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Driving under the influence of cannabis, alcohol, and illicit drugs among adults in the United States from 2016 to 2020

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ABSTRACT

Objective: Driving under the influence (DUI) of substances increases motor vehicle crash risk. Understanding current national trends of driving under the influence of alcohol (DUIA), cannabis (DUIC), and drugs other than cannabis (DUID) can inform public health efforts. Herein, we provide updated trends among United States (US) adults regarding DUIA, DUIC, DUID, and DUI of any substance.

Method: We used nationally-representative National Survey on Drug Use and Health (2016-2020) data to derive prevalence estimates of past-year DUIC, DUIA, DUID, and DUI of any substance among non-institutionalized US adults and among those reporting respective past-year substance use. Prevalence estimates and adjusted logistic regressions characterized temporal trends of these behaviors among US adults, among those with respective past-year substance use, and among stratified demographic subpopulations.

Results: Over 1 in 10 US adults reported DUI of any substance annually from 2016 to 2020.DUIA was most prevalent among all US adults (8.7% in 2017); however, this behavior is decreasing (AOR:0.96; 95% CI:0.94,0.98). No change in DUIC among the US adult population was found, but a decrease was found among those with past-year cannabis use (AOR:0.95; 95%CI:0.93,0.98), which coincided with a 29.1% increase in past-year cannabis use. There were no significant changes in overall DUID; however, females, those ages 26-34 and 65 or older with past-year use displayed increasing trends. DUI of any substance decreased among the US adult population.

Conclusions: DUI remains a salient public health concern in the US and results indicate population subgroups who may benefit from impaired driving prevention interventions.

1. Introduction

Motor vehicle crashes (MVC) are a leading cause of death and injury in the United States (US) and are especially prominent in early adulthood when substance use is most prevalent (Merikangas & McClair, 2012; Xu, 2019). Driving under the influence of cannabis, alcohol, and/or other drugs impairs driving abilities and increases MVC risk (Asbridge et al., 2012; Elvik, 2013; National Center for Statistics and Analysis. (2014), 2014). Substance use is a common contributing factor in fatal MVCs; national data indicate that alcohol, cannabis, and opioids were present in 36%, 38%, and 16% of fatally-injured drivers drug tested in 2016, respectively (Association, 2018). Moreover, the prevalence of MVC deaths involving cannabis tripled from 1999 to 2010 (Brady & Li, 2014). National roadside surveys measuring alcohol and other drug use from 2007 to 2013 found a 33.1% decrease in the prevalence of alcohol-impaired drivers (12.4–8.3%) and a 48.0% increase in the prevalence of cannabis-positive drivers (8.6–12.6%). In these data, the prevalence of illegal drug-positive (including cannabis) drivers increased by 21.8% (12.4–15.1%) and medication-positive (i.e., prescription, over-the-counter) drivers increased by 25.6% (3.9–4.9%) (Berning, Compton, & Wochinger, 2015). National surveys from 1991 to 2013 and 2002 to 2014 (Azofeifa, Mattson, & Lyerla, 2015; Fink et al., 2020) show declining trends in self-reported driving under the influence of alcohol (DUIA). However, National Survey on Drug Use and Health (NSDUH)

Abbreviations: MVC, Motor Vehicle Crashes; DUI, Driving Under the Influence; DUIC, Driving Under the Influence of Cannabis; DUIA, Driving Under the Influence of Alcohol; DUID, Driving Under the Influence of Drugs Other than Cannabis; NSDUH, National Surveys of Drug Use and Health.

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data from 2002 to 2014 showed a non-significant change in the prevalence of driving under the influence of cannabis (DUIC) (Azofeifa et al., 2015). Nationally representative data regarding trends in driving under the influence of drugs other than cannabis (DUID) is lacking.

Changes in the sociopolitical environment surrounding substance use, particularly policies increasing cannabis access, have implications for impaired driving. For example, states with legal medical cannabis have shown greater increases in self-reported DUIC and MVC compared to states without such laws (Berning et al., 2015, Farmer, Monfort, & Woods, 2022). As of September 2022, medical and recreational cannabis is permitted in 38 and 22 states and territories, respectively, (Conference, 2022). In recent years, risk perceptions related to consuming cannabis, cocaine, and alcohol among US citizens declined (Center for Behavioral Health Statistics and Quality, 2021). Lower perceived risk of substance use is associated with greater use and may influence consequent driving under the influence (DUI) behaviors, further emphasizing the need to monitor this behavior (Han, Funk-White, Ko, Al-Rousan, & Palamar, 2021). As social and policy climates surrounding substance use continue changing, informed policies promoting safe driving rely on accurate and current data. Thus, the purpose of the current study is to use nationally representative data to estimate and describe trends of recent DUIA, DUIC, DUID, and any DUI among adults in the US.

