



Published in final edited form as:

*J Safety Res.* 2024 December ; 91: 505–515. doi:10.1016/j.jsr.2024.09.017.

## ***Special Report from the CDC: Driving under the influence of alcohol, marijuana, or other illicit drugs among drivers aged $\geq 16$ years — National Survey on Drug Use and Health, 2016–2019\****

**Amy C. Schumacher<sup>a,\*</sup>, Lauren A. De Crescenzo<sup>a,b</sup>, Merissa A. Yellman<sup>a</sup>, Erin K. Sauber-Schatz<sup>a</sup>**

<sup>a</sup>Division of Injury Prevention, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, 4770 Buford Highway NE, MS S106-9, Atlanta, GA 30341, USA

<sup>b</sup>Oak Ridge Institute for Science and Education, Oak Ridge, TN, USA

### **Abstract**

**Introduction:** This study describes the prevalence of driving under the influence of alcohol (DUIA), marijuana (DUIM), or other illicit drugs (DUID) in the United States over time.

**Method:** This study analyzed data from 2016–2019 National Survey on Drug Use and Health public-use files. The study sample was limited to drivers aged  $\geq 16$  years. Prevalence in 2019 and 2016–2019 trends were assessed overall, by sociodemographic characteristics, and by seatbelt use.

**Results:** The 2019 overall prevalence of DUIA, DUIM, and DUID during the past year was 8.3%, 5.3%, and 0.9%, respectively. DUIA, DUIM, and DUID prevalence was highest for drivers who were male (10.6%, 7.0%, and 1.2%, respectively), not heterosexual (12.3%, 14.7%, and 3.5%, respectively), and did not always wear a seatbelt (12.1%, 11.5%, and 3.1%, respectively). DUIA and DUIM were highest among drivers aged 21–25 years; DUID was highest among drivers aged 21–25 or 26–34 years. From 2016 to 2019, overall DUIA decreased slightly, DUIM increased (4.5% to 5.3%), and DUID did not change; trends differed across sociodemographic groups.

**Conclusions:** DUI is a pervasive public health issue. There are  $\geq 10,000$  DUIA crash deaths in the United States annually; proven interventions exist to prevent these deaths. Decision makers can

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★**Special Report from the CDC:** *The Journal of Safety Research has partnered with the Office of the Associate Director for Science, Division of Injury Prevention, National Center for Injury Prevention and Control at the CDC in Atlanta, Georgia, USA, to briefly report on some of the latest findings in the research community. This report is the 79th in a series of “Special Report from the CDC” articles on injury prevention.*

\*Corresponding author. nrb6@cdc.gov (A.C. Schumacher).

#### **Disclaimer**

The findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

#### **CRedit authorship contribution statement**

**Amy C. Schumacher:** Conceptualization, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Lauren A. De Crescenzo:** Conceptualization, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Merissa A. Yellman:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Erin K. Sauber-Schatz:** Conceptualization, Methodology, Supervision, Writing – review & editing.

#### **Declaration of competing interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

save lives and make our roadways safer by implementing proven strategies to reduce DUIA, including lowering the legal blood alcohol concentration (BAC) for driving. Improved data and more research are needed to understand DUIM and DUID burden and determine effective prevention strategies, especially in the context of increasing DUIM.

**Practical Applications:** There were groups for which changes in behavior patterns were found, which could guide prevention efforts. For drivers who did not always wear a seatbelt, DUIA decreased while DUIM increased. A similar pattern was noted for drivers aged 26–34 years; additionally, DUID increased in this group.

## Keywords

Alcohol-impaired driving; Drug-impaired driving; Adults; Adolescents; Marijuana

## 1. Introduction

In 2019, 10,196 people in the United States were killed in motor vehicle crashes involving an alcohol-impaired driver; this number increased to over 11,500 in 2020 and over 13,500 in 2021 and 2022 (National Center for Statistics and Analysis [NCSA], 2024). Data limitations, such as testing differences across states, prevent calculation of equivalent numbers for crashes involving a drug-impaired driver (Berning et al., 2022). However, among seriously injured or killed drivers seen in selected trauma centers and medical examiner officers in late 2019, 22.0% tested positive for alcohol, 19.1% for cannabinoids, and 6.8% for opioids; these percentages were 25.2%, 32.9%, and 14.9%, respectively, during early months of the COVID-19 pandemic (April–June 2020; Office of Behavioral Safety Research, 2021).

The United States made progress in reducing alcohol-impaired driving deaths for decades before plateauing in the 1990s/2000s (National Academies of Sciences, Engineering, Medicine [NASEM], 2018; Venkatraman et al., 2021). Despite known effective interventions (Kirley et al., 2023; NASEM, 2018), the number of alcohol-impaired driving deaths per year had remained consistent (around 10,000) from 2010 to 2019 (NCSA, 2021) and has increased to over 13,500 in 2022 (NCSA, 2024). It is important to understand how impaired driving, also referred to as driving under the influence (DUI), might be changing, especially considering the changing landscape as many states continue to legalize adult medical and nonmedical marijuana use (Insurance Institute for Highway Safety [IIHS], 2024a).

Multiple nationally representative surveillance systems collect data on self-reported drinking and driving, such as the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS)<sup>1</sup>, CDC's Youth Risk Behavior Surveillance System (YRBSS)<sup>2</sup>, and the National Survey on Drug Use and Health (NSDUH)<sup>3</sup>. Analyzing BRFSS data, Barry et al. (2021) found that an estimated 4 million adults engaged in 147 million alcohol-impaired driving episodes in 2018. Analyzing 2019 national YRBSS data, Yellman et al. (2020) found that among high school students who had driven in the 30 days

<sup>1</sup><https://www.cdc.gov/brfss/index.html>.

<sup>2</sup><https://www.cdc.gov/yrbbs/index.html>.

<sup>3</sup><https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health>.

before the survey, 5.4% drove after drinking alcohol. Both studies found variation across sociodemographic groups, including higher prevalence among males than females (Barry et al., 2021; Yellman et al., 2020).

NSDUH also collects information on DUI. Analyzing NSDUH data, Lipari et al. (2016) calculated the 2014 prevalence of DUI of alcohol (11.1%), illicit drugs including marijuana (4.1%), and alcohol and illicit drugs simultaneously (2.4%). DUI of alcohol and of illicit drugs were highest among respondents aged 21–29 years and 20–23 years, respectively; both DUI types were more common among males than females. Analyzing 2002–2014 trends, Lipari et al. (2016) found decreases over time in DUI of alcohol and of illicit drugs. Azofeifa et al. (2015) analyzed 2002–2014 NSDUH data among respondents aged 16–25 years and excluded respondents who used nonmarijuana illicit drugs. They found that DUI of alcohol decreased whereas DUI of marijuana did not.

### 1.1. Present study

The present study aimed to describe the prevalence of DUI of alcohol (DUIA), marijuana (DUIM), or other illicit drugs (DUID) in the United States by analyzing 2016–2019 NSDUH data among drivers aged  $\geq 16$  years. While studies using these questions have described variability by sociodemographic groups and other variables (e.g., Myers et al., 2023), few studies have focused their analysis specifically on drivers. Excluding nondrivers addresses an important limitation from many prior studies, as nondrivers cannot be at risk for DUI. This study aimed to answer the following research questions (RQs) for DUIA, DUIM, and DUID among drivers aged  $\geq 16$  years:

1. What was the prevalence of DUI during 2019, and how did DUI prevalence differ by sociodemographic characteristics and driver seatbelt use?
2. Did DUI increase, decrease, or remain stable from 2016 to 2019, and how did these trends differ by sociodemographic characteristics and driver seatbelt use?

## 2. Methods

### 2.1. Data source, timeframe, and study sample

This study analyzed data from the 2016–2019 NSDUH public-use files (PUF). Each year, NSDUH collects data on substance use and mental health from a representative sample of the U.S. civilian, noninstitutionalized population aged  $\geq 12$  years (Center for Behavioral Health Statistics and Quality [CBHSQ], 2020a). A deeply stratified, multistage sample design is used to select each year's sample (CBHSQ, 2020a). Interviews are conducted in English or Spanish at respondents' residences (CBHSQ, 2020b). Overall weighted response rates ranged from 45.8% to 53.3% (CBHSQ, 2017, 2018b, 2019, 2020b).

The 2016–2019 study timeframe was selected based on dataset limitations and COVID-19 pandemic considerations. Changes to NSDUH DUI questions between 2015 and 2016 prohibit comparison with previous years (CBHSQ, 2018a), and NSDUH documentation cautions against comparing 2020 and 2021 data to earlier years because of practical and behavioral impacts of the COVID-19 pandemic in 2020 and methodological changes in 2021 (CBHSQ, 2021b, 2022).

