Prevalence of Self-Reported Prescription Drug Use in a National Sample of U.S. Drivers

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ABSTRACT. Objective: Drug-involved driving has become an increasing concern. Although the focus has been on illegal drugs, there is evidence that prescribed medications can impair driving ability. The purpose of this study was to determine the self-reported prevalence of prescription drug use, including medical and nonmedical use, among a nationally representative sample of drivers and to report related driver characteristics. **Method:** As part of the 2013–2014 National Roadside Survey, drivers from 60 sites were randomly recruited and asked to complete a survey on prescription drug use. **Results:** Almost 20% of drivers reported using a prescription drug within the past 2 days, with the most common drug class being sedatives (8.0%), followed by antidepressants (7.7%), narcotics (7.5%), and stimulants (3.9%). Drivers who reported

prescription drug use were significantly more likely to be female, older, non-Hispanic White, and report disability. Three of four drivers who reported medication use (78.2%) said the drug was prescribed for their use; the odds of using without a prescription were significantly higher for males, Black/African American, and Hispanic drivers, and lower for older drivers. Among those with a prescription, taking more than prescribed was most common for narcotics (6.8%), followed by sedatives (4.8%), stimulants (3.8%), and antidepressants (1.5%). **Conclusions:** These findings help to identify drivers using potentially impairing prescription drugs, both medically and nonmedically, and may inform the targeting of interventions to reduce impaired driving related to medications. (*J. Stud. Alcohol Drugs*, 78, 30–38, 2017)

DRIVING UNDER THE INFLUENCE OF DRUGS (DUID), or “drugged driving,” has been a U.S. public health and safety priority since 2011 when the Office of National Drug Control Policy (ONDCP) set a national goal of reducing drugged driving by 10% (Executive Office of the President of the United States, 2011). This ONDCP action was motivated by new data showing that (a) one in nine weekend nighttime drivers tested positive for illicit drugs (Lacey et al., 2009b), (b) one in three drivers killed in motor vehicle crashes tested positive for illegal and/or prescription drugs (National Center for Statistics and Analysis, 2010), and (c) one in eight high school seniors reported that in the last 2 weeks they drove a car after using marijuana (O’Malley & Johnston, 2013). Subsequent state and federal efforts to reduce DUID have focused largely on illegal drugs; however, many prescription drugs have psychoactive effects that can impair driving (Couper & Logan, 2004; Dasanayake et al., 2011; Hetland & Carr, 2014; Leung, 2011; Rapoport & Baniña, 2007).

Medications that can impair driving include antidepressants, which can cause sedation; stimulants, which can influence attention, aggressiveness, and risk taking; sedatives like barbiturates, benzodiazepines, muscle relaxants, and sleep aids (e.g., “Z-hypnotics”), which can cause drowsiness and

impair cognitive and motor function; and opioids/narcotics, which similarly can cause drowsiness and cognitive and motor impairment. Assessing the impact of these medications on driving is complex. Risk profiles vary across drug classes and can vary within classes and even by drug, depending on dosage, duration of therapy, and underlying driver characteristics. The possibility of nonmedical use, whether taken without a prescription or in greater dosage than indicated, increases the complexity of risk assessment and also complicates potential interventions, as there is no opportunity for health care providers to offer counseling on drug-related impairment risks for those who use these drugs without a prescription.

The most comprehensive effort to date to assess the impact of medications on safe driving was conducted by the European Driving Under the Influence of Drugs, Alcohol and Medicines (DRUID) project. Beginning in 2006, DRUID conducted multiple roadside surveys and case-control road traffic crash studies, as well as comprehensive literature reviews, to assess the current state of epidemiological and experimental knowledge regarding psychoactive medications and driving. Results are summarized in the 2012 *DRUID Final Report* (Schulze et al., 2012). DRUID’s case-control studies demonstrated significantly increased risks for benzodiazepines and Z-hypnotics (twofold to threefold and fivefold to sevenfold increase for serious injury and fatality, respectively) as well as for medicinal opioids (fivefold to eightfold and fivefold increase for serious injury and fatality, respectively). Experimental studies showed that certain benzodiazepines have a substantially higher risk of impairment compared with alcohol (.5 g/L alcohol, equivalent to .05% blood alcohol concentration), whereas Z-hypnotics and

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opioids showed comparable impairment to alcohol. However, DRUID's meta-analyses demonstrated that impairment strongly depends on a variety of factors including substance use, dosage, and duration of treatment—with longer treatment regimens contributing to increasing tolerance for some drug classes.