2. Materials and methods

2.1. Sample and procedures

We used public data from the 2016–2020 waves of NSDUH to describe DUI behaviors among participants 18 years and older. NSDUH utilizes a multistage area probability sample and computer-assisted interviews to survey non-institutionalized, civilian US residents' substance use and mental health. Technical details and methodological descriptions of NSDUH are available elsewhere (Center for Behavioral Health Statistics and Quality, 2020). Given that NSDUH data is anonymous and publicly available, this work was deemed non-human subjects by the Michigan State University Institutional Review Board.

2.2. Measures

Past-year Substance Use: Past-year use of each substance was evaluated by separate NSDUH-recoded questions assessing whether or not an individual had: 1) drank an alcoholic beverage, 2) used cannabis or hashish, 3) used illicit drugs other than cannabis in the past-year. We additionally determined past-year use of any substance based on an affirmative response for at least one of the three above categories.

Driving Under the Influence Behaviors: DUI behaviors were assessed by three separate questions: "During the past 12 months, have you driven a vehicle while you were under the influence of 1) alcohol, 2) cannabis, 3) drugs other than cannabis only?" Drugs other than cannabis included cocaine or crack, heroin, hallucinogens, inhalants, or methamphetamine. DUI of any substance was coded based on reports of at least one of the three above behaviors.

Demographics: Self-reported demographic characteristics previously described in the literature to be related to DUI (Gonçalves et al., 2022) include gender (male/female), age (categorized in the public use data as: 18–25, 26–34, 35–49, 50–64, 65+), race/ethnicity (Non-Hispanic White, Black, Asian, Other Race, or Hispanic), and education (less than high school, high school, some college, and college or higher).

Residence in a State with a Medical Cannabis Law: NSDUH data includes a binary indicator (yes/no) of whether a respondent "lived in a state in which a law allowing use of marijuana for medical reasons *had taken effect* (in 2016–2017 NSDUH) or *had been passed* (in 2018–2020 NSDUH) at the time of the interview.".

Medical Cannabis Use: Participants indicating past-year cannabis use were delineated into three categories: medical cannabis use only, nonmedical use only, and medical and non-medical use. These groups were identified from two distinct questions asking, "Was *any* or *all* of your marijuana in the past 12 months recommended by a doctor or other health care professional?".

2.3. Statistical analysis

We computed the prevalence of past-year use of alcohol, cannabis, drugs other than cannabis, and any substance (alcohol and/or cannabis and/or other drugs) and the prevalence of DUIC, DUIA, DUID, and DUI of any substance among two groups: 1) the represented US adult population and 2) among only those reporting past-year use of each respective substance. We also computed prevalence estimates among demographic subgroups, including medical and non-medical consumption for DUIC-focused analyses.

Adjusted odds ratios (AORs) for a continuous year variable describe temporal trends of each DUI behavior and are derived from multivariable logistic regression models that adjust for gender, age, race/ethnicity, education, and living in a state with a medical cannabis law. Models were fitted among the US adult and past-year use populations and within stratified demographic subpopulations. Results are nationally representative; analyses took into account NSDUH's complex survey design and weights within SAS Software (SAS Institute, 2014).

3. Results

3.1. Driving under the influence of any substance

US population trends of DUI from any substance declined from 2016 to 2020 (AOR:0.98; 95%CI:0.96,0.99) (Appendix Table 1), although >1 in 10 adults reported this behavior in 2020. Among those with past-year use, there were no changes in DUI of any substance (Table 1); however, the prevalence among those with past-year use declined in males, age groups less than 35, and college or higher subgroups and increased in the 65 + age group (Table 1).

3.2. Driving under the influence of alcohol

Among the represented US adult population, DUIA was the most common behavior, with a peak prevalence of 8.7% in 2017 (Fig. 1). The prevalence of DUIA among the total population declined during this time period (AOR:0.96; 95%CI:0.94,0.98) (Appendix Table 1). A similar trend was observed among the subset of US adults reporting past-year alcohol use (AOR:0.97; 95%CI:0.95,0.99) (Table 1). Among those with past-year use, the prevalence of DUIA among those ages 65 + significantly increased, whereas significant decreasing trends were found for the 18–25 and 26–34 age groups, in males, and Non-Hispanic Whites (Table 1).

