.75 0.1705	1.92 0.0143	0.64 0.0157	0.75 0.1634	1.01 0.9548	0.82 0.3878	0.77 0.0075
Sober driver	<0.0001	0.0058	1.98 0.0062	1.19 0.5654	1.49 0.2108	0.87 0.2975	0.59 0.0089	0.84 0.2423	1.15 0.5285	0.81 0.0442
Drink driver	<0.0001	0.0006	3.46 0.0002	1.49 0.1241	2.13 0.0006	0.53 <0.0001	0.51 0.0014	1.84 <0.0001	1.20 0.3600	0.87 0.3713
Walked	<0.0001	0.0004	3.07 0.0007	1.90 0.0240	0.97 0.9296	0.94 0.8331	1.23 0.3007	0.79 0.2099	0.52 0.0122	0.81 0.2532
Stayed night	<0.0001	<0.0001	2.49 <0.0001	1.83 0.0318	1.97 0.0008	0.86 0.4392	0.85 0.4621	0.81 0.1143	0.55 0.0050	0.80 0.0363
Drank less	<0.0001	0.0029	1.74 0.0293	0.83 0.4170	1.89 0.0001	0.62 0.0044	0.71 0.0869	1.08 0.5920	1.07 0.6907	0.97 0.7199
Did not drink	<0.0001	0.0008	1.44 0.0940	0.76 0.1338	1.42 0.1698	0.89 0.6069	0.64 0.0005	0.76 0.0735	0.90 0.5949	0.99 0.9404
Stayed home	<0.0001	0.1931	1.53 0.0756	1.15 0.4625	1.44 0.1479	0.84 0.4465	0.79 0.0767	0.76 0.1136	0.73 0.0493	0.98 0.9014

*The three colors signify different levels of statistical significance. Yellow cells denote *P*-values of <0.01; gray denotes *P*-values that are <0.05 but > 0.01; and white cells signify *P*-values that do not reach the 0.05 level of significance; **For the three-level drinking variable, only *P*-values are provided, but odds ratios and associated *P*-values are presented for the two contrasts of drinking levels.

Note: The odds ratios for driving confidence is the change in the odds, expressed as a ratio, corresponding to a change in driving confidence of 5 units (driving confidence was measured on a scale of 0 to 10); the odds ratios for age is the change in the odds corresponding to a change in age of 10 years.

Driving while intoxicated was also a strong predictor of avoidance behavior. For eight avoidance approaches, the odds for use were higher among drivers who had driven intoxicated than those who had not, and four of the differences were significant. One strategy with higher odds for the non-DWI drivers was also significant (took a free cab). Although the OR for any avoidance indicated that DWI drivers had higher odds of using some avoidance strategy than non-DWI drivers, this difference missed significance.

To test effects of lifetime arrests for DWI or DUI, we added it to the predictors in Table 4. The 85 respondents who reported these arrests had significantly higher odds of using a paid cab to avoid DWI than other respondents. This was the only significant arrest-avoidance relationship, and including it in the model did not affect the significance or interpretation of the predictor-avoidance relationships in Table 4.

Site had a universal effect. For all avoidance strategies and any avoidance, Hagerstown drinkers had lower odds of estimated usage than drinkers in Frederick, and three differences were significant.

Gender. Men had lower odds than women of using seven avoidance strategies, including three significant differences. Where men had higher odds of avoidance, only use of a paid cab was significant.

Confidence in driving safely when intoxicated was inversely related to seven specific strategies and any avoidance, but only the lower odds for using a paid cab was significant. Where driving confidence predicted higher odds of avoidance, using a driver who drank less than the respondent was significant.

Marital Status. Compared to the single group, being married or living with a partner predicted lower odds of using some avoidance approach and eight specific strategies, including five significant differences; but no strategy where the married or partnered had higher odds of avoidance was significant.

Age. Increasing age was inversely associated with use of 10 avoidance approaches (all but use of a paid cab) plus any avoidance, and three of these lower odds were significant.

The data in Table 4 can also be interpreted by focusing on each avoidance strategy as a dependent variable and examining its linkages to potential predictors, thereby highlighting specific effects and interactions. For taking a bus, no links to predictors were statistically significant. For the

other approaches, the following effects reached significance at <0.05:

Taking a free cab was positively related to higher drinking level, but it was negatively associated with driving intoxicated and being married or having a live-in partner.

Paying for a cab was also positively related to higher drinking level and negatively related to being married or partnered. Men had higher odds than women of paying for a cab, but the greater one's confidence in driving safely when intoxicated, the lower the odds of paying for a cab. However, a significant interaction occurred between driving confidence when intoxicated and marital status. Increased confidence predicted decreased use of paid cabs among single respondents but increased use among the married and partnered.