In the years since the DRUID report was issued, additional experimental and epidemiological studies and comprehensive reviews have sought to further clarify the impact of psychoactive medications on driving, with the majority of these studies coming out of Europe and Australia. In aggregate (Strand et al., 2016), these studies and their earlier counterparts provide consistent evidence that benzodiazepines and Z-hypnotics have impairing effects, although these effects are variable, depending on dose, time since drug administration, and characteristics of the population under study (Dassanayake et al., 2011; Hetland & Carr, 2014; Leung, 2011; Rapoport & Baniña, 2007; Strand et al., 2016). Findings regarding opioids are less consistent; experimental studies show moderate effects on driving with no clear dose-response relationship (Strand et al., 2016), whereas a review of epidemiological studies showed statistically significant associations between opioids and road traffic crashes in 17 of 25 studies (Gjerde et al., 2015). The greatest risks from this drug class may be among opioid-naïve patients rather than those on long-term therapy (Dassanayake et al., 2011; Fishbain et al., 2003; Galski et al., 2000; Leung, 2011; Wilhelm & Cohen, 2012), suggesting that drug tolerance plays an important role in determining opioid-related driving risks.

Results vary for stimulants, with some experimental studies showing improvement in driving skills whereas others show impairment or no effect; these differences are thought to be related to dosing, but no dose-response relationship has been established (Strand et al., 2016). Epidemiological studies are more conclusive, with 8 of 10 studies showing a significant relationship between stimulants and road traffic crashes (Gjerde et al., 2015).

Last, the most recent epidemiological review of the antidepressant literature found a statistically significant association between both tricyclic antidepressants and selective serotonin reuptake inhibitors and road traffic crashes in 9 of 13 studies (Gjerde et al., 2015). However, other reviews have documented inconsistencies with regard to the impact of these drugs in the experimental literature (Hetland & Carr, 2014; Ravera et al., 2012).

Despite the priority placed on reducing “drugged driving” in the United States, U.S.-based studies are more limited. In contrast to the DRUID findings, the National Highway Transportation Safety Administration (NHTSA) Drug and Alcohol Crash Risk Study (Compton & Berning, 2015) did not find significantly higher odds of crash for drivers who tested positive for legal drugs, either in aggregate or by class, after adjusting for driver demographics. The 2007 National Roadside Survey (NRS) conducted oral fluid test-

ing in a nationally representative sample of drivers, finding that 5.3% of daytime drivers and 3.9% of nighttime drivers tested positive for potentially impairing prescription drugs (Lacey et al., 2009b). However, oral fluid testing cannot discern whether these drivers are using the drugs medically or nonmedically—information that is crucial for targeting interventions to increase driver awareness of medication-related impairment. Data from the Fatality Analysis Reporting System (FARS) show that use of medications such as depressants (e.g., benzodiazepines, muscle relaxants, barbiturates, sleep aids), narcotics, and stimulants vary by gender and age but similarly cannot discern between medical and nonmedical use (Romano & Pollini, 2013).

This study uses data from the 2013–2014 NRS to examine the self-reported prevalence of prescription drug use, including nonmedical use, among a nationally representative sample of U.S. drivers. The purpose of the study was to quantify use of these medications, identify driver characteristics associated with self-reported use, and in doing so inform the targeting of interventions designed to increase driver awareness of the risks of medication-related impaired driving.

Method

Study sample

Since 1973, five national roadside surveys of U.S. drivers have been conducted to estimate the prevalence of drinking and driving and to characterize changes over time (Berning et al., 2015; Furr-Holden et al., 2011; Lacey et al., 2009a, 2009b, 2009c; Lund & Wolfe, 1991; Voas et al., 1998; Wolfe, 1974). These surveys, conducted every decade, intercept drivers on the road to conduct a short interview and request biological samples. The two most recent surveys (2007 and 2013–2014) were expanded to provide a broader perspective on impaired driving by looking at drugs present in the driving population.

As in the previous surveys, the 2013–2014 NRS was based on a national probability sample from the 48 contiguous states (Kelley-Baker et al., 2016). A total of 60 survey sites were selected from the primary sampling units (PSUs) of the NHTSA's National Analysis Sampling System/General Estimates System (NASS/GES). The NASS/GES PSUs are cities, large counties, or groups of counties from within four regions of the country and three levels of population density. Assistance from law enforcement agencies (LEAs) was requested at all 60 PSUs; where LEA assistance from the primary selected PSU could not be obtained, a suitable replacement site with a cooperating LEA was selected.

To determine the exact survey sites within each PSU, 30 specific square-mile grid areas were selected from which five data collection locations were determined. These locations were limited to roadways with sufficient traffic to provide

enough interviews for the study. Thus, counties with populations of less than 20,000 were not included. In counties with larger populations, researchers only surveyed roadways with a range of 2,000–4,000 daily traffic counts.