3.3. Driving under the influence of cannabis

From 2016 to 2020, the prevalence of DUIC among all US adults varied from 4.2 to 4.9% (Table 1), corresponding with a null temporal trend (Appendix Table 1). However, past-year cannabis use increased 29.1% (AOR:1.07; 95%CI:1.05,1.09) (not displayed). Table 1 presents a decline in DUIC among those reporting past-year cannabis use (AOR:0.95; 95%CI:0.93,0.98). Nonetheless, nearly one in four (24.6%) adults who used cannabis reported DUIC in 2020 (Fig. 1). Subgroups with past-year cannabis use that displayed significant declines in DUIC include males, ages 18–25, Non-Hispanic Whites and Hispanics, those with a high school education or less, and those living in a state with a medical cannabis law (Table 1).

DUIC also declined across cannabis-using subgroups. Medical cannabis use only, nonmedical use only, and both medical and nonmedical use all declined with adjusted AORs of 0.83 (95% CI:0.70,0.98), 0.83 (95%CI:0.71,0.97), and 0.95 (95%CI:0.92,0.98), respectively (Appendix Table 2).

Table 1
Prevalences and trends of driving under the influence behaviors from 2016 to 2020 among those reporting past-year consumption of each substance, respectively.

	Driving Under the Influence of Any Substance			Driving Under the Influence of Alcohol (DUIA)			Driving Under the Influence of Cannabis (DUIC)			Driving Under the Influence of Drugs Other than Cannabis (DUID)		
	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)
	n = 174,742,145 (71.5%)	n = 179,071,261 (71.1%)		n = 169,714,713 (69.4%)	n = 171,818,387 (68.2%)		n = 34,589,974 (12.8%)	n = 45,878,516 (18.2%)		n = 22,215,269 (9.1%)	n = 22,051,105 (8.8%)	
Total Sample	15.6% (15.1, 16.2)	14.6% (13.8, 15.4)	0.99 (0.97, 1.00)	12.1% (11.6, 12.6)	10.7% (10.0, 11.5)	0.97 (0.95, 0.99)*	30.1% (28.4, 31.8)	24.6% (22.4, 26.8)	0.95 (0.93, 0.98)*	9.2% (8.0, 10.5)	10.6% (8.3, 12.9)	1.03 (0.97, 1.10)
Sex												
Male	19.5% (18.6, 20.4)	17.8% (16.5, 19.0)	0.98 (0.96, 0.99)*	15.2% (14.4, 15.9)	13.3% (12.1, 14.5)	0.96 (0.94, 0.99)*	33.5% (31.1, 36.0)	27.3% (24.0, 30.6)	0.94 (0.90, 0.98)*	10.8% (9.0, 12.6)	10.7% (8.2, 13.3)	0.97 (0.91, 1.04)
Female	11.6% (11.1, 12.2)	11.5% (10.4, 12.5)	1.00 (0.98, 1.03)	9.0% (8.5, 9.5)	8.2% (7.2, 9.1)	0.98 (0.95, 1.00)	25.3% (23.0, 27.5)	21.3% (18.2, 24.4)	0.96 (0.92, 1.01)	7.4% (5.8, 9.0)	10.5% (6.7, 14.4)	1.15 (1.05, 1.26)*
Age, years												
18–25	24.2% (23.1, 25.4)	18.8% (16.9, 20.8)	0.93 (0.91, 0.96)*	14.8% (13.9, 15.7)	10.4% (8.8, 12.0)	0.91 (0.88, 0.94)*	36.4% (34.2, 38.5)	28.0% (25.1, 31.0)	0.93 (0.89, 0.96)*	9.8% (8.0, 11.6)	5.5% (3.8, 7.3)	0.91 (0.87, 0.95)*