The study sample was limited to drivers aged  $\geq 16$  years because most states do not allow for independent unsupervised driving until at least age 16 (IIHS, 2024b). Driving status was ascertained with a question about seatbelt use when driving a car, for which one response option was “I don’t drive” (CBHSQ, 2020a). Respondents who selected this option or had missing data for this item were not included in the study sample. Unweighted study sample sizes for the four years were 43,219 (2016), 43,167 (2017), 43,410 (2018), and 42,955 (2019).

## 2.2. Measures

**DUI.**—DUI was measured by 7 questions of the form “During the past 12 months, have you driven a vehicle while you were under the influence of [substance]?” (CBHSQ, 2020a). These questions were collapsed into three variables representing DUI of (1) alcohol, (2) marijuana, and (3) other illicit drugs (cocaine or crack, heroin, hallucinogens, inhalants, methamphetamine; CBHSQ, 2020a). Participants who drove under the influence of the substance were coded as “Yes,” and participants who did not drive under the influence of the substance or were not eligible to be asked the question (e.g., did not use the substance during the past 12 months) were coded as “No” (CBHSQ, 2020a).

**Sociodemographic characteristics.**—Age group, sex, education level, family income poverty level, race/ethnicity, employment status, marital status, sexual orientation, and county metropolitan status were selected as sociodemographic variables of interest. Variable categories are in Table 1.

**Seatbelt use.**—Seatbelt use while driving was assessed by the question “How often do you wear a seatbelt when you drive a car?” Responses were dichotomized to always versus not always (sometimes, seldom, or never).

## 2.3. Statistical analyses

All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC) with procedures appropriate for complex survey data and based on NSDUH data analysis guidelines (CBHSQ, 2020a, 2020b, 2021a). This included applying an analysis weight to make the estimates representative of the survey’s target population (CBHSQ, 2020b). A two-stage analysis approach was used to control the Type I error level, with pairwise comparisons examined only when a test for overall differences was significant (CBHSQ, 2020a). *P*-values  $< 0.05$  were considered statistically significant, hereafter referred to as significant. Estimates with a relative standard error  $> 30\%$  were suppressed.

To answer RQ1, the 2019 prevalence and corresponding 95% confidence intervals (CIs) for each DUI type were calculated overall and for each level of the variables of interest. To identify significant prevalence differences, simple logistic regression models were run for each DUI type/variable of interest combination. The joint *F*-test was used to test for overall differences; when it was significant, pairwise comparisons between the levels of the variable of interest were examined with coefficient *t*-tests. The 2016–2019 prevalence estimates are available in Supplemental Tables (ST) 1–3.

To answer RQ2, trends were assessed for each DUI type with two different logistic regression models. Both NSDUH guidelines and guidelines from CDC's National Center for Health Statistics (Ingram et al., 2018) identify logistic regression as appropriate for trend analyses of binary outcomes. In this study, trend analyses and prevalence comparisons were performed with logistic regression because of the model's robustness. Moreover, given the relatively rare nature of the outcome, estimates approximate prevalence ratios. Models incorporated year as: (1) a continuous independent variable or (2) a binary independent variable comparing 2019 to either 2016, 2017, or 2018. Models were then re-run with the addition of a variable of interest and its interaction with year. When the joint  $F$ -test for an interaction term was significant, pairwise comparisons for the interaction term were examined with coefficient  $t$ -tests to identify levels of the variable of interest with significantly different trends and models containing only year were run for each level of the variable of interest. Results of the analyses treating year as a binary variable were similar to those treating year continuously and are presented in ST 4–6; the results of the continuous analysis are the focus in the text.

### 3. Results

#### 3.1. Study sample characteristics

Of drivers aged  $\geq 16$  years, 49.1% were aged 35–64 years, 51.1% were female, 33.6% were a college graduate or higher, 70.0% had a family income more than twice the federal poverty threshold (FPT), 64.2% identified as non-Hispanic White, 50.4% were employed full time, 51.2% were married, 94.3% identified as heterosexual, 55.3% lived in a large metro area, and 91.9% always wore a seatbelt when driving a car (Table 1).

#### 3.2. RQ1: 2019 prevalence and prevalence differences

**3.2.1. Alcohol**—The 2019 overall prevalence of DUIA during the past 12 months was 8.3% (Table 2), an estimated 19,795,246 drivers (ST 1). DUIA was lowest among drivers aged 16–20 years (4.0%), highest among drivers aged 21–25 years (12.9%), and then declined with age group, with those aged  $\geq 65$  years (4.1%) not significantly differing from drivers aged 16–20 years. Prevalence increased with education level; college graduates had the highest prevalence (11.1%).

DUIA was highest among drivers who were male (10.6%), had a family income at least twice the FPT (9.9%), identified as non-Hispanic White (9.8%) or non-Hispanic more than one race (9.1%), were employed full time (11.1%), had never been married (9.9%), identified as not heterosexual (12.3%), and did not always wear a seatbelt (12.1%).

**3.2.2. Marijuana**—The 2019 overall prevalence of DUIM during the past 12 months was 5.3% (Table 3), an estimated 12,657,284 drivers (ST 2). DUIM peaked for drivers aged 21–25 years (13.6%) and then declined with age group. Second-highest prevalence was among drivers aged 16–20 years (11.0%). By educational attainment, DUIM was highest for drivers currently 16–17 years old and likely still in high school (7.1%) and for drivers with some college or an Associate's degree (7.0%).

DUIM was highest among drivers who were male (7.0%), had a family income that categorized them as living in poverty (6.8%) or as  $\leq 2$  times the FPT (5.9%), identified as non-Hispanic more than one race (9.6%), were unemployed (8.5%) or employed part time (7.2%), had never been married (10.9%), identified as not heterosexual (14.7%), lived in a large metro (5.6%) or small metro (5.2%) area, and did not always wear a seatbelt (11.5%).

**3.2.3. Other illicit drugs**—The 2019 overall prevalence of DUID during the past 12 months was 0.9% (Table 4), an estimated 2,196,518 drivers (ST 3).

DUID was highest among drivers aged 21–25 years (2.3%) and 26–34 years (2.0%), who were male (1.2%), had a family income that categorized them as living in poverty (1.5%) or as  $\leq 2$  times the FPT (1.1%), identified as non-Hispanic White (1.0%) or Hispanic (0.9%), were unemployed (3.2%), had never been married (2.0%), identified as not heterosexual (3.5%), and did not always wear a seatbelt (3.1%). Prevalence was lowest among college graduates (0.4%).

### 3.3. RQ2: 2016–2019 trends and trend differences

**3.3.1. Alcohol**—DUIA decreased slightly from a high of 9.1% in 2017 to a low of 8.3% in 2019 (ST 1, ST 4). When overall DUIA changes from 2016 to 2019 were examined with year treated continuously, there was a small but significant decrease (Table 2, Figs. 1–2). With each passing year, the odds of DUIA decreased 0.97 times (95% CI [0.95, 1.00]). This trend differed by age group, education level, and seatbelt use. As age group increased, the trend changed from decreasing, to no change, to increasing. The largest trend differences were between drivers aged 16–20 years (Odds Ratio [OR] = 0.87, 95% CI [0.81, 0.93]) and drivers aged  $\geq 65$  years (OR = 1.09, 95% CI [1.00, 1.18]); these two groups also differed significantly from all (16–20) or most ( $\geq 65$ ) of the other age groups. For education level, DUIA only significantly changed for college graduates (OR = 0.95, 95% CI [0.91, 0.98]). For seatbelt use, there was a significant decrease only for drivers who did not always wear a seatbelt (OR = 0.92, 95% CI [0.88, 0.97]), for whom DUIA decreased from 15.3% in 2016 to 12.1% in 2019 (ST 1, ST 4).

**3.3.2. Marijuana**—DUIM increased from 4.5% in 2016 to 5.3% in 2019 (ST 2, ST 5). When overall DUIM changes from 2016 to 2019 were examined with year treated continuously, there was a small but significant increase (Table 3, Figs. 1–2). With each passing year, the odds of DUIM were 1.05 times as high (95% CI [1.03, 1.08]). This trend differed by age group and seatbelt use. For age group, the main differences were between drivers aged 16–20, for whom there was no significant change, and drivers aged 26–34 years (OR = 1.10, 95% CI [1.05, 1.15]) and 35–49 years (OR = 1.08, 95% CI [1.02, 1.14]), for whom there were significant increases. DUIM significantly increased for both seatbelt use groups, but it increased more for drivers who did not always wear a seatbelt (OR = 1.10, 95% CI [1.06, 1.15]) than who always wear a seatbelt (OR = 1.05, 95% CI [1.02, 1.08]). For drivers who did not always wear a seatbelt, DUIM increased from 8.6% in 2016 to 11.5% in 2019 (ST 2, ST 5).