Staying until the effects of alcohol wore off was positively related to driving intoxicated but negatively related to age and to drinking in Hagerstown rather than Frederick.

Using a sober driver was positively related to drinking level but negatively related to age; and men had lower odds of using this strategy than women. However, when the significant interaction between drinking level and gender was added to the model, men became increasingly likely to use this strategy as their drinking level increased. Thus, among heavy drinkers, the odds of using a sober driver was essentially the same for both genders.

Using a driver who drank less than the respondent was positively related to respondent drinking level, driving when intoxicated, and higher confidence in being able to drive safely when intoxicated. However, men had lower odds than women of using drivers who drank less than they did, and drinkers in Hagerstown had lower odds than drinkers in Frederick.

Walking to avoid DWI was positively associated with drinking level, but the married/partnered drinkers had significantly lower odds of walking as an avoidance strategy than the "single" group.

Staying the night to avoid DWI was positively related to drinking level and to having driven intoxicated, but it was negatively related to age. Moreover, married or partnered drivers had lower odds of staying the night than single drivers.

Deciding to drink less was positively related to driving intoxicated and significantly (but incon-

sistenly) related to drinking level, meaning that the relationship was not linear. Using this strategy had higher odds among heavy than light/infrequent drinkers, but lower odds among heavy than moderate drinkers. Drinkers in Hagerstown also had lower odds than those in Frederick of deciding to drink less.

Choosing not to drink, when drinking was planned, was significantly (but inconsistently) related to drinking level. Heavy drinkers had higher odds of using this strategy than light/infrequent drinkers, but lower odds than moderate drinkers, and neither contrast reached significance. However, men had significantly lower odds of choosing not to drink than women did.

Staying at home despite plans to go out was significantly related to only one predictor variable. The married/partnered group had lower odds of using this strategy than their single counterparts.

Any avoidance strategy was also a dependent variable. In this logistic regression model of potential predictors, only drinking level was significantly (but inconsistently) related to any avoidance ($P < 0.0001$). The odds of using some avoidance strategy was much higher (OR = 3.15) among heavy than light/infrequent drinkers ($P = 0.0004$), but

it was non-significantly lower among heavy than moderate drinkers.

Frequency of driving intoxicated and avoidance behaviors

In further analyses, we measured the frequencies of DWI and specific avoidance behaviors, not simply the proportion who had that experience at least once, and we created the ratios that compared the frequencies of avoidance and DWI. For the entire sample, the average number of avoidance and DWI behaviors was respectively 23.94 and 2.82 (Table 5), yielding an avoidance/DWI ratio of 8.49. However, this ratio varied substantially among subgroups based on drinking level and DWI experiences.

Across the continuum from light/infrequent to heavy drinking, the mean number of DWI occurrences increased more than 18-fold (from 0.30 to 5.42, $P < 0.0001$), while the mean number of avoidance actions increased less than 3-fold (from 11.57 to 33.61, $P < 0.0001$). As a result of this disparity, the avoidance/DWI ratio decreased substantially and consistently as drinking level increased (from 38.49 to 19.48 to 6.21). Like the means, we found that the

Table 5. Number of avoidance actions, times drove intoxicated, and number of avoidance methods by drinking level.

Drinking level	Number of avoidance actions*		Number of times drove intoxicated		Number of avoidance approaches	Avoidance actions/DWI ratio
All levels N = 561						
Mean and N	23.941	13,431	2.820	1,582	3.553	8.490
Median	11		0		3	
Maximum	380		100		13	
Light/infrequent N = 143						
Mean and N	11.573	1,655	0.301	43	2.301	38.488
Median	4		0		2	
Maximum	212		10		8	
Moderate N = 165						
Mean and N	19.836	3,273	1.018	168	3.642	19.482
Median	11		0		3	
Maximum	262		25		11	
Heavy N = 253						
Mean and N	33.609	8,503	5.419	1,371	4.202	6.202
Median	18		1		4	
Maximum	380		100		13	

*Among the 498 users of avoidance strategies, the mean number of actions was 26.97 for users as a whole, 14.91 for the light/infrequent drinkers (n = 111), 21.39 for moderate drinkers (n = 153), and 36.34 for heavy drinkers (n = 234). These values were similar to those for the entire sample, because the proportions of avoidance users were very high.

median and maximum frequencies of DWI, avoidance actions, and different avoidance approaches were positively related to drinking level.