26–34	20.3% (19.0, 21.7)	17.5% (15.7, 19.2)	0.96 (0.93, 0.99)*	15.5% (14.5, 16.6)	12.6% (11.3, 14.0)	0.94 (0.91, 0.97)*	31.3% (28.0, 34.5)	24.6% (20.9, 28.2)	0.95 (0.90, 1.01)	9.9% (8.3, 11.5)	13.3% (8.8, 17.8)	1.10 (1.01, 1.20)*
35–49	15.9% (15.0, 16.9)	16.1% (14.7, 17.4)	1.00 (0.98, 1.03)	13.1% (12.3, 14.0)	12.3% (10.9, 13.7)	0.98 (0.95, 1.01)	28.4% (25.3, 31.5)	25.5% (21.2, 29.8)	0.97 (0.90, 1.04)	11.4% (9.0, 13.7)	13.3% (9.4, 17.2)	1.03 (0.93, 1.14)
50–64	12.8% (11.6, 14.1)	12.6% (10.4, 14.7)	1.00 (0.95, 1.05)	11.2% (10.0, 12.4)	10.1% (7.8, 12.3)	0.98 (0.92, 1.05)	22.1% (17.1, 27.1)	20.9% (13.7, 28.1)	0.96 (0.86, 1.07)	7.3% (3.3, 11.3)	10.4% (1.3, 19.5)	1.05 (0.81, 1.37)
65+	5.8% (4.7, 6.8)	9.1% (7.2, 11.1)	1.10 (1.03, 1.17)*	5.2% (4.2, 6.2)	7.7% (6.0, 9.4)	1.08 (1.01, 1.15)*	14.6% (6.6, 22.5)	17.9% (9.2, 26.5)	1.08 (0.89, 1.30)	0.0% (0.0, 0.0)	9.3% (0.0, 18.8)	4.03 (1.41, 11.48)*
Race/ Ethnicity												
Non-Hispanic White	17.1% (16.4, 17.8)	16.2% (15.2, 17.2)	0.99 (0.97, 1.01)	13.6% (13.0, 14.2)	12.1% (11.2, 13.1)	0.97 (0.95, 0.99)*	28.9% (24.8, 33.0)	17.2% (10.1, 24.3)	0.96 (0.93, 0.99)*	8.9% (7.5, 10.3)	11.7% (8.8, 14.5)	1.07 (1.00, 1.15)*
Non-Hispanic Black	13.5% (12.0, 15.1)	13.4% (10.5, 16.4)	1.00 (0.95, 1.05)	9.1% (7.8, 10.4)	8.6% (6.4, 10.9)	0.97 (0.92, 1.03)	29.7% (26.8, 32.5)	23.3% (19.4, 27.1)	0.96 (0.91, 1.01)	11.1% (7.5, 14.7)	4.6% (1.7, 7.5)	0.83 (0.73, 0.95)*
Non-Hispanic Asian	9.1% (7.1, 11.2)	7.5% (4.2, 10.7)	0.97 (0.88, 1.06)	7.8% (6.0, 9.7)	5.1% (2.3, 7.9)	0.93 (0.84, 1.03)	33.1% (30.2, 36.0)	28.8% (25.1, 32.5)	0.97 (0.84, 1.13)	10.1% (4.0, 16.1)	0.4% (0.0, 1.0)	0.68 (0.48, 0.98)*
Non-Hispanic Other	17.0% (14.6, 19.4)	14.7% (10.8, 18.6)	0.97 (0.90, 1.05)	10.4% (8.6, 12.2)	9.2% (5.7, 12.7)	0.97 (0.89, 1.07)	26.8% (23.2, 30.4)	22.7% (18.6, 26.7)	0.96 (0.85, 1.09)	11.8% (6.9, 16.7)	14.0% (2.8, 25.2)	1.04 (0.85, 1.28)
Hispanic	11.8% (10.6, 12.9)	10.4% (8.0, 12.7)	0.98 (0.93, 1.03)	8.7% (7.8, 9.7)	7.9% (5.6, 10.2)	0.98 (0.91, 1.04)	28.9% (24.8, 33.0)	17.2% (10.1, 24.3)	0.91 (0.84, 0.99)*	8.9% (6.8, 11.0)	10.9% (5.9, 15.9)	1.02 (0.91, 1.15)
Education												
Less than High School	11.5% (10.0, 13.0)	11.0% (7.3, 14.8)	1.00 (0.91, 1.10)	6.6% (5.1, 8.1)	7.5% (4.0, 11.0)	1.04 (0.91, 1.18)	28.9% (24.8, 33.0)	17.2% (10.1, 24.3)	0.89 (0.80, 0.99)*	12.4% (8.1, 16.7)	10.0% (5.0, 15.0)	0.91 (0.79, 1.04)
High School	13.2% (12.1, 14.3)	13.0% (11.1, 14.9)		8.7% (7.6, 9.8)	8.6% (6.9, 10.4)		29.7% (26.8, 32.5)	23.3% (19.4, 27.1)		9.5% (7.3, 11.7)	11.4% (7.2, 15.6)	1.03 (0.93, 1.13)

