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Perceptions of Driving after Marijuana Use Compared to Alcohol Use among Rural American Young Adults

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Abstract

Introduction and Aims—Substance use contributes to motor vehicle crashes, the leading cause of death among young adults. The current qualitative study examined perceptions of the acceptability and harms associated with driving after marijuana versus alcohol use in rural America. Illuminating rural perspectives is critical given that the motor vehicle fatality rate is twice as high in rural as in urban areas in the United States.

Design and Methods—In 2015–2016, 72 young adults aged 18–25 years ($M_{\text{age}}=20.2$; 50.7% female) living in Montana, United States, participated in 11 focus groups. A list of descriptive codes was generated inductively and two individuals coded participant comments. Discussion, memoing, and concept mapping were used to uncover broader themes and transcripts were reviewed for evidence of these themes.

Results—There was shared consensus that, with regard to crash risk, driving after marijuana use was safer than driving after alcohol use. While alcohol was thought to impair driving ability universally, marijuana's impacts depended on individual characteristics (e.g., compensatory behaviours) and the marijuana itself (e.g., type). Participants expressed conflicting beliefs about policies surrounding marijuana use and driving but were more knowledgeable about alcohol-related policies. Participants viewed older adults and those in frontier areas as more disapproving of driving after marijuana use.

Discussion and Conclusions—Misinformation about the consequences of driving after marijuana use is common, demonstrating the need for future research and educational interventions. Developing and disseminating guidelines for driving after marijuana use would help marijuana users make informed decisions and mitigate driving-related risks.

Keywords

Cannabis; Driving under the Influence; Alcohol Drinking; Young Adults; Rural Population

Motor vehicle crashes are a primary cause of death among adolescents and young adults in the United States and around the world. These traffic fatalities disproportionately affect rural populations. Even when controlling for the number of miles driven, the motor vehicle

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fatality rate is twice as high in rural areas in the United States compared to that in urban areas [1].

Substance use is a leading cause of motor vehicle fatalities in both rural and urban areas. The role of alcohol in motor vehicle crashes has long been recognised, but there is growing interest in identifying additional substances that impair driving ability. An increasing body of research demonstrates that THC (9-Tetrahydrocannabinol), the primary psychoactive constituent of marijuana, may impact driving ability by impairing cognitive and psychomotor performance. Existing research suggests that marijuana consumption can slow reaction time, impair performance on divided-attention tasks, and increase lane weaving and overcorrecting while driving [2–4]. Meta-analyses of correlational research suggest that marijuana use may increase motor vehicle crash risk and fatalities [5–7], although results are not always consistent [8] and the increase may be small [7]. Simultaneous use of marijuana and alcohol has also been a focus of prior work [9], with some studies suggesting that the substances may additively enhance driving-related impairment [2,3]

Despite the risks associated with driving after marijuana use, the behaviour is common. Young adults have the highest rates of driving after illicit drug use and driving after drinking of any group in the United States [10]. Although driving under the influence of alcohol has declined for young people over the past 10 years in the United States [11,12], rates of driving after marijuana use have remained stable [12] or increased. A national roadside survey found that the percentage of weekend nighttime drivers testing positive for THC increased from 8.6% to 12.6% between 2007 and 2013–2014 [13]. These behavioural shifts have occurred within a societal context in which the perceived risks associated with marijuana use have decreased [14,15], opinions towards the drug have become more favourable [16] and legal availability has increased.

Perceptions of Driving after Marijuana and Alcohol Use

Given the risks associated with substance use and driving, there is a pressing need to understand young people's views about these behaviours. Theories of reasoned action and planned behaviour [17] emphasise attitudes and perceived norms as predictors of engagement in health-related behaviour. In line with these frameworks, research has demonstrated that individuals who perceive marijuana use as more dangerous [18–20] and as increasing crash risk [21,22] are less likely to drive after marijuana use, whereas users who believe their driving ability is not impaired by marijuana are more likely to drive frequently after using the drug [23]. Young people are also more likely to drive after using marijuana if they perceive that their peers accept the behaviour [18–20], further emphasizing perceptions and norms as useful predictors of behaviours.

