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Prevalence and Motives for Drugged Driving among Emerging Adults Presenting to an Emergency Department

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Abstract

Objectives—Drugged driving [DD] is a public health concern, particularly among emerging adults who have the highest rates of drug use. Understanding involvement with DD could inform prevention efforts for this population. We evaluated the prevalence of, motives for, and correlates of past-year DD among emerging adults from an urban, under-resourced community.

Methods—Emerging adults (*N*=586) ages 18–25 years (54% male, 56% African American, 34% European American) seeking care in an urban emergency department completed past-year surveys

Contributors

Dr. Bonar designed the study under the primary mentorship of Drs. Walton and Cunningham who contributed to the preparation of the manuscript and scientific content. Dr. Bonar completed analyses of results and wrote the majority of the first draft of the manuscript. Dr. Arterberry assisted in drafting the Introduction and Discussion sections, conducting necessary literature reviews, and adding important scientific content. Dr. Davis assisted in drafting the Method and Results sections and also added relevant scientific content. Drs. Blow and Collins were also involved in overall study design and mentorship and contributed to drafts of this manuscript, including providing critical scientific input. All authors contributed to and have approved the final manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

of demographics, frequency of DD within 4 hours of substance use, reasons for DD, and substance use.

Results—DD was reported by 24% of participants (with 25% of those engaging in high frequency DD). DD after cannabis use was most common (96%), followed by prescription opioids, sedatives, and stimulants (9%–19%). Common reasons for DD were: needing to go home (67%), not thinking drugs affected driving ability (44%), not having to drive far (33%), and not feeling high (32%). Demographics were not associated with DD, but, as expected, those with DD had riskier substance use.

Conclusions—In this clinical sample, using a conservative measure, DD, particularly following cannabis use, was relatively common among emerging adults. Based on these data, clinical interventions for cannabis and other drug use should include content on prevention of DD, with particular attention to motives such as planning ahead for alternatives to get home safely and weighing benefits and risks of DD.

Keywords

impaired driving; emerging adults; drug use

1. Introduction

Driving under the influence of drugs (i.e., drugged driving [DD]) is a growing public health problem, particularly because 16% of fatal motor vehicle crashes are associated with drug use (Centers for Disease Control and Prevention, 2016). Although there is much research on alcohol-impaired driving, less is known about DD. Emerging adults (e.g., ages 18–25 years) are an important population to study regarding DD due to their high rates of drug use. Nationally, in the past year, 38% have used illicit drugs, with cannabis being most frequently used, and 10% reporting DD (Center for Behavioral Health Statistics and Quality, 2016). In regional samples, rates ranged from 15%–53% for driving after cannabis use or non-medical use of prescription drugs (Benotsch et al., 2015; Caldeira, Arria, O'Grady, Vincent, & Wish, 2008; Whitehill, Rivara, & Moreno, 2014). The distinctive role of delta-9-tetrahydrocannabinol (THC; the psychoactive compound in cannabis), the most frequently detected drug in motor vehicle crashes, is difficult to ascertain (National Institute on Drug Abuse, 2017); studies show a connection between THC, delayed responses to road obstacles, and diminished driving performance (Downey et al., 2013; Liguori, Gatto, & Robinson, 1998; Ramaekers, Berghaus, van Laar, & Drummer, 2004). Further, a recent review of experimental studies concluded that benzodiazepines, opioids, cannabis, and other drugs cause negative effects on psychomotor functions implicated in driving (Strand, Gjerde, & Morland, 2016). Understanding factors associated with DD is important considering emerging adults engage in this high-risk behavior despite potentially fatal consequences.

Along with the development of alcohol per se laws (Giesbrecht & Greenfield, 2003), brief interventions for young people show desirable outcomes for reducing alcohol-impaired driving (Steinka-Fry, Tanner-Smith, & Hennessy, 2015), but it is unknown the extent to which such interventions address DD. More data are needed to inform policy and interventions targeting DD in emerging adults, particularly to prevent consequences of

cannabis-impaired driving given increasing potency (ElSohly et al., 2016) and changes in access due to medical and recreational legalization in the US. Motives for DD could be important factors in interventions, but these have not been studied. The emergency department (ED) is a potential clinical setting for interventions with previous studies showing that ED-based brief interventions reduced drug use and consequences (Blow et al., 2017; Woolard et al., 2013). To inform interventions by addressing a gap in the literature about reasons for DD, we assessed the prevalence of and motivations for DD among 18–25 year-olds seeking care in an urban ED and evaluated demographics and substance use correlates of DD.