**3.3.3. Other illicit drugs—**DUID was consistent at 0.9% in both 2016 and 2019 (ST 3, ST 6). When overall DUID changes from 2016 to 2019 were examined with year treated continuously, there were no significant changes (Table 4, Figs. 1–2). DUID trends differed by age group. There was a significant difference between the significant decrease for drivers aged 16–20 years (OR = 0.87, 95% CI [0.79, 0.97]) and the significant increase for drivers aged 26–34 years (OR = 1.09, 95% CI [1.01, 1.17]). For drivers aged 26–34 years, DUID increased from 1.5% in 2016 to 2.0% in 2019 (S3, S6).

## 4. Discussion

Among drivers aged  $\geq 16$  years in the United States in 2019, DUIA was the most common type of impaired driving, with an estimated 19,795,246 drivers (8.3%) engaging in this behavior at least once during the past 12 months. Additionally, an estimated 12,657,284 drivers (5.3%) engaged in DUIM, and an estimated 2,196,518 drivers (0.9%) engaged in DUID (i.e., cocaine or crack, heroin, hallucinogens, inhalants, or methamphetamine). All three DUI types were highest among drivers who were male, had never been married, identified as not heterosexual, and did not always wear a seatbelt. DUIA and DUIM were highest among drivers aged 21–25 years; DUID was highest among drivers aged 21–25 or 26–34 years. DUIA was highest among drivers with a college degree, higher family income, and full-time employment. DUIM and DUID were higher among drivers with lower family income and who were unemployed and lower among drivers with a college degree. Only DUIM differed by metropolitan status and was lowest among respondents living in nonmetro areas.

DUIA was highest among drivers identifying as non-Hispanic White or non-Hispanic more than one race; DUIM was highest among people identifying as non-Hispanic more than one race and lowest among people included in the non-Hispanic other category. Group heterogeneity makes it difficult to draw conclusions. There were no significant DUIM differences between non-Hispanic White and non-Hispanic Black or Hispanic drivers.

When comparing DUIA and DUIM by age group, drivers aged 16–20 years exhibited the largest discrepancy, with DUIM (11.0%) almost three times as high as DUIA (4.0%); this age group cannot legally buy or use alcohol or nonmedical marijuana under most circumstances in any state. Drivers aged 21–25 years were the only other age group for which DUIM (13.6%) exceeded DUIA (12.9%); however, the absolute difference was less than one percentage point. Significance testing was not performed across DUI types.

Prevalence difference results are similar to those of previous studies using national survey data (e.g., Azofeifa et al., 2019; Barry et al., 2021; Rudisill & Smith, 2020; Yellman et al., 2020). Differences exist but may be due to study sample or variable recoding differences. Higher prevalence of DUI among respondents identifying as gay, lesbian, or bisexual (LGB) was also found by Rudisill and Smith (2020). LGB people experience social and structural inequities, including stigma and discrimination, and are disproportionately affected by multiple health threats (CDC, 2014), including a higher prevalence of substance use and use disorders, compared with people identifying as heterosexual (McCabe et al., 2009). Prevention services developed specifically for this population that consider unique

experience and stressors are needed (CDC, 2014). The association between inconsistent seatbelt use and DUI has been identified in survey data (Barry et al., 2021; Yellman et al., 2020) and crash data (Shyhalla, 2014; NCSA, 2024). Adoption of primary enforcement seatbelt laws (Shults et al., 2004; Kirley et al., 2023) covering all seating positions is a proven strategy to increase seatbelt use and can help protect all car occupants if a crash occurs.

There were significant 2016–2019 trend changes in DUIA and DUIM prevalence among drivers aged  $\geq 16$  years, with DUIA decreasing slightly and DUIM increasing. These changes were not found to differ across multiple sociodemographic groups, including family income poverty level and race/ethnicity. There were a few groups for which changes in behavior patterns were found, which could guide prevention efforts. For drivers who did not always wear a seatbelt, DUIA decreased while DUIM increased, bringing the 2019 prevalence of DUIM (11.5%) closer to DUIA (12.1%). A similar pattern was noted for drivers aged 26–34 years; additionally, this group experienced a significant increase in DUID from 2016 (1.5%) to 2019 (2.0%).

The overall decrease in DUIA among drivers aged  $\geq 16$  years is encouraging; however, DUIA did not decline for all groups, and prevalence remains high. Millions of drivers still drive impaired by alcohol every year, with more than 13,500 people dying in alcohol-impaired driving crashes in 2022 (NCSA, 2024), despite the availability of many proven prevention strategies. Effective countermeasures include ignition interlocks for all people convicted of alcohol-impaired driving, lowering blood alcohol concentration (BAC) limits, alcohol policies to decrease drinking to impairment, and supporting affordable alternative transportation options, among others (Kirley et al., 2023; NASEM, 2018).

Most high-income countries have BAC limits of  $\leq 0.05$  g per deciliter (g/dL; World Health Organization, 2018; Yellman & Sauber-Schatz, 2022), but all U.S. states, except for Utah, have a BAC limit of 0.08 g/dL. In 2018, Utah became the first U.S. state to implement a 0.05 g/dL BAC law (Thomas et al., 2022). Lowering BAC limits to 0.05 g/dL deters alcohol-impaired driving across a range of high BACs—not just 0.05–0.08 g/dL (NASEM, 2018). These lower limits have saved lives globally (NASEM, 2018) and in Utah (Thomas et al., 2022). An estimated 1,790 lives could be saved each year if all states adopted a 0.05 g/dL BAC limit (Fell & Scherer, 2017).

Intersections between alcohol-impaired drivers and legal or medical systems provide opportunities to apply effective countermeasures through screening or assessment for excessive drinking or alcohol use disorder (AUD). People who drink excessively can benefit from brief interventions assessing readiness, motivators, and barriers to behavior change. People with AUD can benefit from long-term, specialized AUD treatment programs (Kirley et al., 2023; NASEM, 2018). Both interventions address what can be an underlying cause of DUI behavior to prevent reoccurrence. Voas et al. (2016) found that incorporating AUD treatment into an ignition interlock program reduced DUI recidivism even after interlock removal.

The increased DUIM and steady DUID (with the increase for drivers aged 26–34 years) are also concerning. Marijuana and other illicit drugs can negatively impact skills needed for safe driving (Busardo et al., 2018; McCartney et al., 2021). Before 2016, nonmedical marijuana use for adults aged  $\geq 21$  years was legal in four states and the District of Columbia (DC). By 2019, this number rose to 10 states and DC, and by September 2024, 24 states and DC allowed for adult nonmedical marijuana use (IIHS, 2024a). A study estimating the effects of marijuana legalization and retail sales on crash rates from 2009 to 2019 in 11 states found increases of 5.8% for injuries and 4.1% for fatalities; however, these effects varied by state and were based on early data that may not tell the full story (Farmer et al., 2022).

Few effective countermeasures have been identified for drug-impaired driving. Enforcement of drug-impaired driving laws is promising, and trained drug recognition experts (DREs) are often used to identify potential impairment by conducting a standardized 12-step protocol (Kirley et al., 2023). Like for alcohol-impaired drivers, intersections between drug-impaired drivers and legal or medical systems may provide opportunities to assess and identify individuals with substance use disorder and link them to specialized treatment.

Further research on effective countermeasures will be assisted by continued advancement of roadside detection methods for drugs and standardized implementation of toxicology testing protocols (D’Orazio et al., 2021). Currently, drug data in the Fatality Analysis Reporting System (FARS) have limitations that preclude comparisons across geography or time (Berning et al., 2022). Additionally, interpretation is complicated. A positive test does not always mean the driver was impaired, and drugs such as opioids may have been administered during treatment (Berning et al., 2022; Berning & Smither, 2014). In addition to containing a provision on advanced impaired driving prevention technology for motor vehicles, the recent Bipartisan Infrastructure Law (i.e., the Infrastructure Investment and Jobs Act) contains a provision directing the National Highway Traffic Safety Administration (NHTSA) to investigate barriers states face in submitting toxicology information into FARS and make recommendations to address them (NHTSA, n.d.). Addressing these barriers and improving drug-impaired driving data in FARS will ultimately improve countermeasure evaluation.