(*continued on next page*)

Table 1 (*continued*)

	Driving Under the Influence of Any Substance			Driving Under the Influence of Alcohol (DUIA)			Driving Under the Influence of Cannabis (DUIC)			Driving Under the Influence of Drugs Other than Cannabis (DUID)		
	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)	2016	2020	AOR (95% CI)
	n = 174,742,145 (71.5%)	n = 179,071,261 (71.1%)		n = 169,714,713 (69.4%)	n = 171,818,387 (68.2%)		n = 34,589,974 (12.8%)	n = 45,878,516 (18.2%)		n = 22,215,269 (9.1%)	n = 22,051,105 (8.8%)	
			1.00 (0.97, 1.04)			1.00 (0.95, 1.06)			0.94 (0.90, 0.98)*			
Some College	16.6% (15.7, 17.6)	16.7% (15.1, 18.2)	1.01 (0.98, 1.04)	12.2% (11.4, 12.9)	11.5% (10.2, 12.8)	0.98 (0.95, 1.02)	33.1% (30.2, 36.0)	28.8% (25.1, 32.5)	0.97 (0.92, 1.02)	11.3% (9.1, 13.5)	15.0% (10.4, 19.7)	1.09 (0.99, 1.20)
College or higher	17.4% (16.5, 18.2)	14.6% (13.3, 16.0)	0.95 (0.93, 0.97)*	15.7% (14.8, 16.5)	12.2% (10.9, 13.4)	0.93 (0.91, 0.96)*	26.8% (23.2, 30.4)	22.7% (18.6, 26.7)	0.96 (0.91, 1.02)	5.1% (3.7, 6.6)	5.4% (2.8, 8.1)	0.99 (0.87, 1.13)
Live in a State with a Medical Cannabis Law												
Yes	15.9% (15.1, 16.7)	14.8% (13.9, 15.7)	0.99 (0.97, 1.01)	12.2% (11.5, 12.9)	10.6% (9.6, 11.6)	0.97 (0.94, 0.99)*	28.7% (26.3, 31.1)	23.4% (20.9, 26.0)	0.94 (0.91, 0.98)*	9.0% (7.3, 10.6)	11.0% (8.3, 13.8)	1.04 (0.96, 1.13)
No	15.4% (14.6, 16.1)	14.1% (12.4, 15.8)	0.98 (0.95, 1.01)	12.0% (11.3, 12.8)	11.1% (9.5, 12.6)	0.97 (0.94, 1.00)	32.1% (29.7, 34.5)	28.5% (24.3, 32.7)	0.97 (0.93, 1.02)	9.6% (8.1, 11.1)	9.6% (5.2, 13.9)	1.03 (0.93, 1.14)

All adjusted odds ratios (AOR) describe temporal trends derived from a continuous year indicator (2016–2020) in logistic regressions stratified by each covariate subpopulation. Models are adjusted for sex, age, race, education, and living in a state with a medical cannabis law.

n values are conditional upon the count of those reporting past-year consumption of each substance separately. N value percentages represent the percent of total population 18 years and older reporting past-year use of each substance.

* Indicates a significant temporal trend at a 5% significance level.

3.4. *Driving under the influence of drugs other than cannabis*

As presented in Fig. 1, DUID behaviors were stable from 2016 to 2020. Multivariable analyses showed no changes in the prevalence of DUID in the represented US adult population (Appendix Table 1) nor among those who used drugs other than cannabis in the past-year (Table 1). However, DUID among the past-year use subgroup increased in females, those ages 26–35 and 65 or greater, and Non-Hispanic Whites, whereas it decreased among those ages 18–25, Non-Hispanic Blacks and Non-Hispanic Asians (Table 1).