The 213 drivers who had driven intoxicated had appreciably larger mean and median numbers of avoidance actions than the 348 who had not driven intoxicated (Table 6), but the maximum number of avoidance actions was considerably larger among the non-DWI group. For light/infrequent and moderate drinkers, the DWI drivers reported larger means and medians for avoidance actions than the non-DWI group. Among heavy drinkers, however, the non-DWI drivers had the larger mean for avoidance actions.

Focusing on the DWI drivers alone in Table 6, we found only small differences between light/infrequent and moderate drinkers in their mean number of DWI events, mean number of avoidance actions, and their avoidance/DWI ratios. However, the heavy drinkers had driven intoxicated more than three times as often, on average, as the light/infrequent or moderate drinkers and had an appreciably larger average number of avoidance actions than the other two drinking groups. Yet, in relative terms the avoidance difference was smaller than the difference in DWI events; so within the DWI subgroup, heavy drinkers had a much smaller avoidance/DWI ratio than light/infrequent or moderate drinkers.

Lastly, we computed the total, mean, median, and maximum times each avoidance strategy was used during the past 12 months among its users, as well as its average use among the entire sample (Table 7). Using sober drivers, using drivers who drank less than

the respondent, and staying home despite plans to go out had the largest total frequencies. Among the users, the 111 who "left their cars and walked home" had the largest average frequency (9.95 times), followed by the 195 who stayed home (9.04 times). Because the magnitude of maximum use skewed all the frequency distributions, median use was always smaller than mean use. For six strategies, at least one person used it 100 or more times.

Discussion

In our study of strategies used to avoid DWI among bar patrons in two medium-sized cities in Maryland, several findings are encouraging from a public-health perspective: Whereas 89% of respondents reported using one or more DWI avoidance strategies during the past year, only 38% reported driving intoxicated; for the entire sample, the average frequency of avoidance actions was 23.9 compared to 2.8 DWI experiences, yielding an avoidance/DWI ratio of 8.5; the average frequency of avoidance actions increased substantially and significantly as drinking level increased, and that frequency was substantially and significantly larger among respondents who had driven intoxicated than those who had not; in multivariate regression analyses, drinking level positively and significantly predicted use of *some* avoidance approach; and using a sober driver was the most popular and frequent avoidance strategy.

However, these findings tell an incomplete story about drinkers at high risk of continued intoxicated driving. As drinking level increased, the average

Table 6. Frequency of avoidance behavior: by whether drove intoxicated and drinking level.

	N	Frequency of avoidance behavior			DWI events	Avoidance/DWI ratio
		Mean	**Median**	**Maximum**	**Mean**	**For means**
Drove intoxicated						
Yes	213	29.263	15.0	262	7.427	3.940
Drinking level						
Light/infrequent	15	24.600	9.0	181	2.867	8.580
Moderate	56	23.375	12.0	262	3.000	7.792
Heavy	142	32.078	18.5	254	9.655	3.322
No	348	20.684	8.0	380	–	–
Drinking level						
Light/infrequent	128	10.047	3.5	212	–	–
Moderate	109	18.018	9.0	232	–	–
Heavy	111	35.568	16.0	380	–	–

Table 7. Frequency of using specific avoidance strategies.

Strategy used	Respondents using the strategy at least once		Number of times used during the past 12 months				
			Among users N = 498				Among all N = 561
	N	Percent	Total	Mean	Median	Maximum	Mean
Any strategy	498	88.8	13,431	26.97	12.5	380	23.94
Bus	30	5.3	103	3.43	2.0	20	0.18
Free cab	44	7.8	149	3.39	1.0	50	0.27
Paid cab	139	24.8	731	5.26	3.0	50	1.30
Stayed wore off	207	36.9	933	4.51	2.0	60	1.66
Sober driver	335	59.7	2,500	7.46	3.0	200	4.46
Drink driver	240	42.8	1,852	7.72	4.0	150	3.30
Walked	111	19.8	1,104	9.95	2.0	320	1.97
Stayed night	216	38.5	1,295	6.00	3.0	50	2.31
Drank less	234	41.7	1,613	6.89	4.0	100	2.88
Did not drink	212	37.8	1,247	5.88	3.0	100	2.22
Stayed home	195	34.8	1,763	9.04	4.0	150	3.14
Other strategy	21	3.7	141	6.71	4.0	20	0.25

frequency of DWI events increased relatively more than avoidance actions, causing an inverse association between drinking level and the avoidance/DWI ratio, which decreased from 38.5 to 6.2 as drinking level increased. Moreover, that ratio was only 3.9 for DWI drivers, and 3.3 for heavy drinking DWI drivers (25.3% of the entire sample).