#### 4.1. Strengths and Limitations

NSDUH is a large, nationally representative dataset, and sensitive questions are asked in a manner that protects respondents’ privacy. The study sample was restricted to drivers, excluding respondents not at risk for DUI. These self-reported data are subject to recall error and social desirability bias; social desirability bias or fear of legal consequences for use of marijuana could also vary by jurisdiction because of law or regulation variations. Respondents might have driven under the influence but not considered themselves impaired; DUI questions can be interpreted in many ways by respondents (Wilson, 2017). This study was not able to examine polysubstance-impaired driving; current NSDUH questions do not ask about DUI of more than one substance at a time.

The only variable with a missing percentage  $> 1.5\%$  among our final study sample was sexual orientation (9.3% missing); the NSDUH PUF included imputed variables for most

other variables of interest (CBHSQ, 2020a). Small sample sizes for some race/ethnicity categories resulted in the need to collapse some categories into a “Non-Hispanic Other” category.

## 4.2. Practical Applications

Prevalence differences identified in this analysis can be used to identify priority groups for prevention efforts. DUI prevalence differed by sociodemographic characteristics, including higher prevalence of all three types of DUI among males, drivers who did not always wear a seatbelt, and drivers who did not identify as heterosexual. Over the 2016–2019 period, DUIA decreased slightly and DUIM increased. This pattern was strongest among drivers aged 26–34 years (for whom DUID also increased) and for drivers who did not always wear a seatbelt.

## 4.3. Conclusion

DUI is a long-standing, pervasive public health issue with known effective interventions. Increased use of proven DUIA interventions can reduce the  $\geq 10,000$  alcohol-impaired driving crash deaths annually in the United States. Regarding DUIM/DUID, better data and more research are still needed to understand burden and determine effective interventions. This is especially important in the context of increasing state-level legalization of marijuana use and the high prevalence of DUIM among adolescents and young adults.

Decision makers can save lives and make our roadways safer by widely implementing proven strategies to reduce alcohol-impaired driving and by prioritizing research to improve data collection and evaluate interventions to reduce drug-impaired driving. The recent Bipartisan Infrastructure Law contains provisions on both alcohol- and drug-impaired driving and serves as an encouraging national commitment to address impaired driving; however, further multisectoral and collaborative action from individuals, communities, organizations, and decisionmakers is needed to prevent this annual loss of life and achieve tangible progress in road safety in the United States.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

Vaughn Barry, Xinjian Zhang.

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Biographies

**Amy Schumacher**, PhD, MS, has served as a health scientist on the Transportation Safety Team in the Division of Injury Prevention at CDC’s National Center for Injury Prevention

and Control since 2019. Her work and research focus primarily on impaired driving, distracted driving, and older adult mobility.

**Lauren De Crescenzo**, MPH, was an Oak Ridge Institute for Science and Education Fellow on the Transportation Safety Team in the Division of Injury Prevention at CDC's National Center for Injury Prevention and Control from 2019 to 2021. Since 2021, she has returned to her career as a professional cyclist.

**Merissa A. Yellman**, MPH, was an epidemiologist on the Transportation Safety Team in the Division of Injury Prevention at CDC's National Center for Injury Prevention and Control from 2017 to 2022. Her work and research focused primarily on impaired driving, child passenger safety, teen driver safety, and global road safety.

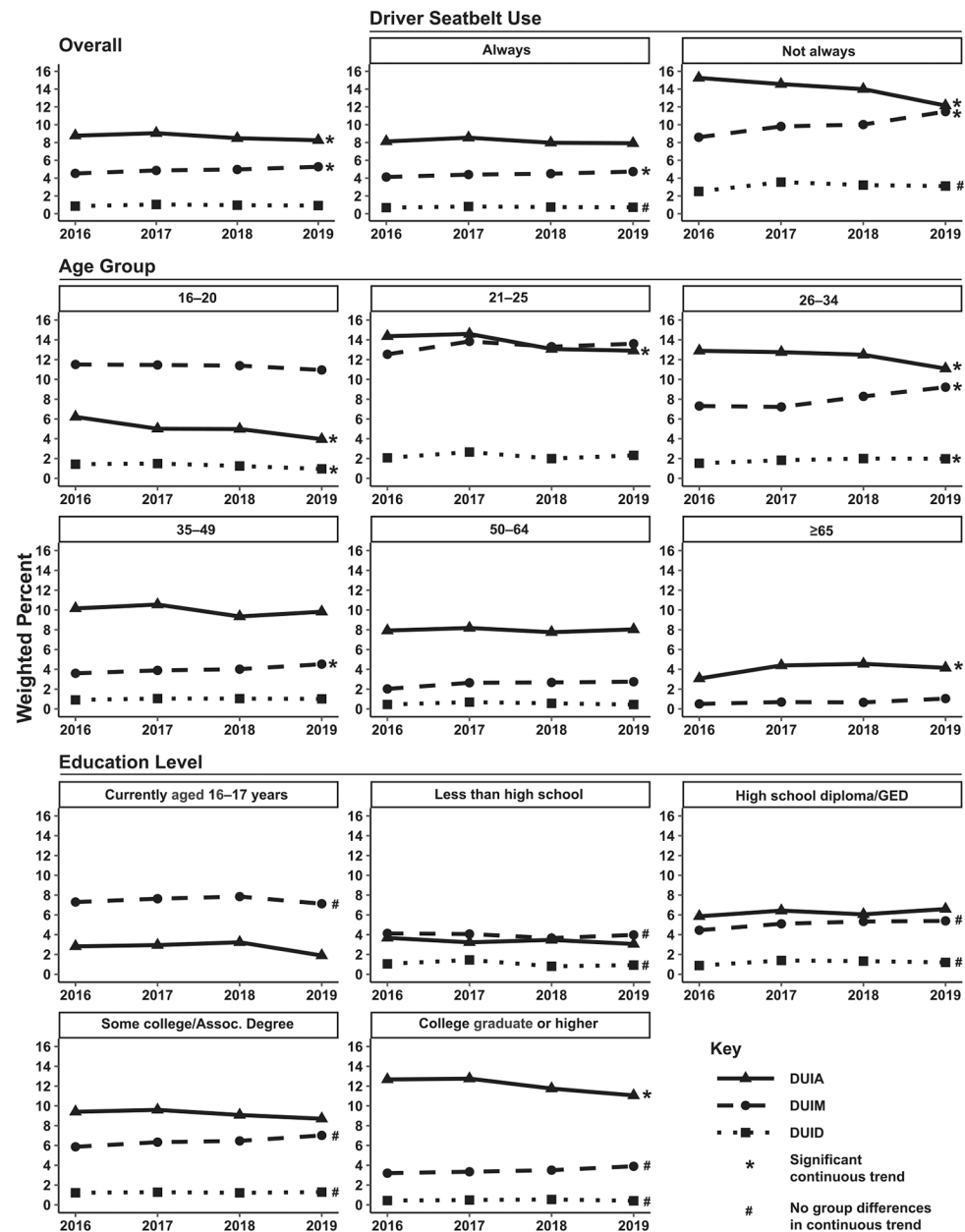
**Erin Sauber-Schatz**, PhD, MPH, served as the team lead of the Transportation Safety Team in the Division of Injury Prevention at CDC's National Center for Injury Prevention and Control from 2012 to 2021. As team lead, she was responsible for overseeing CDC's transportation safety research and activities. Since 2021 she has worked for CDC's Global Health Center.