4. Discussion

Although DUI is prominent, with 10.3% of US adults reporting DUI of any substance in 2020, DUI behaviors across subpopulations and substances showed varying trends. Present results complement and expand upon recently published trends of DUIC and DUIA, describe decreasing trends in the societal prevalence of DUIA and unchanged DUIC trends (Azofeifa et al., 2015; Oh, Vaughn, Salas-Wright, AbiNader, & Sanchez, 2020; Salas-Wright, Cano, Hai, Oh, & Vaughn, 2021). Most recent roadside survey data describing blood and oral verification of substance ingestion predate this analysis, however, our results show a continued finding of a decrease in the prevalence of DUIA (Berning et al., 2015). To improve confidence in the accuracy of these estimates, roadside survey data should be updated and compared with results presented here. Prevalence estimates of US societal DUID parallel prior work (Azofeifa, Rexach-Guzmán, Hagemeyer, Rudd, & Sauber-Schatz, 2019); however, the present analyses provide additional information regarding trends of DUID among important demographic subpopulations.

In addition to providing updated DUI trends among the non-institutionalized US adult population, we provide information about those who use each substance. Although overall population prevalence estimates accurately describe societal burden, results restricted to those reporting past-year use of each substance account for trends in consumption, and more precisely describe the prevalence of these behaviors among those who have the potential to engage in impaired driving. DUIC showed no statistical change in the overall adult population, however, we found a decreasing trend in self-reported DUIC among those who use cannabis. Additional data are needed to explain why fewer individuals who use cannabis report DUIC over time, which could reflect intentional harm reduction behaviors among those who use cannabis to avoid DUIC (particularly given increasing use of higher potency cannabis products which cause greater impairment), consumption patterns that are less associated with driving (e.g., use before sleeping), and/or other possibilities, including self-reporting biases (Smart, Caulkins, Kilmer, Davenport, & Midgette, 2017; Cash, Cunnane, Fan, & Romero-Sandoval, 2020; Mahamad, Wadsworth, Rynard, Goodman, & Hammond, 2020).

DUI trends presented in this analysis have implications for future interventions. High prevalences of DUIC among those who use cannabis underscore the importance of primary prevention, potentially reaching those yet to initiate cannabis use. Decreasing trends of DUIA and DUIC among those with past-year use may reflect changes in social norms surrounding impaired driving (Guide to Community Preventative Services, 2021). Nonetheless, future work is necessary to investigate and promote risk reduction pertaining to impaired driving, particularly as cannabis consumption increases. Demographic subgroups showing increasing trends are highlighted in this work. Adults age 65+ may warrant specific interventions given DUIA and DUID had notable increases in prevalence in this age group. DUID has also become more prevalent among females, Non-Hispanic Whites, and those ages 26–34. Future work should continue to monitor these subgroups, and potentially seek to create tailored interventions to reduce this dangerous behavior.

Results are limited by the self-reported nature of the survey, resulting in potential recall bias or demand characteristics. Also, individuals may