A handful of studies have compared young adults' perceptions of driving after marijuana and alcohol use. Danton et al. [24] conducted a qualitative study with young adults in the United Kingdom and identified a general cultural unwillingness to drink and drive; however, this same cultural antipathy was not expressed towards marijuana use and driving [24]. Similarly, studies of Canadian and Australian marijuana users found that the clear majority of participants agreed that intoxication from alcohol increased risk for a crash more than

intoxication from marijuana [22,23]. A recent study with users of high-potency marijuana (i.e., extracts) explored perceptions of risks associated with driving after marijuana use; some participants described the behaviour as less risky than driving after alcohol use, whereas others thought that the substances were equally harmful in terms of crash risk [25]. In a survey of students at a US university, McCarthy et al. [20] found that respondents perceived marijuana use and driving to have fewer negative consequences and be more accepted by peers than alcohol use and driving [20].

These studies demonstrate that in several Western countries, young people consider driving after marijuana use to be less risky than drinking and driving. The current qualitative study fills a gap in this literature by incorporating the voices of rural young people, a group with high rates of motor vehicle fatalities. Although quantitative research dominates the field of substance use and driving, qualitative studies complement these approaches by uncovering the cognitions, values, and beliefs underlying behaviours and actions [26]. The current study gleans “rich description” from young adults living in small towns and sparsely populated frontier areas in rural America, recognizing that these young people may have unique beliefs surrounding driving after substance use as well as access to services (such as public transportation).

Study Context

The current study explores how young people in the rural U.S. state of Montana perceived the acceptability of and harms associated with driving after marijuana use versus driving after alcohol use. This context is relevant given that the United States has a substantially higher motor vehicle fatality rate (10.6 per 100,000 people) than many other comparable countries such as Australia, Canada, and the United Kingdom (5.4, 6.0, and 2.9, respectively) [27]. Montana’s motor vehicle fatality rate is more than twice as high as the US average (21.7 per 100,000 people) [28].

Medical marijuana use was legalised in Montana in 2004. However, adult recreational marijuana use remains illegal, despite being allowed in a handful of US states. Further, Montana law explicitly prohibits drivers with blood THC concentrations above 5 ng/ml from operating a vehicle. Alcohol can be consumed legally at age 21 years in the United States, and driving with a blood alcohol content (BAC) over .08 is unlawful. The BAC threshold for underage individuals in Montana is .02. Because driving under the influence occurs when drugs or alcohol “diminish” a person’s ability to safely operate a vehicle, a driver could, hypothetically, receive a DUI even if his or her blood levels had not reached the illegal threshold (i.e., .08 for alcohol and 5 ng for THC).

Method

Participants and Procedure

Semi-structured focus groups were chosen to elicit discussions and illuminate contrasting opinions associated with driving after substance use among rural young adults. Eligible individuals were between 18 and 25 years of age and resided in a nonmetropolitan county in Montana (i.e., no population cluster >50,000 people). Effort was made to conduct focus

groups in both frontier counties (i.e., counties with <6 persons per square mile, $n=6$ focus groups) and rural, non-frontier counties (i.e., counties with ≥ 6 persons per square mile, $n=5$ focus groups). Participants were recruited with the help of interested community members, flyers, and the social media website Facebook.

A total of 72 young adults participated in 11 focus groups ($M_{\text{group size}}=6.5$, $SD=2.6$) between August 2015 and July 2016. The sample averaged 20.2 ($SD=2.1$) years of age, and both genders were equally represented (50.7% female). In terms of educational attainment, 15.5% reported no degree, 74.7% had a high school diploma, and 9.9% had a four-year university degree. Many participants (63.4%) were enrolled in university and self-identified as non-Hispanic white (91.6%), reflecting the demographics of the sampled counties ($M=91\%$ white in 2010) [29]. Almost half (42.3%) of respondents drove over 50 miles in a typical week. In addition, most participants (94.4%) had consumed alcohol in their lifetime. Personal history of marijuana use was not queried because of concerns about alienating respondents.