2. Method

2.1 Procedures

From November 2014 to September 2015, patients aged 18–25 years were recruited from the ED at Hurley Medical Center (HMC), a Level-1 trauma center serving urban Flint, Michigan. As part of recruitment for a longitudinal study (Bonar et al., 2017), participants were identified via ED medical records and provided written informed consent to screen for the study. Exclusion criteria (detailed elsewhere; Bonar et al., 2017) generally included conditions that would preclude informed consent or ED visit involving intensive social work (e.g., sexual assault or suicidal ideation). Compensation was a token gift (e.g., lotion, notepads) for self-administering the computerized 15–20-minute screener. Institutional review boards at HMC and the University of Michigan approved the study. A Certificate of Confidentiality was provided by the National Institutes of Health.

2.2 Participants

We approached 726 patients for screening; 81% (N = 586) participated. Those refusing screening (19%) did not differ from screened participants based on age (t[724] = 1.35, p = 0.18) or gender (χ^2[1] = 0.0, p = .99). Enrolled participants' mean age was 21.7 years (SD = 1.1); 54% were male, 56% were African American, 34% European American, and 10% of other backgrounds. About half (48%) were receiving public assistance. See Table 1 for further demographics.

2.3 Measures

2.3.1 Demographics—Items were adapted from national surveys (Johnston, Bachman, O'Malley, & Schulenberg, 2011; United States Department of Health and Human Services, National Institutes of Health, & National Institute on Drug Abuse, 2008) to assess demographics (e.g., age, sex, race).

2.3.2 Substance Use—Based on the NIDA-Modified Alcohol Smoking and Substance Involvement Screening Test (ASSIST; WHO ASSIST Working Group, 2002), we assessed frequency of past-year use of cannabis, prescription sedatives, stimulants, opioids/pain relievers; cocaine, methamphetamine, street opioids, hallucinogens, and inhalants. We report drug use frequency variables for cannabis and prescription drug misuse using these response options: never, once or twice, monthly, weekly, daily/or almost daily (coded 0 to 4, respectively, for analyses). The remaining five drugs were combined into "Yes" to any

versus “No” due to lower frequency. Tobacco use was assessed dichotomously. The CRAFFT screening tool (Knight et al., 1999) characterized substance use risk in the sample (α = .79) and the AUDIT-C (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998) assessed hazardous drinking (α = .85)

2.3.3. Drugged Driving—Based on drugs assessed in the NIDA-Modified ASSIST, we listed the same nine drugs listed above, followed by an item we developed, “In the past 12 months, how many times did you drive within four hours after using any of the drugs above?” with responses: Never, 1–2 times, 3–5 times, 6–10 times, and 10+ times. Those responding affirmatively were asked: “Think about all the times in the past 12 months you drove within 4 hours after using any drugs. Which drugs did you use in those 4 hours before driving?” Response options included the same nine drugs and participants could check all that applied. We chose the 4-hour window for drugged driving after consumption as a gross measure of potential impairment because the range of substances assessed can differentially impact driving-related functions depending on dose and half-life (e.g., psychomotor effects of cannabis can last up to 8 hours; Neavyn, Blohm, Babu, & Bird, 2014). Based on alcohol-impaired driving research (Basch, DeCicco, & Malfetti, 1989; Kulick & Rosenberg, 2000; Rosenberg, 1988), we developed 16 reasons for DD (Table 2) and asked participants, for the past year, to choose all the reasons they had “decided to drive within 4 hours of using drugs.”

2.4 Data analysis

We used SAS version 9.4 for descriptive statistics, chi-square analyses, and independent samples t-tests to examine associations among past-year DD (collapsed to binary: yes/no), demographics, and substance use characteristics. Among those with DD, we repeated these analyses comparing those with high frequency DD (10+ times) to lower frequency DD.