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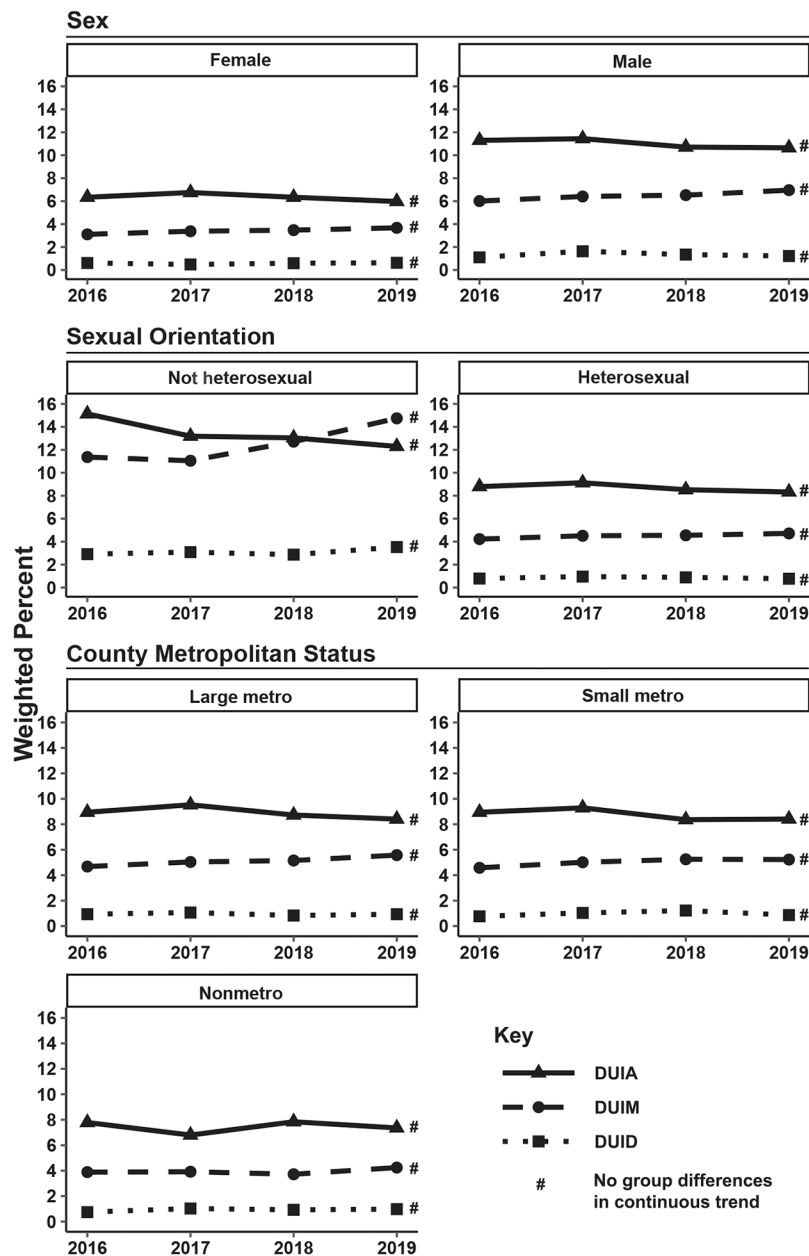
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**Fig. 1.**

Driving under the influence of alcohol, marijuana, or other illicit drugs during the past 12 months among drivers aged  $\geq 16$  years overall and by driver seatbelt use, age group, and education level, National Survey on Drug Use and Health (NSDUH), 2016–2019. *Notes:*  $\alpha = 0.05$ . Analyses account for NSDUH’s complex sampling design, including applying analysis weights to make the estimates representative of the survey’s target population. Trend significances are from  $t$ -tests from simple logistic regressions with year treated continuously. The # indicates that, for that DUI type, the joint  $F$ -test of the interaction term between the variable of interest and continuous year was not significant and thus significance testing was not performed for the trend by group. Driving under the influence of other illicit drugs is suppressed for respondents in the “ $\geq 65$ ” age group category and

the “currently aged 16–17 years” education category based on a relative standard error >30%. Unweighted study sample sizes for the four years were 43,219 (2016), 43,167 (2017), 43,410 (2018), and 42,955 (2019). DUIA = driving under the influence of alcohol; DUIM = driving under the influence of marijuana; DUID = driving under the influence of other illicit drugs.

**Fig. 2.**

Driving under the influence of alcohol, marijuana, or other illicit drugs during the past 12 months among drivers aged  $\geq 16$  years by sex, sexual orientation, and country metropolitan status, National Survey on Drug Use and Health (NSDUH), 2016–2019. *Notes:*  $\alpha = 0.05$ . Analyses account for NSDUH's complex sampling design, including applying analysis weights to make the estimates representative of the survey's target population. The # indicates that, for that DUI type, the joint  $F$ -test of the interaction term between the variable of interest and continuous year was not significant and thus significance testing was not performed for the trend by group. Unweighted study sample sizes for the four years were 43,219 (2016), 43,167 (2017), 43,410 (2018), and 42,955 (2019). DUIA = driving under the

influence of alcohol; DUIM = driving under the influence of marijuana; DUID = driving under the influence of other illicit drugs.

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Sociodemographic characteristics and seatbelt use of drivers aged  $\geq 16$  years (unweighted  $n = 42,955$ ), National Survey on Drug Use and Health (NSDUH), 2019.

**Table 1**

| Variable                        | Unweighted Frequency | Weighted Frequency | Weighted % |
|---------------------------------|----------------------|--------------------|------------|
| Age Group (Years)               |                      |                    |            |
| 16–20                           | 7,877                | 17,176,891         | 7.1        |
| 21–25                           | 8,093                | 18,656,560         | 7.8        |
| 26–34                           | 8,109                | 38,024,661         | 15.8       |
| 35–49                           | 10,667               | 58,447,727         | 24.3       |
| 50–64                           | 4,635                | 59,689,118         | 24.8       |
| $\geq 65$                       | 3,574                | 48,498,592         | 20.2       |
| Sex                             |                      |                    |            |
| Female                          | 22,631               | 122,791,279        | 51.1       |
| Male                            | 20,324               | 117,702,269        | 48.9       |
| Education Level                 |                      |                    |            |
| Currently aged 16–17 years      | 3,296                | 5,865,431          | 2.4        |
| Less than high school           | 4,282                | 24,850,063         | 10.3       |
| High school diploma/GED         | 10,267               | 55,618,001         | 23.1       |
| Some college/Associate's degree | 13,728               | 73,408,225         | 30.5       |
| College graduate or higher      | 11,382               | 80,751,828         | 33.6       |
| Family Income Poverty Level     |                      |                    |            |
| Living in poverty               | 6,513                | 27,784,307         | 11.6       |
| Income $\leq 2 \times$ FPT      | 8,758                | 43,983,273         | 18.4       |
| Income $> 2 \times$ FPT         | 27,207               | 167,635,347        | 70.0       |
| Race/Ethnicity                  |                      |                    |            |
| NH White                        | 25,954               | 154,396,906        | 64.2       |
| NH Black/African American       | 5,186                | 27,348,303         | 11.4       |
| NH other race                   | 2,795                | 15,832,747         | 6.6        |
| NH more than one race           | 1,494                | 4,265,003          | 1.8        |
| Hispanic                        | 7,526                | 38,650,590         | 16.1       |
| Employment Status               |                      |                    |            |

| Variable                   | Unweighted Frequency | Weighted Frequency | Weighted % |
|----------------------------|----------------------|--------------------|------------|
| Full time                  | 21,782               | 121,240,605        | 50.4       |
| Part time                  | 7,376                | 32,539,771         | 13.5       |
| Unemployed                 | 2,561                | 9,542,520          | 4.0        |
| Other                      | 11,236               | 77,170,652         | 32.1       |
| Marital Status             |                      |                    |            |
| Married                    | 16,426               | 123,128,603        | 51.2       |
| Never been married         | 21,106               | 71,336,641         | 29.7       |
| Widowed/Divorced/Separated | 5,423                | 46,028,304         | 19.1       |
| Sexual Orientation         |                      |                    |            |
| Not heterosexual           | 3,180                | 13,190,988         | 5.7        |
| Heterosexual               | 35,776               | 217,057,019        | 94.3       |
| County Metropolitan Status |                      |                    |            |
| Large metro                | 18,898               | 133,029,253        | 55.3       |
| Small metro                | 15,447               | 73,762,663         | 30.7       |
| Nonmetro                   | 8,610                | 33,701,633         | 14.0       |
| Seatbelt Use as Driver     |                      |                    |            |
| Always                     | 38,311               | 221,006,753        | 91.9       |
| Not always                 | 4,644                | 19,486,795         | 8.1        |

Notes: FPT = Federal Poverty Threshold; NH = Non-Hispanic. Analyses account for NSDUH's complex sampling design, with weights making the estimates representative of the survey's target population. Family income poverty level is set to missing for respondents aged 18–22 years living in a college dorm. The "NH other race" group combines non-Hispanic respondents who identify as American Indian, Alaska Native, Native Hawaiian, other Pacific Islander, or Asian. Percentages may not add up to 100% because of rounding.