One facilitator led the focus groups, which occurred in diverse meeting spaces (e.g., public meeting rooms in local government offices, universities, libraries, etc.). Focus groups began with establishing ground rules (e.g., all opinions are valued and opposing viewpoints are welcome). Questions about driving after alcohol use were followed by three items asking participants to compare the behaviour with driving after marijuana use in terms of perceived acceptability, prevalence, and harms. As in prior work [24,30], participants responded about *young people their age* (e.g., “Do people your age think driving after using marijuana is more or less dangerous than driving after drinking alcohol?”). Focus groups averaged 1 hr 18 min ($SD=11.7$ min) and participants received US \$20 compensation. During the first 7 focus groups, a research assistant managed logistics (e.g., food set-up); the moderator assumed these tasks in subsequent groups. Study protocols were approved by the university’s Institutional Review Board. Data collection continued until a point of saturation had been reached [31].

Analytical Plan

Analysis began during data collection [31]. Audio recordings were transcribed verbatim; transcripts were subsequently deidentified. After each focus group, the facilitator and research assistant(s) met to debrief. If a research assistant was not present at the focus group, she listened to the recording and the team then debriefed, discussing salient comments, challenges, and similarities or differences from previous focus groups. Additionally, the facilitator used memoing to record ideas and thoughts during the research process. The goal was to assume theoretical naïveté and listen to the words of rural young adults without imposing a particular theoretical framework on the data. Information gleaned from debriefing sessions, combined with notes and memos, guided the creation of an initial list of 20 descriptive codes that captured the topics discussed by participants [32]. After coding two discussions as a team, two coders went through the remaining nine transcripts independently to code each participant comment [32] using NVIVO version 11. Discrepancies were resolved through dialogue. Subsequently, concept mapping was used as a tool to understand relationships between codes and facilitate the emergence of broader themes. After themes

were identified, two independent coders again reviewed all of the transcripts. During this review, coders documented when a transcript provided evidence of a particular theme. Any discrepancies in the presence or absence of a theme were resolved through discussion and consensus.

Results

At the heart of the 11 focus group discussions were comments about the physical and legal consequences of driving after substance use. Driving after marijuana use was perceived as less dangerous than driving after alcohol use. However, participants believed that marijuana had the potential to impair or improve driving ability. Participants also provided “rich description” of their thoughts about the intersection of drug testing, legality, and perceived consequences. Finally, driving after marijuana use was perceived as more acceptable than driving after drinking alcohol overall, but participants noted that approval depended on age and degree of rurality.

Marijuana Use and Perceived Driving-Related Risks

Participants expressed confidence that consuming marijuana prior to driving was much safer than consuming alcohol. Although some noted that using marijuana could result in minor impairment, there was a consensus that driving after marijuana use was relatively benign with regard to crash risk. One male participant summed up this sentiment: “Alcohol destroys lives and families. Marijuana’s a plant” [Male, FG 9]. This theme was endorsed unanimously: The belief that marijuana was less harmful than alcohol was voiced in all 11 groups.

Whereas alcohol was viewed as universally impairing, beliefs about marijuana’s impacts on driving were less straightforward. According to young adults in 9 focus groups, the degree to which marijuana impaired or improved driving ability depended on individual characteristics (i.e., tolerance and compensatory behaviours) and characteristics of the occasion and marijuana itself (i.e., the type and amount of marijuana consumed and other drug use). In terms of individual factors, some respondents accurately highlighted the concept of tolerance, noting that the driving behaviours of frequent users would be less impaired than those of occasional marijuana users. Compensatory behaviours such as driving at or below the speed limit, staying within the lines, and being focused and cautious were also frequently discussed as these behaviours were thought to negate any minor impairments in driving ability. One participant explained, “Somebody was describing smoking [marijuana] and driving as driving safe... because they’re so concerned about every little thing that they do... So, super-focused and trying to drive exactly on the speed limit or something” [Male, FG 2]. By employing these driving behaviours, the motor vehicle crash risk was presumed to be equivalent or even *lower* on occasions when marijuana was consumed compared to alcohol or drug-free occasions. The idea that marijuana could improve driving ability was expressed in 5 focus groups.