Teams were dispatched to each of the five survey locations during specific time frames (between 10:00 P.M. and midnight and between 1:00 A.M. and 3:00 A.M.) on Fridays and Saturdays and during the day (between either 9:30 A.M. and noon or 1:30 P.M. and 3:30 P.M.) on Fridays.

Vehicles were recruited by a traffic director stationed at the roadway to direct drivers from the traffic flow and safely into the survey location. To ensure an unbiased selection of vehicles, the traffic director waved in the third vehicle passing each survey location. Once an interviewer completed a survey with this vehicle, the traffic director would signal the next car to approach. This procedure is typical of roadside surveys and results in a random selection of eligible vehicles that is not biased toward any particular class of driver.

All drivers were informed that participation was voluntary and anonymous and that they could cease participation at any time. Drivers age 16 years and older who spoke English or Spanish were eligible to participate. Commercial drivers, drivers who did not speak English or Spanish, and drivers deemed to be significantly impaired were not invited to participate. All survey procedures were reviewed by the Pacific Institute for Research and Evaluation's Institutional Review Board.

Instrument and procedures

After providing informed consent, survey participants answered interviewer-administered questions regarding their sociodemographics, driving behaviors, alcohol consumption, and drinking and driving. They were then asked to provide a breath sample to estimate their blood alcohol concentration and an oral fluid sample to test the presence of some 75 or more drugs. While the oral fluid sample was being collected, drivers were asked to complete a self-administered, general drug use survey covering use of both illegal drugs and medications, an alcohol use disorder screening test, and a drug use disorder screening test (Conley, 2001; Cottler et al., 1997; Maisto et al., 2000). Questions on prescription drug use focused on a list of drugs chosen because of their potential impaired-driving effects and their likelihood of appearing in drivers. Subjects indicated the last time they used a particular drug by responding with one of the following options: *past 24 hours*, *past 2 days*, *past month*, *over a month*, or *beyond a year/never*. Subjects who indicated use of a drug category within either the past 24 hours or 2 days were prompted to answer several follow-up items related to that drug including whether the drug had been prescribed to them by a physician and if they had taken more of the drug than was prescribed. Table 1 lists the drug categories

TABLE 1. Prescription drug categories and classes

Category	Analysis class
Antidepressants (e.g., Prozac, Zoloft, Wellbutrin, Lexapro, Effexor)	Antidepressants
Methadone or buprenorphine (e.g., Subutex, Suboxone)	Narcotics
Morphine or codeine (e.g., Tylenol with codeine)	Narcotics
Other prescription pain medications (e.g., OxyContin/oxycodone, Percocet, Opana/oxymorphone, Vicodin/hydrocodone)	Narcotics
Barbiturates (e.g., phenobarbital)	Sedatives
Benzodiazepines (e.g., Xanax/alpraxolam, Valium/diazepam, Ativan/lorazepam)	Sedatives
Muscle relaxants (e.g., Soma, Flexeril)	Sedatives
Sleep aids (e.g., Ambien, Lunesta)	Sedatives
ADHD medications (e.g., Ritalin, Aderall, Concerta)	Stimulants
Other amphetamines (e.g., Benzadrine, Dexedrine)	Stimulants
Prescription dietary/appetite suppressant (e.g., Tenuate, phentermine)	Stimulants

Notes: ADHD = attention-deficit/hyperactivity disorder.

verbatim as they appeared in the questionnaire and their categorization for purposes of analysis.

Statistical analyses

Prevalence of prescription drug use was based on self-reported survey responses from 7,405 NRS drivers, with those who reported use in either the past 24 hours or 2 days combined into one category (prescription drug use “within the past 2 days”). We calculated prevalence for each drug category in the survey and, to accommodate small sample sizes, further grouped these drug categories into classes (antidepressants, sedatives, stimulants, and narcotics) based on their pharmacological characteristics. Among those who reported prescription drug use within the past 2 days, we calculated by category and class the proportion of respondents who responded affirmatively to the question, “Was this drug prescribed for your use?” and, among these, those who responded affirmatively to the question, “Did you take more of this drug than prescribed?”