Table 2

Driving under the influence of alcohol during the past 12 months among drivers aged  $\geq 16$  years by sociodemographic characteristics and seatbelt use, National Survey on Drug Use and Health (NSDUH), 2019 prevalence and 2016–2019 continuous trends.

| Variable                        | Group | Prevalence and Trends (superscripts indicate significant group differences) |                                                                                     |                          |                                        |
|---------------------------------|-------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------|----------------------------------------|
|                                 |       | 2019 Prevalence Overall and by Variables of Interest                        | 2016–2019 Trends Overall and for Variables of Interest with Group Trend Differences | OR (95% CI) <sup>d</sup> |                                        |
| Overall                         |       |                                                                             |                                                                                     |                          |                                        |
| Age Group (Years)               |       |                                                                             |                                                                                     |                          |                                        |
| 16–20                           | 1     | <0.001                                                                      | 8.3 (7.8, 8.7)                                                                      | 0.005                    | 0.97 (0.95, 1.00)                      |
| 21–25                           | 2     |                                                                             | 4.0 (3.4, 4.6) <sup>2,3,4,5</sup>                                                   |                          | 0.87 (0.81, 0.93) <sup>2,3,4,5,6</sup> |
| 26–34                           | 3     |                                                                             | 12.9 (11.8, 14.0) <sup>1,3,4,5,6</sup>                                              |                          | 0.95 (0.92, 0.98) <sup>1,6</sup>       |
| 35–49                           | 4     |                                                                             | 11.1 (10.1, 12.1) <sup>1,2,4,5,6</sup>                                              |                          | 0.95 (0.91, 0.99) <sup>1,6</sup>       |
| 50–64                           | 5     |                                                                             | 9.8 (9.1, 10.6) <sup>1,2,3,5,6</sup>                                                |                          | 0.98 (0.94, 1.01) <sup>1,6</sup>       |
| $\geq 65$                       | 6     |                                                                             | 8.0 (7.0, 9.1) <sup>1,2,3,4,6</sup>                                                 |                          | 1.00 (0.94, 1.06) <sup>1</sup>         |
|                                 |       |                                                                             | 4.1 (3.3, 5.0) <sup>2,3,4,5</sup>                                                   |                          | 1.09 (1.00, 1.18) <sup>1,2,3,4</sup>   |
| Sex                             |       | <0.001                                                                      |                                                                                     | 0.930                    |                                        |
| Female                          | 1     |                                                                             | 6.0 (5.5, 6.4) <sup>2</sup>                                                         |                          |                                        |
| Male                            | 2     |                                                                             | 10.6 (10.0, 11.3) <sup>1</sup>                                                      |                          |                                        |
| Education Level                 |       | <0.001                                                                      |                                                                                     | 0.046                    |                                        |
| Currently aged 16–17 years      | 1     |                                                                             | 1.9 (1.3, 2.4) <sup>2,3,4,5</sup>                                                   |                          | 0.91 (0.82, 1.02) <sup>3</sup>         |
| Less than high school           | 2     |                                                                             | 3.1 (2.3, 3.8) <sup>1,3,4,5</sup>                                                   |                          | 0.95 (0.87, 1.04)                      |
| High school diploma/GED         | 3     |                                                                             | 6.6 (5.9, 7.3) <sup>1,2,4,5</sup>                                                   |                          | 1.03 (0.98, 1.09) <sup>1,5</sup>       |
| Some college/Associate's degree | 4     |                                                                             | 8.7 (8.0, 9.4) <sup>1,2,3,5</sup>                                                   |                          | 0.97 (0.93, 1.01)                      |
| College graduate or higher      | 5     |                                                                             | 11.1 (10.1, 12.0) <sup>1,2,3,4</sup>                                                |                          | 0.95 (0.91, 0.98) <sup>3</sup>         |
| Family Income Poverty Level     |       | <0.001                                                                      |                                                                                     | 0.192                    |                                        |
| Living in poverty               | 1     |                                                                             | 3.9 (3.1, 4.7) <sup>3</sup>                                                         |                          |                                        |
| Income $\leq 2 \times$ FPT      | 2     |                                                                             | 4.6 (3.9, 5.3) <sup>3</sup>                                                         |                          |                                        |
| Income $> 2 \times$ FPT         | 3     |                                                                             | 9.9 (9.3, 10.6) <sup>1,2</sup>                                                      |                          |                                        |
| Race/Ethnicity                  |       | <0.001                                                                      |                                                                                     | 0.900                    |                                        |
| NH White                        | 1     |                                                                             | 9.8 (9.2, 10.4) <sup>2,3,5</sup>                                                    |                          |                                        |
| NH Black/African American       | 2     |                                                                             | 5.1 (4.3, 5.9) <sup>1,4</sup>                                                       |                          |                                        |

| Variable                   | Group | Prevalence and Trends (superscripts indicate significant group differences) |                                    |                                                                                     |                                      |
|----------------------------|-------|-----------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|
|                            |       | 2019 Prevalence Overall and by Variables of Interest                        |                                    | 2016–2019 Trends Overall and for Variables of Interest with Group Trend Differences |                                      |
|                            |       | <i>p</i> <sup>a</sup>                                                       | % (95% CI) <sup>b</sup>            | <i>p</i> <sup>c</sup>                                                               | OR (95% CI) <sup>d</sup>             |
| NH other race              | 3     |                                                                             | 3.9 (2.9, 5.0) <sup>1,4,5</sup>    |                                                                                     |                                      |
| NH more than one race      | 4     |                                                                             | 9.1 (7.0, 11.3) <sup>2,3,5</sup>   |                                                                                     |                                      |
| Hispanic                   | 5     |                                                                             | 6.0 (5.3, 6.8) <sup>1,3,4</sup>    |                                                                                     |                                      |
| Employment Status          |       | <0.001                                                                      |                                    | 0.267                                                                               |                                      |
| Full time                  | 1     |                                                                             | 11.1 (10.5, 11.8) <sup>2,3,4</sup> |                                                                                     |                                      |
| Part time                  | 2     |                                                                             | 8.2 (7.3, 9.1) <sup>1,4</sup>      |                                                                                     |                                      |
| Unemployed                 | 3     |                                                                             | 6.5 (4.8, 8.2) <sup>1,4</sup>      |                                                                                     |                                      |
| Other                      | 4     |                                                                             | 4.0 (3.4, 4.7) <sup>1,2,3</sup>    |                                                                                     |                                      |
| Marital Status             |       | <0.001                                                                      |                                    | 0.069                                                                               |                                      |
| Married                    | 1     |                                                                             | 7.6 (7.0, 8.3) <sup>2</sup>        |                                                                                     |                                      |
| Never been married         | 2     |                                                                             | 9.9 (9.2, 10.6) <sup>1,3</sup>     |                                                                                     |                                      |
| Widowed/Divorced/Separated | 3     |                                                                             | 7.4 (6.4, 8.4) <sup>2</sup>        |                                                                                     |                                      |
| Sexual Orientation         |       | <0.001                                                                      |                                    | 0.195                                                                               |                                      |
| Not heterosexual           | 1     |                                                                             | 12.3 (10.6, 13.9) <sup>2</sup>     |                                                                                     |                                      |
| Heterosexual               | 2     |                                                                             | 8.3 (7.8, 8.8) <sup>1</sup>        |                                                                                     |                                      |
| County Metropolitan Status |       | 0.207                                                                       |                                    | 0.638                                                                               |                                      |
| Large metro                | 1     |                                                                             | 8.4 (7.8, 9.0)                     |                                                                                     |                                      |
| Small metro                | 2     |                                                                             | 8.4 (7.6, 9.2)                     |                                                                                     |                                      |
| Nonmetro                   | 3     |                                                                             | 7.4 (6.4, 8.3)                     |                                                                                     |                                      |
| Seatbelt Use as Driver     |       | <0.001                                                                      |                                    | 0.014                                                                               |                                      |
| Always                     | 1     |                                                                             | 7.9 (7.4, 8.4) <sup>2</sup>        |                                                                                     | 0.98 (0.96, 1.01) <sup>2</sup>       |
| Not always                 | 2     |                                                                             | 12.1 (10.9, 13.4) <sup>1</sup>     |                                                                                     | <b>0.92 (0.88, 0.97)<sup>1</sup></b> |

Notes: OR = Odds ratio; CI = Confidence interval; FPT = Federal Poverty Threshold; NH = Non-Hispanic.  $\alpha = 0.05$ . ORs, 95% CIs, and *p*-values in bold are statistically significant. Significant pairwise comparisons are indicated by the superscript group numbers (e.g., 1, 2) and are only presented if the corresponding *F*-test was significant. Analyses account for NSDUH's complex sampling design, including applying analysis weights to make the estimates representative of the survey's target population. Family income poverty level is set to missing for respondents aged 18–22 years living in a college dorm. The “NH other race” group combines non-Hispanic respondents who identify as American Indian, Alaska Native, Native Hawaiian, other Pacific Islander, or Asian. County metropolitan status is based on 2013 Rural/Urban Continuum Codes.