Characteristics of the marijuana itself and the quantity consumed were also thought to impact driving ability. Driving under the influence of certain types of marijuana was

considered beneficial by participants (e.g., “those that wake you up”), whereas other types were detrimental. This sentiment was clear in the following statement:

The plants are bred for specific purposes. You could buy something that will put you to sleep, or you could buy something that would be for socializing, and depending on how that makes you feel would depend on what type of driver that makes you. [Male, FG 1]

The implication was that young adults needed to be aware of the *type* of high they would get from the drug to understand how the drug would impact their driving ability.

Participants also viewed the quantity of marijuana consumed to be an important factor, hypothesizing that impairment would increase in tandem with consumption. Interestingly, participants noted that assessing marijuana-related impairment was difficult. Young adults noted that estimating the amount of marijuana consumed on a particular occasion and associated cognitive and motor impairment was challenging. As one female participant noted,

Another tricky piece is that... it [marijuana] is not really measured.... You would take a couple of hits or whatever – it’s not like I had this many ounces.... No one knows.... Either you’re baked or kind of baked or you’re not, and there’s no real numbers that go along with that. [Female, FG 8]

Due to variation in the strength of the drug and the intensity of a “hit,” participants felt that they could not merely assign a number (of hits, drags, etc.) to quantify their consumption and impairment in a straightforward manner. For alcohol, this was perceived as less challenging: Young adults described counting their drinks to gauge their ability to drive safely.

A third factor that participants viewed as contributing to the variable impacts of marijuana on driving was the presence of other substances. The topic of combining marijuana and alcohol was discussed in 3 of the 11 focus groups. It was notable that—despite a general perception by many that marijuana had minimal impacts on driving—marijuana and alcohol use together were viewed as particularly dangerous. The words “twisted” and “cross-faded” were used to identify this joint substance use, and participants noted that combining the drugs “messes you up more” and results in especially poor driving ability.

Finally, when queried about the harms associated with driving after marijuana use, young adults in 5 focus groups expressed doubt about their knowledge on the topic. As one young adult noted: “I feel like there’s an information or research gap or something. I don’t know anything about what the effects of marijuana use on driving are... and I don’t think I’m alone” [Female, FG 6]. Participants had long received messages about the cognitive, motor, and legal consequences associated with drinking and driving, but they freely discussed how little they knew about marijuana. One noted, “I feel like people our age aren’t really... as educated about the marijuana and driving. I mean, I personally know I’m not.... But drinking and driving is something that everybody knows about, and everybody talks about, and everybody says, ‘Don’t do this’” [Male, FG 4]. Participants reported receiving little to no information about driving after marijuana use from parents, school teachers, or media

campaigns. Conversations about marijuana were rare. If they did occur, they were vague (e.g., “don’t do drugs”) and disconnected from driving. In contrast, drinking and driving were viewed as two intertwined behaviours that merited discussion jointly.

Driving after Marijuana Use and Perceived Legal Consequences

In addition to comparing the physical risks, participants in 5 focus groups contemplated legal repercussions associated with driving after marijuana versus alcohol use. Participants confidently explained that a breathalyser could be used to test for alcohol intoxication. However, they expressed conflicting views about how marijuana consumption and impairment are assessed. For instance, one participant opined, “It’s pretty hard to prove if someone’s high or not. There’s not, like, a field sobriety test for that” [Female, FG 2]. Participants disagreed about issues of drug testing, with some suggesting that there was no way to test for impairment due to marijuana whereas others suggested that there existed a cheek swab or blood test. The perceived lack of a straightforward impairment test, combined with the perception that marijuana testing was uncommon, indicated to some that the risk of legal consequences for marijuana use and driving was quite low. One participant said, “People don’t feel like they’re going to get caught as easily if they smoke pot and drive ’cause they can’t get breathalysed and they don’t make you pee in a cup or anything right there... so people think they can get away with it” [Male, FG 8].