We compared the characteristics of prescription drug users and non-users by utilizing information for 6,791 drivers with complete socioeconomic data and identified significant differences between the two groups using 95% confidence intervals. We used multivariate logistic regression models to separately analyze the relationship between driver characteristics and the odds of self-reported prescription drug use and use with a prescription. In addition to demographic characteristics such as age, gender, and race/ethnicity, these models controlled for socioeconomic characteristics such as education, employment or disability status, and income. We also adjusted for regional differences and whether the data were collected from daytime or nighttime drivers. All analyses were weighted to account for the multistage sampling

TABLE 2. Prevalence of prescription drug use and prescription patterns, National Roadside Survey 2013–2014^a

Drug category/class (<i>N</i> = 7,405)	Used within past 2 days <i>n</i> (%)	Prescribed for driver's use <i>n</i> (%)	Took more than prescribed <i>n</i> (%)
Antidepressants	572 (7.7)	563 (98.3)	15 (1.5)
Narcotics			
Methadone or buprenorphine	59 (0.9)	47 (81.2)	5 (9.6)
Morphine or codeine	256 (3.3)	165 (67.4)	10 (5.4)
Other prescription pain medications	358 (4.9)	315 (86.9)	17 (5.7)
Any narcotic	547 (7.5)	412 (76.6)	28 (6.8)
Sedatives			
Barbiturates	8 (0.1)	5 (63.0)	0 (0.0)
Benzodiazepines	188 (2.9)	177 (94.5)	7 (3.9)
Muscle relaxants	169 (2.4)	151 (85.0)	6 (3.6)
Sleep aids	303 (4.2)	206 (68.5)	12 (5.7)
Any sedative	557 (8.0)	436 (77.3)	21 (4.8)
Stimulants			
ADHD medications	158 (2.1)	139 (86.3)	6 (4.6)
Prescription dietary/ appetite suppressants	115 (1.6)	56 (53.3)	1 (2.0)
Other amphetamines	41 (0.6)	27 (58.6)	2 (3.0)
Any stimulant	292 (3.9)	207 (70.6)	8 (3.8)
All prescription drugs	1,438 (19.7)	1,127 (78.2)	52 (4.4)

Notes: ADHD = attention-deficit/hyperactivity disorder. ^aPercentages are weighted.

strategy in order to generate nationally representative survey estimates. Specifically, we generated case weights for each driver based on the product of probabilities from each stage of the sampling strategy to reflect the probability that a particular driver would be selected for the survey from among the total pool of all drivers in the continental United States. This weighting structure is identical to that used in the 2007 NRS (Lacey et al., 2009c). All analyses were conducted using Stata Version 11 software (StataCorp LP, College Station, TX).

Results

Sample characteristics and reported prescription drug use

Of the 8,804 NRS drivers who were eligible and participated in the general roadside interview, 7,405 completed the prescription drug questionnaire (representing 83.9% of the total drivers who participated in the NRS). A majority was male (55.8%), non-Hispanic White (56.1%), under age 35 (52.3%), and had at least some postsecondary education (69.8%).

Table 2 shows the self-reported prevalence of prescription drug use by category and class. Overall, 19.7% of drivers reported using at least one prescription drug within the past 2 days. The most common drug class was sedatives (8.0%), followed by antidepressants (7.7%), narcotics (7.5%), and stimulants (3.9%). A majority of these drivers (69.9%) reported using only one drug class, but 23.8% reported using

two drug classes, 5.2% three drug classes, and 1.1% four drug classes (data not shown). The most common two-drug class combination was antidepressants and sedatives, followed by narcotics and sedatives, and then antidepressants and stimulants.

Across drug classes, a majority of drivers (78.2%) reported that the drugs had been prescribed for their use. Use without prescription was highest for stimulants (29.4%), followed by sedatives (22.7%), narcotics (23.4%), and antidepressants (1.7%). Among drivers for whom the drug had been specifically prescribed, few reported that they had taken more of the drug than directed. Narcotics were the most commonly taken in quantities greater than prescribed (6.8%), followed by sedatives (4.8%), stimulants (3.8%), and antidepressants (1.5%). Given the small sample indicating greater-than-prescribed use of the drug, further analysis of this outcome was not conducted.

Sociodemographic characteristics of drivers who self-reported prescription drug use

Table 3 compares the sociodemographic characteristics of prescription drug users with non-users. Drivers who reported prescription drug use within the past 2 days were significantly more likely than those who did not report use to be female (56.7% vs. 41.0%), older than 45 years old (38.1% vs. 28.8%), and non-Hispanic White (68.3% vs. 53.0%). They were significantly less likely to be employed (52.8% vs. 60.9%) and more likely to report disability (7.2% vs. 1.3%). There were no significant differences in the distribution of income or education levels among those who reported prescription drug use and those who did not.

Factors independently associated with prescription drug use, by drug class

Table 4 presents the adjusted odds ratios from the regression analysis of prescription drug use within the past 2 days. Overall, males had significantly lower odds of prescription drug use relative to females, as did all other races/ethnicities compared with non-Hispanic Whites. Drivers 35 years and older had higher odds of prescription drug use relative to those younger than age 21, as did those who were disabled or out of the labor force ("other" category including students, homemakers, and retirees) compared with drivers who were employed.