3. Results

Of the 586 participants surveyed, 24% (n=138) reported past-year DD. Among those 138 who reported past-year DD, the frequency was as follows: 1–2 times = 48%, 3–5 times = 15%, 6–10 times = 12%, and 10+ times (i.e., high frequency DD) = 25%. Among substances used prior to past-year DD, cannabis was most frequent (96%) followed by misuse of prescriptions: opioids (19%), sedatives/sleeping pills (9%), and stimulants (9%). Other drugs were infrequently reported (cocaine = 5%, street opioids = 4%, hallucinogens = 3%, methamphetamine = 1%, inhalants = 0%). Table 1 also displays comparisons between those who reported DD and those who did not. The two groups did not differ on any demographic characteristics assessed: age, gender, race, marital status, current school enrollment, highest education level, public assistance, and having children (ps > .05). As might be expected, compared to those not reporting DD, those reporting any DD had significantly higher use of cannabis and misuse of prescription opioids, sedatives, and stimulants and were more likely to report other drug use, tobacco use, and had higher CRAFFT and AUDIT-C scores. Drug use and CRAFFT scores also distinguished those with higher frequency DD from those with less frequent DD.

Reasons for DD are shown in Table 2. Most participants (65%) selected more than one reason (M = 3.3 reasons, SD = 2.8). The most common reasons for DD were: needing to go home (67%); not thinking drugs had affected driving ability (44%); not having to drive very far (33%); and, not feeling high (32%). The lowest number of participants (3%) endorsed purposefully wanting to take a risk. Only 4% reported that they did not remember the reason for driving due to a blackout. Seven reasons were selected by a significantly higher proportion of those with high frequency DD compared to those with lower frequency DD (Table 2).

4. Discussion

We sought to fill a gap in the literature regarding emerging adults' motivations for DD, which can aid in the development of intervention and prevention programs for clinical settings, such as the ED. Among emerging adults sampled in an urban ED, approximately 1 in 4 reported past-year DD. Second to cannabis, which was used prior to DD among 96% of those reporting DD, misuse of prescription drugs precipitated DD for nearly 20%. The rate of DD was more than twice that reported in national data during a similar time frame (Center for Behavioral Health Statistics and Quality, 2016); differences in measurement, or the increased rates of cannabis use in clinical samples and/or urban communities (Hasin et al., 2015) may account for this discrepancy. Regardless, these findings highlight the need for interventions to prevent DD among emerging adults, particularly those using cannabis. Notably, demographic factors did not distinguish individuals reporting DD. As might be expected, those reporting more frequent and severe substance use were more likely to indicate DD, supporting the integration of DD prevention into substance use interventions.

Participants chose, on average, at least three reasons for DD. They commonly reported DD because they needed to go home, did not have to go far, and because they did not perceive any impairment or think their driving ability would be affected. Without more fine-grained detail on potency, dose, timing of substance use, and co-ingestion with alcohol or other drugs prior to driving, it is unclear whether participants' subjective assessments of lack of impairment were accurate. About one-quarter engaged in DD because driving high was not perceived as being as dangerous as driving drunk. This is consistent with prior research indicating that cannabis is perceived as less risky than alcohol (Lau et al., 2015), general decreasing trends in cannabis risk perceptions (Lipari, 2013), and low risk perceptions of driving after non-medical use of prescription drugs (Benotsch et al., 2015). The 15% of participants who did not think they would get caught for DD were perhaps accurate given that at the time of this study their state of residence did not enforce roadside saliva drug screening. Our findings regarding the perception that DD is low risk could relate to the fact that no guidelines exist for "safe" levels of intoxication or lengths of time to wait prior to driving once cannabis or other drugs are consumed; thus, making it difficult to determine when it is "safe" to drive. Other endorsed motives reflected a perceived necessity to drive (e.g., having an emergency, being relied upon by others for a ride) or convenience (e.g., easier to drive than take the bus).

Discrepancies in traffic studies regarding the effects of drug presence versus drug intoxication can make it difficult to make inferences about the connection between crash risk

and intoxication (Berning & Smither, 2014). Participants' selection of reasons such as convenience, perceived necessity, and their beliefs that driving ability is unaffected by drugs may be a function of these inconsistencies. Studies suggest that drug presence increases the odds of motor vehicle crashes (Berning & Smither, 2014; Compton & Berning, 2009), but drug presence may not equate to impairment and potentially increases the inconsistency in reports of crash risk (Berning & Smither, 2014). This is especially true in the case of cannabis, where inconsistent reports of crash risk based on epidemiological studies versus laboratory studies as well as unclear legal standards regarding impairment continue to burden policy-makers (DuPont, Logan, Shea, Talpins, & Voas, 2011; Huestis, 2015). Note also that our data were collected in a state with legal medical cannabis, but not legal recreational cannabis, and rates of DD could vary across states with different cannabis policies (Salomonsen-Sautel, Min, Sakai, Thurstone, & Hopfer, 2014).