Relatedly, participants interpreted the increasingly lenient marijuana laws in the United States as an indicator of the drug’s safety. Although participants admitted that they were not sure about laws surrounding driving after marijuana use, one inferred that marijuana’s legalisation for adult recreational use in some US states demonstrated that “obviously there’s been some type of research or knowledge or education.” She went on to say that “it [marijuana] would not be legal if it was not okay” [Female, FG 11]. Indeed, in one focus group, there was a discussion about how some designated drivers would substitute illegal drugs (including marijuana and prescription pills) in place of alcohol to “be safe” and not get caught driving under the influence.

Driving after Marijuana Use and Perceived Acceptability

Because of the minimal perceived harms associated with marijuana use, participants generally agreed that driving after marijuana use was more accepted than driving after alcohol use. However, participants noted that approval differed by age and degree of rurality. In terms of age, there was a perception that views towards marijuana were changing in rural areas, with young adults having more favourable opinions than older adults. One respondent said,

...It’s a generation thing. I would say for younger people driving under the influence of marijuana is way more acceptable than the older generation ’cause the older generation isn’t really into it. They’ve always just had alcohol or have been driving drunk. [Female, FG 8]

Older adults were thought to hold more conservative and negative views towards marijuana use, while tolerating drinking and driving.

Likewise, there was a perception that location rurality shaped views towards driving after marijuana use. Participants who had lived in multiple rural locations noted a persistent stigma associated with marijuana use in very rural frontier areas that was not present in towns. People in frontier areas were thought to hold more traditional views that stigmatised the use of drugs (and driving) but not alcohol. One participant who grew up in a frontier area but moved to a small town described this: “I think it [marijuana] is more frowned upon—people freak out more about it... in my hometown compared to here.” She described where she grew up as an explanation for this divergent opinion: “It’s a ranching community—old-time ranchers and farmers. That’s where I grew up. So it’s a different outlook on things, I guess” [Female, FG 6]. Another participant noted that “people judge you more” for marijuana use in more rural areas. This sentiment was echoed by a male participant who noted that driving after drinking alcohol was more accepted than driving after marijuana use where he grew up in frontier Montana, but “the reverse” was true in the small cities in which he had lived. Thus, although young adults agreed that driving after marijuana use was more accepted than alcohol, they noted that certain populations disputed this view. Older adults and residents in sparsely populated areas were perceived to disagree with this consensus and possess more favourable views towards driving after drinking alcohol.

Discussion

The current study contributes to the literature by documenting beliefs and perceptions about marijuana use, alcohol use, and driving. Through a series of 11 focus groups, the results demonstrated that young adults viewed driving after marijuana use as less dangerous than driving after alcohol use. These findings are in line with prior quantitative studies on perceptions [19,21]. Importantly, the qualitative approach used in the current study advanced prior research by uncovering participants’ beliefs about the conditions under which marijuana purportedly improves or impairs driving as well as participants’ understanding of the acceptability and legality of the behaviour.

Previous research has linked marijuana use and driving-related impairment [2–4,9](4–6), and the results from the current study indicate that many young people recognise that marijuana can interfere with the operation of a motor vehicle. Some participants also mentioned the dangerous driving consequences that could occur if alcohol and marijuana were used simultaneously prior to driving, in line with research on the topic [32]. Yet participants expressed varied opinions on whether marijuana increased crash risk. Some participants described the persistent—and concerning—opinion that marijuana use improves driving ability. Other participants described how compensatory behaviours could be used to mitigate crash risk. Some previous research has documented slower driving speeds and increased following distances among individuals administered THC [2], suggesting that some marijuana users may engage in these compensatory behaviours.

The inconsistent beliefs about the harms associated with driving after marijuana use make it clear that there is a pressing need for research and dissemination efforts on the topic. As research progresses, considering how young adults quantify marijuana-related impairment will be critical. In all but one of the groups in the current study, young adults mentioned counting alcoholic drinks to determine whether they could drive safely. If science-based

recommendations associating particular THC amounts or number of “hits” with impairment could be developed and disseminated, young adults could use this information to assess their risk and make decisions about whether to delay driving. Unfortunately, determining recommendations is challenging as there is no direct correlation between blood THC levels and impairment; much more research is needed about the topic [33–35]. Instead, impairment depends on variation in several factors including the drug (e.g., potency, strain) and between-person factors (e.g., frequency of use), complicating recommendations. Nonetheless, young people desire research on the topic and it is therefore important that the scientific community share research with young people (even if it is complicated).