With respect to differences across drug classes, males and Black/African American drivers had significantly lower odds of use across all categories except narcotics. Hispanic drivers had lower odds of both antidepressant and sedative use. Drivers who reported being disabled had significantly higher odds across all drug classes when compared with employed drivers, with the exception of stimulants.

TABLE 3. Characteristics of prescription drug users^a and non-users in the 2013–2014 National Roadside Survey^b

Variable	Non-users			Prescription drug users			All		
	<i>n</i>	%	[95% CI]	<i>n</i>	%	[95% CI]	<i>n</i>	%	[95% CI]
Sex									
Female	2,156	41.0%*	[39.2, 42.9]	747	56.7%*	[53.2, 60.1]	2,903	44.2%	[42.5, 45.9]
Male	3,277	59.0%*	[57.2, 60.8]	611	43.3%*	[39.9, 46.8]	3,888	55.8%	[54.1, 57.5]
Age, in years									
<21	674	12.1%	[10.8, 13.5]	130	10.3%	[7.9, 13.3]	804	11.7%	[10.5, 13.1]
21–34	2,327	42.6%*	[40.5, 44.7]	452	32.8%*	[29.4, 36.4]	2,779	40.6%	[38.7, 42.6]
35–44	899	16.5%	[15.3, 17.9]	256	18.9%	[15.6, 22.5]	1,155	17.0%	[16.0, 18.1]
≥45	1,533	28.8%*	[26.9, 30.7]	520	38.1%*	[34.0, 42.4]	2,053	30.7%	[28.9, 32.5]
Race/ethnicity									
White, non-Hispanic	3,052	53.0%*	[47.5, 58.5]	962	68.3%*	[62.7, 73.4]	4,014	56.1%	[50.8, 61.3]
Black/African American	1,152	27.4%	[22.7, 32.7]	208	19.4%	[15.2, 24.5]	1,360	25.8%	[21.3, 30.7]
Hispanic	647	10.2%	[8.0, 13.1]	89	5.8%	[3.9, 8.7]	736	9.3%	[7.3, 12.0]
Other	582	9.4%	[7.7, 11.4]	99	6.5%	[4.8, 8.8]	681	8.8%	[7.4, 10.5]
Education									
High school or less	1,662	30.8%	[28.5, 33.1]	403	27.9%	[25.0, 31.1]	2,065	30.2%	[28.2, 32.2]
College attendance	3,771	69.2%	[66.9, 71.5]	955	72.1%	[68.9, 75.1]	4,726	69.8%	[67.8, 71.8]
Employment									
Employed	3,280	60.9%*	[58.6, 63.1]	708	52.8%*	[48.8, 56.7]	3,988	59.2%	[57.3, 61.1]
Unemployed	270	5.0%	[4.3, 5.9]	90	5.4%	[4.1, 7.1]	360	5.1%	[4.4, 5.9]
Disabled	77	1.3%*	[0.93, 1.79]	93	7.2%*	[5.41, 9.6]	170	2.5%	[2.0, 3.2]
Other	1,806	32.8%	[30.7, 35.0]	467	34.6%	[31.0, 38.4]	2,273	33.2%	[31.3, 35.1]
Income ^c									
<\$25K	1,520	26.7%	[24.3, 29.3]	385	27.6%	[24.4, 31.1]	1,905	26.9%	[24.6, 29.3]
\$25K–\$50K	1,688	31.5%	[29.5, 33.6]	411	30.9%	[27.7, 34.3]	2,099	31.4%	[29.6, 33.2]
\$50K–\$75K	1,014	18.9%	[17.5, 20.5]	266	18.9%	[16.4, 21.7]	1,280	18.9%	[17.6, 20.3]
>\$75K	1,211	22.9%	[20.6, 25.3]	296	22.6%	[19.1, 26.5]	1,507	22.8%	[20.6, 25.2]

Notes: CI = confidence interval; K = 1,000. ^aThose who reported use within the past 2 days; ^bpercentages are weighted; ^call income amounts are in U.S. dollars. **p* < .05.

Factors independently associated with self-reported drug use without a prescription

Table 5 shows adjusted odds ratios for using a prescription drug without a prescription among drivers who reported use within the past 2 days. Males had significantly higher odds than females of reporting use without a prescription, as did Black/African American and Hispanic drivers compared with non-Hispanic White drivers. In contrast, drivers 35 years and older had lower odds than those younger than age 21 of using drugs without a prescription, as did those with at least some postsecondary education.