Despite the new information provided by this study, there were limitations. These include reliance on cross-sectional, retrospective, self-report data that may be subject to response biases and inhibit causal interpretations. There is potential limited generalizability to other populations outside urban hospital settings. Further, compared to a national survey (Center for Behavioral Health Statistics and Quality, 2016) querying driving "under the influence" our conservative 4-hour window for assessing DD may have over-estimated *impaired* driving due to variation in how different substances alter motor coordination or reaction time. Knowing that it would be impossible to retrospectively assess impairment (which would be best measured through laboratory and performance-based measures), we chose this 4-hour window to create a gross measure of *possible* impairment from a range of substances that metabolize at different rates. Although limited in some respects, this method improves somewhat upon assessments of driving "after" consumption (Caldeira et al., 2008; Whitehill et al., 2014) and also does not rely on subjective reports of whether the participants were "under the influence." Event-based methods (Stone, Shiffman, Atienza, & Nebeling, 2007) are suggested for future research examining quantity, co-ingestion, and temporal sequencing of substance use, and motivations, with DD. It is also possible that our data underestimate DD given we did have information regarding whether participants had a driver's license or access to a vehicle, which should be considered in future research.

Given the prevalence, interventions addressing DD are a logical next step, and may be delivered in the ED or other settings where high-risk emerging adults present. Although participants reported an average of three motives for DD, interventions should likely be tailored to unique, and possibly situationally-specific, combinations of motives. Several reasons distinguished those reporting more frequent DD (25% of those with DD) compared to less frequent DD. These reasons (e.g., perceiving that DD is not dangerous, not thinking drugs had affected driving ability, needing to leave, or being the designated driver) may be key intervention targets for those with riskier profiles, particularly because these participants also had higher severity scores on the CRAFFT and were more likely to use drugs other than cannabis and prescriptions. Low perceptions of dangerousness and impairment as reasons for DD are important for future investigations with high-risk participants, because they were endorsed more frequently and could reflect unique patterns of drug use that may be more or less risky. In general, psychoeducation in conjunction with motivational approaches (e.g., the motivational interviewing strategy: Elicit-Provide-Elicit; Miller & Rollnick, 2012) targeting

discrepant beliefs surrounding the ways in which drugs can impair reaction time or coordination may be helpful in reducing DD behaviors. Providing resources for and developing planning skills for obtaining safe rides (e.g., mobile transportation apps, public transportation, designating a driver) may also be useful if tailored to individual motivation and access.

The passing of alcohol per se laws (Giesbrecht & Greenfield, 2003) and intervention/prevention efforts have contributed to decreasing the public health impact of alcohol-impaired driving (Steinka-Fry et al., 2015), thus developing similar policies, informed by experimental data on impairment associated with various levels of consumption and/or co-ingestion, along with intervention/prevention programs targeting motives for drug use has the potential to successfully promote the use of protective behaviors that reduce DD among emerging adults.

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Highlights

- Past-year drugged driving was common in emerging adults in an emergency department.
- Cannabis use was most frequent prior to drugged driving.
- The most common reason for drugged driving was needing to go home.
- The second most common reason was not thinking drugs had affected driving ability.

Table 1

Demographics and past-year substance use characteristics for participants reporting drugged driving versus not reporting drugged driving and high frequency drugged driving versus lower frequency drugged driving