Contradictory and factually inaccurate statements posited by participants also make it clear that young adults are confused about the laws governing driving under the influence of marijuana and the ability of law enforcement officers to test for drug impairment. Whereas the .08 BAC limit was common knowledge and frequently discussed in focus groups, the legal limit for marijuana was never mentioned. Given the substantial across-state variation in legal policies and the absence of a reliable and valid test for identifying marijuana-related driving impairment, it is not surprising that young adults are confused. Existing laws that posit particular THC levels as indicating that people are “under the influence” of marijuana (e.g., 5ng/ml in the state of Montana) are not based on current scientific knowledge [33]. Nonetheless, addressing research gaps and creating science-based policies is especially urgent as more states move to legalise marijuana and these policy changes are interpreted by young adults as proof of marijuana’s safety.

Results from the current study further demonstrate that rural residents hold diverse opinions about whether driving after marijuana use is accepted. Participants articulated the shared belief that young adults had more favourable views towards driving after marijuana use than older adults, findings that are in line with US national data [15]. Furthermore, perceptions of driving after substance use depended on the rurality of the area. Young adults perceived a cultural aversion towards driving after alcohol (but not marijuana) in small towns. However, the reverse was true in very rural frontier areas: In these areas it was marijuana that was stigmatizing. These findings remind researchers and practitioners that rural adults are not a homogeneous group but hold heterogeneous and often contradictory views. Yet studies that aggregate all rural residents into a single category would not distinguish the views of hard-to-reach adults in frontier areas.

The results of the current study should be interpreted considering its limitations. Participants came from a single state and a convenience sampling method was used. In addition, the very rural nature of some of the group locations (i.e., town populations <1,000 and young adult populations <50 people) made it infeasible to stratify by demographic characteristics (e.g., age or gender). Furthermore, because of concerns about confidentiality and stigma, we did not ask participants about their own marijuana use history. Although some participants volunteered this information, others did not.

Continuing research is needed to understand how young people perceive the risks and the benefits of using different substances prior to driving. The current study highlights the contrasting beliefs held by many young adults. Understanding the source of beliefs about

marijuana use and driving will be an important avenue for future research. The current results also documented the salience of compensatory behaviours to young adults. Future research could explore the various protective strategies (e.g., waiting a certain amount of time before driving or driving slowly) that young adult marijuana users employ to mitigate their driving-related risks. Exploring the actual and perceived impact of the marijuana strain on driving ability as well as the sources of strain-related beliefs is another fruitful area for future research. In general, understanding how characteristics of participants' location (i.e., culture and place factors) intersect with individual factors such as age and gender will be important areas for research.

As medical and recreational marijuana use increase in the United States, uncovering individual perceptions and beliefs surrounding drug-impaired driving becomes ever more critical. The current study illuminated the beliefs about driving after marijuana versus alcohol use among rural young adults, a population at high risk for motor vehicle fatalities. Despite recreational marijuana use being illegal in the state, participants believed that the behaviour was common and driving after marijuana use was relatively benign with regard to crash risk. These findings highlight a need for coordinated research, education, and dissemination efforts related to driving under the influence of alcohol or drugs. Some of these efforts are currently underway in Montana, where reducing impaired driving is a priority; the state recently received funding to train officers to detect and evaluate drug impairment [36]. The current study suggests that additional dissemination efforts are needed to improve young people's understanding of existing policies, correct misinformation about driving after marijuana use, and discourage driving after substance use. Furthermore, additional research is needed so that young people who use marijuana—whether legally or illegally—understand their risks and can engage in harm-reduction strategies to reduce their chances of serious motor vehicle injuries or fatalities.

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