Discussion

Twenty percent of drivers who completed the NRS prescription drug survey reported using a potentially impairing prescription drug within the past 2 days. Prevalence was similar across sedatives, antidepressants, and narcotics, which had a roughly twofold higher prevalence than stimulants. Self-reported medication use was significantly higher for female, older, and non-Hispanic White drivers, and those who reported being disabled.

Because of differences in survey methodologies (e.g., self-report vs. biological measures, differences in drug category definitions, variations in sampling by day and time), our prevalence estimates should not be compared quantitatively

to those of DRUID (Schulze et al., 2012). However, there are subgroup similarities across the two studies. For example, both studies showed that sedative and medicinal opioid/narcotic use were more common among female drivers (our study also showed significantly higher stimulant use among females, whereas this differed by country in DRUID). Stimulant use in DRUID was more common among younger drivers, whereas sedative and medicinal opioid use was higher among older drivers; we also found stimulant use to be significantly lower among older drivers, whereas older drivers had higher odds of narcotic use. Methodological differences also preclude direct comparison with prevalence estimates from crash risk studies. However, consistent with our findings, a recent U.S. study of the FARS showed that female drivers and older drivers were significantly more likely to test positive for depressant drugs and narcotics than were male and younger drivers (Romano & Pollini, 2013).

Older drivers in our study had significantly higher odds of using prescription drugs overall, and antidepressants and narcotics specifically, and may constitute an especially important group for interventions. A study sponsored by the American Automobile Association (AAA) Foundation found that a majority of drivers 55 years and older were taking medications with the potential to impair driving, but only one in four were aware of impairment potential, and less than one in five received warnings from a health care professional (MacLennan et al., 2009). Our data col-

TABLE 4. Adjusted odds ratio (AOR) for prescription drug use,^a National Roadside Survey 2013–2014 drivers (*N* = 6,791)

Variable	Any prescription drug AOR [95% CI]	Antidepressants AOR [95% CI]	Sedatives AOR [95% CI]	Stimulants AOR [95% CI]	Narcotics AOR [95% CI]
Sex					
Female	1.00	1.00	1.00	1.00	1.00
Male	0.57** [0.49, 0.67]	0.38** [0.29, 0.48]	0.47** [0.38, 0.58]	0.61* [0.40, 0.92]	0.97 [0.78, 1.20]
Age, in years					
<21	1.00	1.00	1.00	1.00	1.00
21–34	1.00 [0.73, 1.37]	1.71 [0.96, 3.04]	1.10 [0.62, 1.94]	0.79 [0.50, 1.23]	1.22 [0.76, 1.97]
35–44	1.54** [1.11, 2.13]	3.19** [1.62, 6.27]	1.46 [0.83, 2.57]	0.99 [0.58, 1.68]	1.25 [0.75, 2.07]
≥45	1.54* [1.08, 2.18]	3.83** [2.20, 6.66]	1.53 [0.83, 2.83]	0.61* [0.37, 1.01]	1.55* [0.95, 2.53]
Race/ethnicity					
White, non-Hispanic	1.00	1.00	1.00	1.00	1.00
Black/African American	0.51** [0.40, 0.64]	0.27** [0.19, 0.38]	0.43** [0.31, 0.59]	0.64* [0.42, 0.99]	0.82 [0.62, 1.10]
Hispanic	0.50** [0.32, 0.77]	0.33** [0.18, 0.59]	0.27** [0.13, 0.56]	0.52 [0.25, 1.07]	0.90 [0.39, 2.05]
Other	0.57** [0.39, 0.82]	0.31** [0.16, 0.61]	0.94 [0.59, 1.50]	0.51 [0.26, 1.01]	0.70 [0.45, 1.10]
Education					
High school or less	1.00	1.00	1.00	1.00	1.00
College attendance	1.17 [0.96, 1.43]	1.79** [1.33, 2.43]	0.91 [0.70, 1.18]	1.25 [0.73, 2.15]	0.94 [0.70, 1.24]
Employment					
Employed	1.00	1.00	1.00	1.00	1.00
Unemployed	1.35 [0.94, 1.95]	1.35 [0.84, 2.15]	1.70* [1.08, 2.68]	1.30 [0.72, 2.34]	1.69* [1.04, 2.76]
Disabled	5.77** [3.75, 8.87]	4.21** [2.23, 7.93]	7.49** [4.84, 11.57]	2.06 [0.89, 4.80]	6.05** [3.52, 10.39]
Other	1.28* [1.03, 1.59]	1.34* [1.01, 1.76]	1.88** [1.41, 2.51]	1.35 [0.95, 1.90]	1.23 [0.91, 1.65]
Income ^b					
<\$25K	1.00	1.00	1.00	1.00	1.00
\$25K–\$50K	1.01 [0.80, 1.27]	0.82 [0.57, 1.19]	0.98 [0.71, 1.35]	1.26 [0.81, 1.95]	1.03 [0.75, 1.42]
\$50K–\$75K	0.96 [0.74, 1.25]	0.89 [0.59, 1.33]	0.79 [0.57, 1.10]	1.23 [0.70, 2.16]	0.99 [0.68, 1.45]
>\$75K	0.93 [0.72, 1.19]	0.83 [0.59, 1.17]	1.04 [0.69, 1.55]	1.21 [0.71, 2.05]	0.84 [0.57, 1.25]
Region					
West	1.00	1.00	1.00	1.00	1.00
Northeast	1.03 [0.79, 1.34]	1.02 [0.69, 1.52]	1.06 [0.68, 1.64]	0.79 [0.50, 1.25]	1.04 [0.71, 1.53]
Midwest	1.26* [1.00, 1.57]	0.84 [0.61, 1.15]	1.15 [0.77, 1.72]	1.01 [0.68, 1.49]	1.72** [1.17, 2.52]
South	1.17 [0.93, 1.48]	0.83 [0.57, 1.21]	1.35 [0.90, 2.02]	1.37* [0.97, 1.95]	1.08 [0.73, 1.59]
Time of day					
Daytime	1.00	1.00	1.00	1.00	1.00
Nighttime	0.98 [0.82, 1.16]	0.95 [0.68, 1.35]	1.05 [0.79, 1.39]	0.76 [0.57, 1.03]	1.23 [0.98, 1.55]