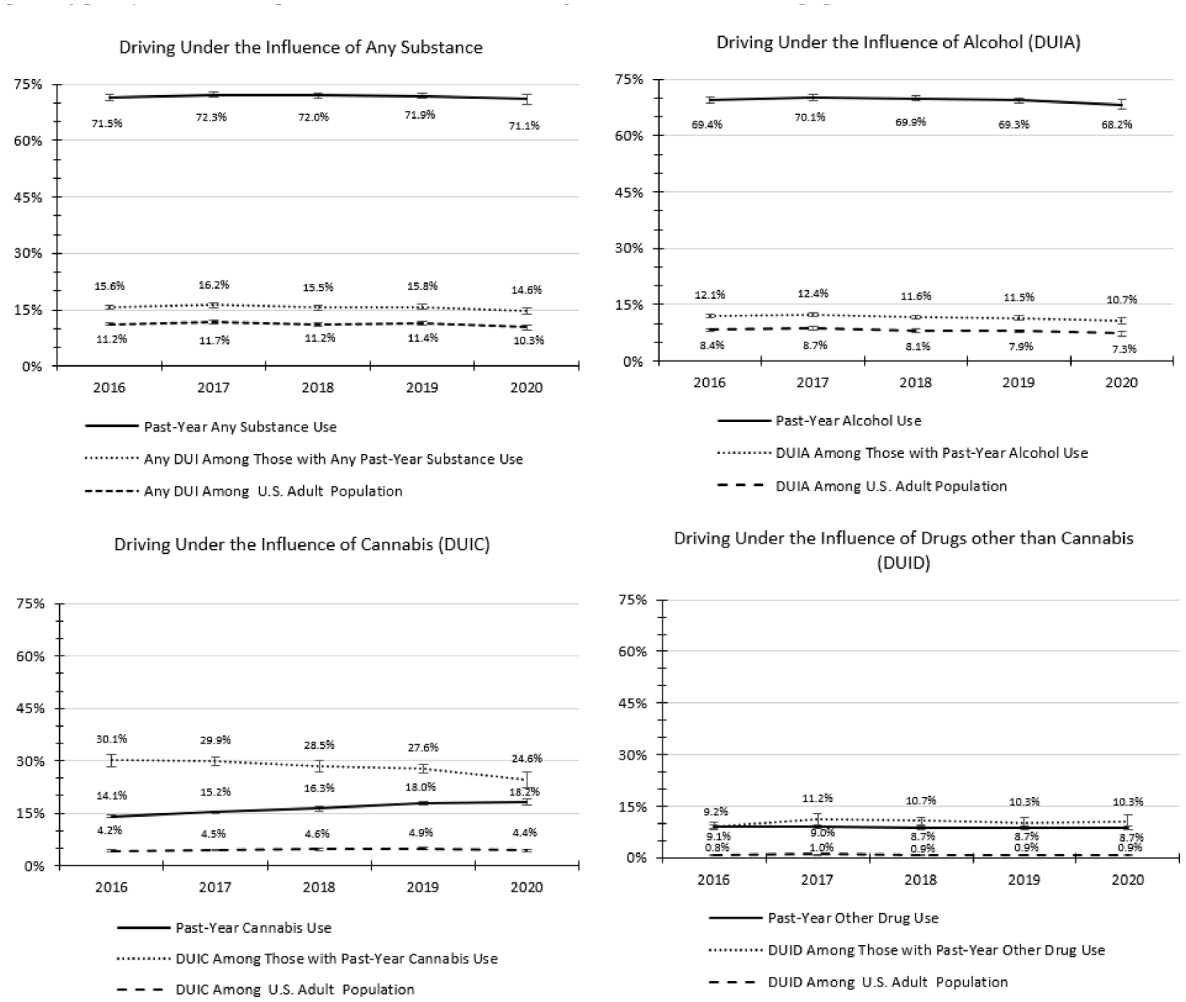

Fig. 1. Prevalences of driving under the influence of any substance, alcohol (DUIA), cannabis (DUIC), and drugs other than cannabis (DUID) among those reporting past-year use of respective substances and among the United States 18 + population. Error bars indicate 95% confidence intervals for each estimate and may be ineligibly small due to large sample sizes.

vary in their interpretation of questions reflecting "under the influence." These limitations may result in under-estimation of DUI rates. To mitigate these biases, NSDUH uses audio and computer assisted self-interviewing (Center for Behavioral Health Statistics and Quality. (2020), 2020). Additionally, changes in NSDUH coding limits comparability to DUI variables collected before 2015, and we are unable to capture impaired driving related to prescription drug misuse in this analysis. Given that publicly available NSDUH data does not allow for state-level analysis, we are unable to further refine state cannabis policies, such as whether or not a policy includes the provision of a medical cannabis marketplace. Methodological changes, including interruptions to sampling procedures and shifts from in-person to web-based data collection, to the 2020 NSDUH due to the COVID-19 pandemic may also present limitations; thus, subsequent years of NSDUH data should be analyzed to examine whether trends change over time. Finally, we were unable to analyze the prevalence of impaired driving due to simultaneous use of substances in this sample. Special attention to the prevalence of this behavior is crucial given that it is common in the US adult population and may lead to greater impairment and injury risk (Gonçalves et al., 2022; Starkey, Charlton, Malthotra, & Ameratunga, 2017). In addition to maintaining timely and updated surveillance of DUI, future work should expand by analyzing simultaneous use of substance-impaired driving.

5. Conclusions

Traffic-related injury is among the most prevalent sources of morbidity and mortality in the US and risk of MVC increases substantially when a driver is impaired. Given recent shifts in substance use policy, and simultaneous increases in substance use behaviors, timely and representative surveillance of impaired driving is necessary for informed public health efforts. This study provides important information regarding the changing patterns of these risky behaviors.

CRediT authorship contribution statement

Matthew G. Myers: Conceptualization, Methodology, Formal analysis, Writing – original draft. **Erin E. Bonar:** Validation, Writing – review & editing. **Kipling M. Bohnert:** Supervision, Conceptualization, Funding acquisition, Validation, 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. This work was funded, in part, by a Veteran's Affairs Health Service Research and Development Investigator-Initiated Research Award (IIR 15-348).

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2023.107614.

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