<sup>a</sup> *p*-values from joint *F*-tests from simple logistic regression models;

<sup>b</sup> pairwise comparisons are *t*-tests from simple logistic regression models;

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ORs and 95% CIs are from simple logistic regression models and pairwise comparisons are from interaction term  $F$ -tests in logistic regression models.  
 $p$ -values from joint  $F$ -tests for the interaction terms from logistic regression models with year, the variable of interest, and their interaction term;

Driving under the influence of marijuana during the past 12 months among drivers aged  $\geq 16$  years by sociodemographic characteristics and seatbelt use, National Survey on Drug Use and Health (NSDUH), 2019 prevalence and 2016–2019 continuous trends.

Table 3

| Prevalence and Trends (superscripts indicate significant group differences) |       |        |                                        |                                    |
|-----------------------------------------------------------------------------|-------|--------|----------------------------------------|------------------------------------|
| Variable                                                                    | Group | $p^a$  | % (95% CI) <sup>b</sup>                | OR (95% CI) <sup>d</sup>           |
| Overall                                                                     |       |        | 5.3 (5.0, 5.5)                         | 1.05 (1.03, 1.08)                  |
| Age Group (Years)                                                           |       | <0.001 |                                        | 0.026                              |
| 16–20                                                                       | 1     |        | 11.0 (9.9, 12.0) <sup>2,3,4,5,6</sup>  | 0.98 (0.93, 1.03) <sup>3,4,6</sup> |
| 21–25                                                                       | 2     |        | 13.6 (12.6, 14.6) <sup>1,3,4,5,6</sup> | 1.02 (0.99, 1.06) <sup>3</sup>     |
| 26–34                                                                       | 3     |        | 9.2 (8.3, 10.1) <sup>1,2,4,5,6</sup>   | 1.10 (1.05, 1.15) <sup>1,2</sup>   |
| 35–49                                                                       | 4     |        | 4.5 (4.0, 5.1) <sup>1,2,3,5,6</sup>    | 1.08 (1.02, 1.14) <sup>1</sup>     |
| 50–64                                                                       | 5     |        | 2.7 (2.1, 3.4) <sup>1,2,3,4,6</sup>    | 1.09 (0.98, 1.22)                  |
| $\geq 65$                                                                   | 6     |        | 1.0 (0.6, 1.5) <sup>1,2,3,4,5</sup>    | 1.25 (1.00, 1.57) <sup>1</sup>     |
| Sex                                                                         |       | <0.001 |                                        | 0.833                              |
| Female                                                                      | 1     |        | 3.7 (3.4, 4.0) <sup>2</sup>            |                                    |
| Male                                                                        | 2     |        | 7.0 (6.5, 7.4) <sup>1</sup>            |                                    |
| Education Level                                                             |       | <0.001 |                                        | 0.158                              |
| Currently aged 16–17 years                                                  | 1     |        | 7.1 (6.1, 8.1) <sup>2,3,5</sup>        |                                    |
| Less than high school                                                       | 2     |        | 4.0 (3.1, 4.9) <sup>1,3,4</sup>        |                                    |
| High school diploma/GED                                                     | 3     |        | 5.4 (4.9, 5.9) <sup>1,2,4,5</sup>      |                                    |
| Some college/Associate's degree                                             | 4     |        | 7.0 (6.4, 7.6) <sup>2,3,5</sup>        |                                    |
| College graduate or higher                                                  | 5     |        | 3.9 (3.4, 4.4) <sup>1,3,4</sup>        |                                    |
| Family Income Poverty Level                                                 |       | <0.001 |                                        | 0.805                              |
| Living in poverty                                                           | 1     |        | 6.8 (6.1, 7.6) <sup>3</sup>            |                                    |
| Income $\leq 2 \times$ FPT                                                  | 2     |        | 5.9 (5.3, 6.5) <sup>3</sup>            |                                    |
| Income $> 2 \times$ FPT                                                     | 3     |        | 4.8 (4.5, 5.2) <sup>1,2</sup>          |                                    |
| Race/Ethnicity                                                              |       | <0.001 |                                        | 0.805                              |
| NH White                                                                    | 1     |        | 5.4 (5.1, 5.8) <sup>3,4</sup>          |                                    |
| NH Black/African American                                                   | 2     |        | 6.2 (5.4, 7.0) <sup>3,4,5</sup>        |                                    |

| Variable                   | Group | Prevalence and Trends (superscripts indicate significant group differences) |                                    |                                                                                     |                                      |
|----------------------------|-------|-----------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|
|                            |       | 2019 Prevalence Overall and by Variables of Interest                        |                                    | 2016–2019 Trends Overall and for Variables of Interest with Group Trend Differences |                                      |
|                            |       | <i>p</i> <sup>a</sup>                                                       | % (95% CI) <sup>b</sup>            | <i>p</i> <sup>c</sup>                                                               | OR (95% CI) <sup>d</sup>             |
| NH other race              | 3     |                                                                             | 2.4 (1.8, 3.0) <sup>1,2,4,5</sup>  |                                                                                     |                                      |
| NH more than one race      | 4     |                                                                             | 9.6 (6.9, 12.2) <sup>1,2,3,5</sup> |                                                                                     |                                      |
| Hispanic                   | 5     |                                                                             | 4.8 (4.2, 5.3) <sup>2,3,4</sup>    |                                                                                     |                                      |
| Employment Status          |       | <b>&lt;0.001</b>                                                            |                                    | 0.195                                                                               |                                      |
| Full time                  | 1     |                                                                             | 6.0 (5.6, 6.4) <sup>2,3,4</sup>    |                                                                                     |                                      |
| Part time                  | 2     |                                                                             | 7.2 (6.3, 8.1) <sup>1,4</sup>      |                                                                                     |                                      |
| Unemployed                 | 3     |                                                                             | 8.5 (7.2, 9.9) <sup>1,4</sup>      |                                                                                     |                                      |
| Other                      | 4     |                                                                             | 2.9 (2.5, 3.4) <sup>1,2,3</sup>    |                                                                                     |                                      |
| Marital Status             |       | <b>&lt;0.001</b>                                                            |                                    | 0.079                                                                               |                                      |
| Married                    | 1     |                                                                             | 2.4 (2.1, 2.8) <sup>2,3</sup>      |                                                                                     |                                      |
| Never been married         | 2     |                                                                             | 10.9 (10.3, 11.4) <sup>1,3</sup>   |                                                                                     |                                      |
| Widowed/Divorced/Separated | 3     |                                                                             | 4.2 (3.5, 5.0) <sup>1,2</sup>      |                                                                                     |                                      |
| Sexual Orientation         |       | <b>&lt;0.001</b>                                                            |                                    | 0.072                                                                               |                                      |
| Not heterosexual           | 1     |                                                                             | 14.7 (13.0, 16.4) <sup>2</sup>     |                                                                                     |                                      |
| Heterosexual               | 2     |                                                                             | 4.7 (4.5, 5.0) <sup>1</sup>        |                                                                                     |                                      |
| County Metropolitan Status |       | <b>0.006</b>                                                                |                                    | 0.632                                                                               |                                      |
| Large metro                | 1     |                                                                             | 5.6 (5.2, 6.0) <sup>3</sup>        |                                                                                     |                                      |
| Small metro                | 2     |                                                                             | 5.2 (4.7, 5.8) <sup>3</sup>        |                                                                                     |                                      |
| Nonmetro                   | 3     |                                                                             | 4.2 (3.7, 4.8) <sup>1,2</sup>      |                                                                                     |                                      |
| Seatbelt Use as Driver     |       | <b>&lt;0.001</b>                                                            |                                    | <b>0.043</b>                                                                        |                                      |
| Always                     | 1     |                                                                             | 4.7 (4.5, 5.0) <sup>2</sup>        |                                                                                     | <b>1.05 (1.02, 1.08)<sup>2</sup></b> |
| Not always                 | 2     |                                                                             | 11.5 (10.2, 12.8) <sup>1</sup>     |                                                                                     | <b>1.10 (1.06, 1.15)<sup>1</sup></b> |

Notes: OR = Odds ratio; CI = Confidence interval; FPT = Federal Poverty Threshold; NH = Non-Hispanic.  $\alpha = 0.05$ . ORs, 95% CIs, and *p*-values in bold are statistically significant. Significant pairwise comparisons are indicated by the superscript group numbers (e.g., 1, 2) and are only presented if the corresponding *F*-test was significant. Analyses account for NSDUH's complex sampling design, including applying analysis weights to make the estimates representative of the survey's target population. Family income poverty level is set to missing for respondents aged 18–22 years living in a college dorm. The “NH other race” group combines non-Hispanic respondents who identify as American Indian, Alaska Native, Native Hawaiian, other Pacific Islander, or Asian. County metropolitan status is based on 2013 Rural/Urban Continuum Codes.