	Total Sample N= 586 % (N) or M (SD)	No Drugged Driving N = 448 % (N) or M (SD)	Any Drugged Driving N = 138 % (N) or M (SD)	Lower Frequency Drugged Driving N = 103 % (N) or M (SD)	High Frequency Drugged Driving N = 35 % (N) or M (SD)
Demographics					
Age	21.7 (2.3)	21.6 (2.4)	22.0 (2.2)	22.0 (2.2)	21.8 (2.2)
Male	318 (54.3%)	237 (52.9%)	81 (58.7%)	60 (58.3%)	21 (60.0%)
African American	326 (55.6%)	261 (58.3%)	65 (47.1%)	47 (45.6%)	18 (51.4%)
European American	201 (34.3%)	145 (32.4%)	56 (40.6%)	41 (39.8%)	15 (42.9%)
Other	59 (10.1%)	42 (9.4%)	17 (12.3%)	15 (14.6%)	2 (5.7%)
Married	76 (13.0%)	60 (13.4%)	16 (11.6%)	12 (11.7%)	4 (11.4%)
Currently in school	152 (21.0%)	123 (27.5%)	29 (21.0%)	23 (22.3%)	6 (17.1%)
Highest education					
Less than high school	169 (28.8%)	133 (29.7%)	36 (26.1%)	26 (25.2%)	10 (28.6%)
High school/GED	240 (41.0%)	183 (40.9%)	57 (41.3%)	48 (46.6%)	9 (25.7%)
Some college or more	177 (30.2%)	132 (29.5%)	45 (32.6%)	29 (28.2%)	16 (45.7%)
Public assistance	280 (47.8%)	219 (48.9%)	61 (44.2%)	46 (44.7%)	15 (42.9%)
Has children	265 (45.2%)	206 (46.0%)	59 (42.8%)	45 (43.7%)	14 (40.0%)
Substance Misuse					
Cannabis frequency[a]	1.5 (1.6)	1.0 (1.4)	3.0 (1.3)	2.9 (1.3)	3.3 (1.2)
Prescription opioid frequency[a]	0.2 (0.6)	0.1 (0.4)	0.4 (0.8)	0.3 (0.8)	0.6 (1.1)
Prescription sedative frequency[a]	0.2 (0.6)	0.1 (0.5)	0.4 (0.9)	0.3 (0.8)	0.5 (1.0)
Prescription stimulants frequency[a]	0.2 (0.6)	0.1 (0.4)	0.4 (0.8)	0.3 (0.8)	0.5 (0.9)
Other drug use[a,c]	66 (11.3%)	25 (5.6%)	41 (29.7%)	26 (25.2%)	15 (42.9%)
Tobacco use[a]	321 (54.8%)	217 (48.4%)	104 (75.4%)	75 (72.8%)	29 (82.9%)
CRAFFT score[a,c]	1.6 (1.8)	1.1 (1.5)	3.1 (1.8)	2.9 (1.8)	3.7 (1.9)
AUDIT-C score[b]	2.6 (2.8)	2.2 (2.6)	3.9 (2.8)	3.8 (2.8)	3.9 (3.0)

Note. Drug use frequency variables included response options never, once or twice, monthly, weekly, daily/or almost daily (coded 0 to 4, respectively, for analyses). Other drugs (cocaine, methamphetamine, street opioids, hallucinogens, and inhalants) were combined into yes to any versus no due to lower frequency. For the three prescription drugs, participants were instructed to answer based on misuse, "to get high, or taking them when they were prescribed to someone else, or taking more than what was prescribed to you." Scores ≥2 on the CRAFFT represent high-risk substance use.

[a] $p < .01$ for DD versus no DD

[b] $p < .001$ for DD versus no DD

[c] $p < .05$ for High Frequency DD versus Lower Frequency DD.

Table 2

Reasons for drugged driving based on participants' frequency of drugged driving in the past year

	Total Sample N=138	Lower Frequency DD N=103	High Frequency DD N=35
	% (N)	% (N)	% (N)
Reasons for drugged driving (check all that apply)			
I needed to go home or somewhere else *	67% (92)	61% (63)	83% (29)
I did not think the drugs had affected my ability to drive safely *	44% (61)	39% (40)	60% (21)
I did not have to drive very far	33% (45)	32% (33)	34% (12)
I did not feel high	32% (44)	29% (30)	40% (14)
Driving high does not seem as dangerous as driving drunk **	25% (35)	19% (20)	43% (15)
I did not think driving would be dangerous ***	22% (31)	15% (15)	46% (16)
I was the only one who had a car	20% (28)	18% (19)	26% (9)
Driving was more convenient than walking, taking a bus, or getting another ride **	19% (26)	14% (14)	34% (12)
I did not think I would get caught for driving high *	15% (21)	11% (11)	29% (10)
I was the designated driver *	14% (19)	10% (10)	26% (9)
Others wanted me to drive them somewhere	12% (16)	9% (9)	20% (7)
I had an emergency and had to get there quickly	10% (14)	9% (9)	14% (5)
I had used less than all the other people who could drive	7% (10)	8% (8)	6% (2)
There were not a lot of other people driving at that time of day or night	4% (5)	3% (3)	6% (2)
I don't remember why I drove because I was blacked out	4% (5)	2% (2)	9% (3)
I wanted to take a risk	3% (4)	2% (2)	6% (2)

* $p<.05$,

** $p<.01$,

*** $p<.001$