Another disturbing finding is that level of confidence in driving safely when intoxicated was positively and significantly related to drinking level and driving intoxicated, consistent with a California bar-room study conducted much earlier.[46] This form of confidence also predicted lower odds of using any avoidance strategy (consistent with[14]), but the OR of 0.65 just missed significance ($P = 0.0510$). Higher confidence in driving safely when intoxicated did predict higher odds of using drivers who drank less than the respondent ($P < 0.0001$), perhaps the most available avoidance option but not necessarily the safest. We can only speculate about causal links between such self-confidence and related variables. Drinkers who underestimate the impairing effects of alcohol or misinterpret cues of impairment are more inclined to drive after drinking and less cautiously.[48] They may also be more likely to drive with false confidence and less likely to plan avoidance strategies.[14] In addition, repeated intoxicated driving without suffering harm may increase confidence in doing so safely, which may in turn perpetuate alcohol-impaired driving.

At first we were puzzled by the lower odds of avoidance behaviors among the married/partnered respondents compared to the "single" group, given that their drinking levels were not significantly different. However the married and partnered had significantly lower odds of using a free cab, paid cab, staying the night, walking, and staying at home despite plans to go out, which could all be explained by having an available partner who could drive or whose presence may have deterred impaired driving.[13] Although the higher odds among the married and partnered for using a sober driver, using a driver who drank less than the respondent, or personally drank less than planned were not statistically significant, these avoidance choices are also consistent with being married or having a live-in partner.

The gender differences appear to reflect differences in gender-induced drinking cultures: the larger proportion of heavy drinkers and intoxicated drivers among men, their higher confidence in driving safely when intoxicated, their significantly lower odds of using a sober driver, using one who drank less than they did, or not drinking at all, plus their significantly higher odds of using a paid cab. Among heavy drinkers, the odds of using a sober driver became gender neutral when the interaction between gender and drinking level was added to the predictor model. This finding is consistent with data showing that once women are arrested for alcohol-impaired driving, recidivism becomes gender neutral.[57]

The fact that age was inversely related to drinking level and driving intoxicated cannot explain the lower odds of avoidance among older drinkers, since the model controlled for those factors. Perhaps, the older drinkers drove fewer miles, especially at night,[58,59] which itself constituted an avoidance strategy.

Despite demographic similarities between Hagerstown and Frederick, drinkers in Hagerstown had higher confidence in driving safely when intoxicated and lower odds of using each of the 11 avoidance strategies (including three significant differences). This pattern may reflect alcohol-related cultural differences between the two communities that are not captured by the demographics we measured. Hagerstown was more rural, farther from large cities, and possibly more insular and driver-dependent.

Strengths and limitations

It is difficult to estimate the effectiveness of avoidance strategies used by our respondents, without knowing the context of their choices, possible alternatives, and whether DWI's were actually prevented. Clearly, staying home, not drinking at all, using a sober driver, and taking a free or paid cab would be safe antidotes for anticipated DWI. Staying the night could be safe if it portended discontinued drinking, and the value of using a bus might depend on distances to and from the bus stop. The remaining strategies are highly suspect. Staying until the effects of alcohol supposedly wore off, using a driver who drank less than the respondent, drinking "less" than planned, and walking intoxicated can all result in tragedy.

The validity of self reports about drinking levels, intoxicated driving, and avoidance behavior may be subject to "social desirability" bias. However, our questionnaires were devoid of identifiers, making further contact impossible, and studies suggest that self-reports are reliable, valid, and even essential tools for measuring alcohol consumption and related behaviors,[56,60,61] especially when confidentiality is protected. Since our respondents were instructed not to share or discuss their answers, drinking partners are likely to have had minimal influence. Moreover, the highly significant and meaningful differences in response patterns (eg, linkages among drinking level, DWI, and its avoidance) indicate that the respondents took their assigned task seriously.

Because we examined many predictor-avoidance relationships, we considered the potential impact of chance. If we select only one drinking-level predictor (the three drinking levels combined), we have 77 relationships between 7 independent predictors and 11 distinct avoidance strategies. If we include race and income, removed for their nonsignificant effects on avoidance in our initial models, we have 99 (9×11) outcomes. Using a simplistic approach, we could contend that chance alone would explain 5 significant effects at the 0.05 level. Instead, we used Benjamini and Hochberg's False Discovery Rate (FDR) procedure,[62] and found that our cut-off point for assessing significance was 0.0126 rather than 0.05. A total of 22 of our P-values were less than 0.0126, 20 < 0.01 and 2 others < 0.0126 (all in Table 4). Based on the FDR, we would expect (on average) 95% of these 22 P-values to be correctly classified as significant. Clearly, our results were not a function of chance.