<sup>a</sup> *p*-values from joint *F*-tests from simple logistic regression models;

<sup>b</sup> pairwise comparisons are *t*-tests from simple logistic regression models;

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ORs and 95% CIs are from simple logistic regression models and pairwise comparisons are from interaction term  $F$ -tests in logistic regression models.  
 $p$ -values from joint  $F$ -tests for the interaction terms from logistic regression models with year, the variable of interest, and their interaction term;

Table 4

Driving under the influence of other illicit drugs during the past 12 months among drivers aged  $\geq 16$  years by sociodemographic characteristics and seatbelt use, National Survey on Drug Use and Health (NSDUH), 2019 prevalence and 2016–2019 continuous trends.

| Variable                        | Group | Prevalence and Trends (superscripts indicate significant group differences) |                                                                                     |                | OR (95% CI) <sup>d</sup>         |
|---------------------------------|-------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|----------------------------------|
|                                 |       | 2019 Prevalence Overall and by Variables of Interest                        | 2016–2019 Trends Overall and for Variables of Interest with Group Trend Differences | p <sup>c</sup> |                                  |
| Overall                         |       |                                                                             |                                                                                     |                | 1.01 (0.96, 1.07)                |
| Age Group (Years)               |       |                                                                             |                                                                                     | 0.013          |                                  |
| 16–20                           | 1     | <0.001                                                                      | 0.9 (0.8, 1.0)                                                                      |                |                                  |
| 21–25                           | 2     |                                                                             | 1.0 (0.7, 1.2) <sup>2,3,5</sup>                                                     |                | 0.87 (0.79, 0.97) <sup>3,4</sup> |
| 26–34                           | 3     |                                                                             | 2.3 (1.9, 2.7) <sup>1,4,5</sup>                                                     |                | 1.00 (0.92, 1.09)                |
| 35–49                           | 4     |                                                                             | 2.0 (1.6, 2.4) <sup>1,4,5</sup>                                                     |                | 1.09 (1.01, 1.17) <sup>1</sup>   |
| 50–64                           | 5     |                                                                             | 1.0 (0.8, 1.3) <sup>2,3,5</sup>                                                     |                | 1.03 (0.94, 1.13) <sup>1</sup>   |
| $\geq 65$                       | 6     |                                                                             | 0.4 (0.2, 0.7) <sup>1,2,3,4</sup>                                                   |                | 0.97 (0.76, 1.24)                |
| Sex                             |       |                                                                             | *                                                                                   |                | *                                |
| Female                          | 1     | <0.001                                                                      | 0.6 (0.5, 0.8) <sup>2</sup>                                                         | 0.666          |                                  |
| Male                            | 2     |                                                                             | 1.2 (1.0, 1.4) <sup>1</sup>                                                         |                |                                  |
| Education Level                 |       |                                                                             |                                                                                     | 0.317          |                                  |
| Currently aged 16–17 years      | 1     | <0.001                                                                      | *                                                                                   |                |                                  |
| Less than high school           | 2     |                                                                             | 0.9 (0.6, 1.3) <sup>5</sup>                                                         |                |                                  |
| High school diploma/GED         | 3     |                                                                             | 1.2 (0.9, 1.5) <sup>5</sup>                                                         |                |                                  |
| Some college/Associate's degree | 4     |                                                                             | 1.3 (1.0, 1.5) <sup>5</sup>                                                         |                |                                  |
| College graduate or higher      | 5     |                                                                             | 0.4 (0.3, 0.5) <sup>4,3,2</sup>                                                     |                |                                  |
| Family Income Poverty Level     |       |                                                                             |                                                                                     | 0.461          |                                  |
| Living in Poverty               | 1     | <0.001                                                                      | 1.5 (1.0, 1.9) <sup>3</sup>                                                         |                |                                  |
| Income $\leq 2 \times$ FPT      | 2     |                                                                             | 1.1 (0.9, 1.4) <sup>3</sup>                                                         |                |                                  |
| Income $> 2 \times$ FPT         | 3     |                                                                             | 0.8 (0.6, 0.9) <sup>1,2</sup>                                                       |                |                                  |
| Race/Ethnicity                  |       |                                                                             |                                                                                     | 0.603          |                                  |
| NH White                        | 1     | 0.039                                                                       | 1.0 (0.9, 1.2) <sup>2,3</sup>                                                       |                |                                  |
| NH Black/African American       | 2     |                                                                             | 0.6 (0.4, 0.8) <sup>1</sup>                                                         |                |                                  |

| Prevalence and Trends (superscripts indicate significant group differences) |       |                       |                                 |                                                |
|-----------------------------------------------------------------------------|-------|-----------------------|---------------------------------|------------------------------------------------|
| Variable                                                                    | Group | <i>p</i> <sup>a</sup> | % (95% CI) <sup>b</sup>         | <i>p</i> <sup>c</sup> OR (95% CI) <sup>d</sup> |
| NH other race                                                               | 3     |                       | 0.5 (0.2, 0.8) <sup>1</sup>     |                                                |
| NH more than one race                                                       | 4     |                       | *                               |                                                |
| Hispanic                                                                    | 5     |                       | 0.9 (0.6, 1.2)                  |                                                |
| Employment Status                                                           |       | <b>&lt;0.001</b>      |                                 | 0.466                                          |
| Full time                                                                   | 1     |                       | 1.0 (0.8, 1.2) <sup>3,4</sup>   |                                                |
| Part time                                                                   | 2     |                       | 0.7 (0.4, 1.0) <sup>3</sup>     |                                                |
| Unemployed                                                                  | 3     |                       | 3.2 (2.1, 4.4) <sup>1,2,4</sup> |                                                |
| Other                                                                       | 4     |                       | 0.6 (0.4, 0.8) <sup>1,3</sup>   |                                                |
| Marital Status                                                              |       | <b>&lt;0.001</b>      |                                 | 0.994                                          |
| Married                                                                     | 1     |                       | 0.3 (0.2, 0.4) <sup>2,3</sup>   |                                                |
| Never been married                                                          | 2     |                       | 2.0 (1.7, 2.3) <sup>1,3</sup>   |                                                |
| Widowed/Divorced/Separated                                                  | 3     |                       | 0.9 (0.6, 1.2) <sup>1,2</sup>   |                                                |
| Sexual Orientation                                                          |       | <b>&lt;0.001</b>      |                                 | 0.367                                          |
| Not heterosexual                                                            | 1     |                       | 3.5 (2.8, 4.3) <sup>2</sup>     |                                                |
| Heterosexual                                                                | 2     |                       | 0.8 (0.7, 0.9) <sup>1</sup>     |                                                |
| County Metropolitan Status                                                  |       | 0.705                 |                                 | 0.384                                          |
| Large metro                                                                 | 1     |                       | 0.9 (0.8, 1.1)                  |                                                |
| Small metro                                                                 | 2     |                       | 0.9 (0.7, 1.1)                  |                                                |
| Nonmetro                                                                    | 3     |                       | 1.0 (0.7, 1.3)                  |                                                |
| Seatbelt Use as Driver                                                      |       | <b>&lt;0.001</b>      |                                 | 0.399                                          |
| Always                                                                      | 1     |                       | 0.7 (0.6, 0.8) <sup>2</sup>     |                                                |
| Not always                                                                  | 2     |                       | 3.1 (2.4, 3.9) <sup>1</sup>     |                                                |

Notes: OR = Odds ratio; CI = Confidence interval; FPT = Federal Poverty Threshold; NH = Non-Hispanic. Other illicit drugs are cocaine or crack, heroin, hallucinogens, inhalants, or methamphetamine.  $\alpha = 0.05$ . ORs, 95% CIs, and *p*-values in bold are statistically significant. Significant pairwise comparisons are indicated by the superscript group numbers (e.g., 1, 2) and are only presented if the corresponding *F*-test was significant. Analyses account for NSDUH's complex sampling design, including applying analysis weights to make the estimates representative of the survey's target population. Family income poverty level is set to missing for respondents aged 18–22 years living in a college dorm. The “NH other race” group combines non-Hispanic respondents who identify as American Indian, Alaska Native, Native Hawaiian, other Pacific Islander, or Asian. County metropolitan status is based on 2013 Rural/Urban Continuum Codes.

<sup>a</sup> *p*-values from joint *F*-tests from simple logistic regression models;

<sup>b</sup> pairwise comparisons are *t*-tests from simple logistic regression models;

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values from joint  $F$ -tests for the interaction terms from logistic regression models with year, the variable of interest, and their interaction term;  
 $d$  ORs and 95% CIs are from simple logistic regression models and pairwise comparisons are from interaction term  $F$ -tests in logistic regression models.  
\* = Relative standard error > 30%—estimate suppressed and group excluded from prevalence comparisons and trend comparisons.