Notes: CI = confidence interval; K = 1,000. ^aWithin the past 2 days; ^ball income amounts are in U.S. dollars.

p* < .05; *p* < .01.

lection methodology, which focused on late night weekend drivers, resulted in a small sample of “elderly” drivers (e.g., 65 years and older), which led us to define our upper age group as *older than 45 years* to facilitate regression analyses. Therefore, our ability to comment on more senior drivers is limited; however, our findings suggest that older drivers are worthy of further study and interventions designed to increase awareness of medication-related impaired driving.

Disability was the characteristic most strongly associated with prescription drug use in our study, with significant associations across all drug classes except stimulants. We are unaware of any specific efforts to examine drug-impaired driving in this population, and further research and intervention are warranted here. We note, however, that—as is the case for others taking these medications—the use of psychoactive medications should not be equated with impairment. Although taking medications at therapeutic doses can impair driving ability, risk of impairment is influenced by a variety of factors including drug type, dose, duration of use, concomitant use of other drugs and/or alcohol, and patient characteristics.

For example, the most recent evidence suggests that although acute administration of opioids is associated with driving impairment, such impairment diminishes with chronic, stable use (Wilhelmi & Cohen, 2012). As a result, those who are disabled because of conditions like chronic pain may experience no driving-related impairment at all when taking their medication long-term as directed. In addition, medications may be used to treat chronic conditions that impair psychomotor function and pose a risk to safe driving in the absence of treatment. The *DRUID Final Report* stresses these points when highlighting evidence that “while being under long-term medical treatment, depressed patients and patients using analgesics perform better than patients without treatment or in comparison to healthy controls” (Schulze et al., 2012, p. 86). Managing driving-related risks for these patients requires careful consideration of the risks inherent to the underlying condition and those of the prescribed medication as well as careful patient counseling regarding the potential for driving-related impairment.

A majority of drivers who reported recent prescription drug use also reported that the drugs they were taking were prescribed for them, providing opportunities for informa-

TABLE 5. Adjusted odds ratio (AOR) for prescription drug use^a without prescription ($N = 1,358$ prescription drug users), National Roadside Survey 2013–2014

Characteristics	AOR [95% CI]
Sex	
Female	1.00
Male	1.44* [1.05, 1.96]
Age, in years	
<21	1.00
21–34	0.75 [0.41, 1.37]
35–44	0.24** [0.12, 0.48]
≥45	0.18** [0.10, 0.35]
Race/ethnicity	
White, non-Hispanic	1.00
Black/African American	2.00** [1.25, 3.21]
Hispanic	1.90* [1.01, 3.58]
Other	1.52 [0.67, 3.45]
Education	
High school or less	1.00
College attendance	0.61* [0.41, 0.91]
Employment	
Employed	1.00
Unemployed	1.23 [0.61, 2.48]
Disabled	0.45 [0.18, 1.15]
Other	1.09 [0.71, 1.66]
Income ^b	
<\$25K	1.00
\$25K–\$50K	1.21 [0.74, 1.96]
\$50K–\$75K	0.88 [0.50, 1.56]
>\$75K	1.26 [0.74, 2.16]
Region	
West	1.00
Northeast	0.80 [0.43, 1.48]
Midwest	1.00 [0.64, 1.57]
South	0.84 [0.53, 1.35]
Time of day	
Daytime	1.00
Nighttime	1.37 [0.91, 2.06]

Notes: CI = confidence interval; K = 1,000. ^aWithin the past 2 days; ^ball income amounts are in U.S. dollars.