Despite all efforts to include a representative sample of eligible bar-rooms and patrons, we cannot be certain our findings are generalizable to similar communities elsewhere. Patrons of bars that refused participation or had scheduling problems may have differed from our respondents in avoidance behaviors. However, heavy-drinking bar patrons tend to bar-hop; so we likely included some patrons from our missing bars. We do not know whether customers who declined to answer screening-eligibility questions (35.5% of those approached) were simply in a hurry, had something to hide (like age), or were particularly disinterested in "free public services for drinkers" (as the study was described). In a recent all-inclusive study of urban bar patrons in Southern California,[56] 44.6% of the 402 groups approached refused to participate. Clearly, random recruitment of bar patrons poses special challenges.

Conclusion

We recognize that a substantial proportion of alcohol-impaired drivers are hard-core drinking drivers[63–65] who are too dependent on alcohol to effectively resist the urge to drink or desire to drive despite intoxication. Although some alcoholics have achieved durable sobriety through self-initiated "natural recovery",[66–69] most dependent drinkers may require pharmacologic therapy and/or supportive counseling to address their alcohol problems.[70] Judicial and administrative

interventions (such as ignition interlocks) might also be necessary to diminish opportunities to drink and drive.[71,72]

When heavy drinkers try to avoid DWI, they may fail due to alcohol dependence,[44] alcohol-impaired judgment, and peer pressure. They may also fail because of unavailable sober drivers; embarrassment in requesting a free cab, paid cab, or spending the night; and fear of leaving their cars behind. In addition, fundamental dispositional characteristics such as lower action orientations and weaker "volition" skills may hinder effective planning and implementation of avoidance strategies.[73]

Research indicates that decisions that predispose drinkers to drive alcohol-impaired are "quite removed in space and time from the act" itself.[74] Instead of planning to avoid DWI, these decision makers essentially plan to drink and drive. Even sizable proportions of repeat offenders plan to drink knowing they will be driving afterward.[48] Thus, some investigators contend that the best way to avoid driving intoxicated is not to drive at all, by staying home or leaving the car at home.[25,26,74] Our study of bar-room drinkers (who did not stay home) shows that their choice of safe or risky avoidance strategies was related to their drinking and driving behaviors, demographic attributes, residential area, and self-confidence in driving safely when intoxicated. These findings can inform the design of strategically-tailored interventions that can increase, reinforce, and sustain DWI avoidance behaviors among bar-room drinkers, taking into account drinkers' perceptions of personal risks,[75] peer-group expectations, server practices, the availability of avoidance options, and the larger environment in which alcohol is consumed. No single avoidance strategy is likely to have universal plausibility, appeal, or adoption.

Both specific and general deterrence approaches may be appropriate and feasible. Based on further studies of avoidance strategies by drinkers who admittedly drive intoxicated, interventions can be targeted toward individuals and subgroups at increased risk of impaired driving. Bar-room patrons at any given time are not a cross-section of American drivers. They exemplify the convergence of drinking and driving. In our sample of bar-room patrons, 49% had driven themselves to the bar, and at least 42% planned to drive themselves home. Since self-confidence in driving safely when intoxicated is positively related to

drinking level and driving intoxicated, interventions should attempt to change perceptions of personal risk, not simply by improving targeted messages but also by implementing policies that actually increase the likelihood that alcohol-impaired drivers will be identified and appropriately sanctioned. For drinkers who are alcohol-dependent, those sanctions should involve state-of-science treatment[70,76] and/or effective constraints on the offenders' ability to drive (eg, advanced interlock devices[77]). The preventive role of significant others should also be addressed.

In future research, investigators should use qualitative and quantitative methods to examine the decision-making context in which alcohol-impaired drinkers "decide" to drive intoxicated or to avoid doing so. Sometimes that decision will be made before the fact (eg, by delegating the task of driving to a sober driver). Other times, decisions to drive impaired may be subverted by peers, partners, bar personnel, or even by patrons who are strangers. We need to know the cognitive, social-psychological, and contextual factors that can explain why the same high-risk drinkers drive intoxicated on some occasions but refrain or are refrained from doing so on other occasions. These types of "case-control" studies could identify barriers to DWI avoidance that could be surmounted (eg, fear of leaving cars behind or shame in requesting help). A self-monitoring or diary approach might be used to track these drinkers, recognizing that such methods can bias results by serving as interventions. Although our bar-room study could be considered exploratory, it identifies significant predictors of DWI avoidance behavior and raises a number of questions that deserve further study.

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