* $p < .05$; ** $p < .01$.

tional interventions by physicians, pharmacists, and other medical professionals regarding the risks of drug-impaired driving. However, almost one in four reported that the drugs they were taking were not prescribed for their use; this was most common for stimulants, followed by narcotics and sedatives. Overall, these individuals represent a small proportion of our overall driver sample but raise significant concerns because they are taking these medications without medical supervision at possibly higher than indicated doses. There is also little opportunity for intervention with these drivers within the current health system, as there is no opportunity for health care provider counseling on drug-related driving risks.

Our findings regarding nonmedical use of prescription drugs reflect both similarities and differences to other national studies. For example, our finding that males and older drivers had significantly higher and lower odds of nonmedical use, respectively, is consistent with findings on nonmedical use of psychotherapeutics in the National Survey on Drug Use and Health (NSDUH; Center for Behavioral

Health Statistics and Quality, 2015). However, the NSDUH showed the highest prevalence of nonmedical use for pain relievers, followed by sedatives and stimulants. In contrast, in the NRS, nonmedical use was highest for stimulants, followed by pain relievers and sedatives. The aforementioned study on fatal crashes also found stimulants to be more prevalent than narcotics and depressants (Romano & Pollini, 2013). The source of this difference may lie with differences in sampling, because the NRS consists mostly of nighttime drivers who may use nonmedical stimulants at a higher rate; these differences should be investigated further to determine whether more intensely targeted interventions for stimulant use among nighttime drivers are warranted.

Another form of nonmedical use—taking more of a drug than prescribed—was reported by a relatively small percentage of NRS drivers; this was most common for narcotics, followed by sedatives and stimulants. Many of these drivers may not be aware of the potential for increased impairment risk, as Smyth et al. found that one in five hospital outpatients taking medications that could impair driving did not believe that taking more than the prescribed dose could influence crash risk (Smyth et al., 2013).

Strengths and limitations

This study is the first to document self-reported use of potentially impairing medications in a national sample of U.S. drivers, including both therapeutic and nonmedical use, and provides new information for targeting interventions to increase driver awareness of the potential for “drugged driving.” Our study does have limitations. First, although our methodology was rigorous and adhered to the International Council on Alcohol, Drugs, and Traffic Safety guidelines (Walsh et al., 2008), participation was voluntary. Nonparticipation may have contributed to selection bias; drivers who completed the prescription drug module of the NRS were significantly more likely than those who did not to be female, younger than age 21, have attended college, earn less than \$50,000 annually, and be from the West or Midwest region. Second, the roadside nature of our study necessitated keeping the prescription drug survey brief and precluded probing for more specific drug information. We could not provide extensive drug lists or photographs to ensure the validity of driver reports, which may have contributed to misclassification. Drivers who took multiple drugs in a single class (e.g., oxycodone and hydrocodone within the prescription pain category) could only answer questions regarding the drug they took most recently. This precluded a complete inventory of drugs taken by each driver and thus a complete inventory of multiple drug use within drug categories and classes. Future studies must carefully weigh the need for more specific and valid measures of prescription drug use against the brevity mandates inherent to roadside surveys. Third, it is possible that drivers underreported

prescription drug use, particularly nonmedical drug use, because of concerns regarding confidentiality, stigma, and/or legal concerns.

Although biological sampling (e.g., oral fluid tests) may provide more valid measures of prevalence, the window for which these drugs are detectable varies, and biological testing cannot discern medical versus nonmedical use. Further, the inability to obtain results at roadside precludes follow-up questioning on receipt of medication warnings, drug-related risk perceptions, and other issues crucial for informing interventions to reduce drug-impaired driving. Finally, our study did not undertake assessments of driving-related impairment among drivers who reported medication use and therefore cannot be interpreted as providing measures of medication-related impairment among U.S. drivers.

Conclusions

Concerns regarding drug-involved driving have increased in recent years, but data on prescription drug use among U.S. drivers are lacking. Our study found that one in five drivers report recent use of a potentially impairing medication. Although prevalence is similar across drug classes, there are certain subgroups at higher odds of both medical and nonmedical use that may warrant specific focus for informational interventions. A majority of drivers reported that the drugs were prescribed for their use, suggesting that health care provider-based interventions to increase driver awareness of the risks of “drugged driving” are appropriate for most drivers. Exploration of other interventions is warranted for those taking medications nonmedically.

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