
INTRODUCTION

Marijuana legal reform in the United States is rapidly evolving (Cumpston et al., 2017). As of 2017, 29 states and the District of Columbia have legalized marijuana for recreational or medical purposes (Hemeny et al., 2016). One public health concern about reform is the risk of operating a vehicle under the influence of marijuana (Arterberry et al., 2013). Epidemiological and laboratory studies indicate that marijuana use compromises psychomotor function and increases the risk of vehicle accidents (Rigby et al., 2016; Sewell et al., 2008). At the behavioral level, marijuana use impairs hand-eye coordination, reaction time, divided and sustained attention, tracking, and memory recall (Ramsay et al., 2005). While at the population level, the risk for vehicular accidents is more than doubled for current marijuana users, drivers who tested positive for marijuana, and drivers who reported using marijuana 3 hours or less prior to driving (Li et al., 2016).

In light of legislation, a number of states have passed marijuana-related driving laws (Figure 1). Nonetheless, further investigation into the role marijuana plays in driving performance and accident risk is needed, as there are inconsistencies among previous studies, and their generalizability is limited (Sewell et al., 2008). Our study is a continuation of previous work done by Terry-McElrath et al., 2014. Here we report frequencies of unsafe driving behaviors after alcohol, marijuana, and other drug use from years 2011 to 2015. Additionally, our study investigates associations between unsafe driving and substance use harm perceptions.

Figure 1. Marijuana driving laws by state

METHODS

Driving laws

• No laws limiting THC content in marijuana
• Per se THC content
• Legal THC content
• THC test used to determine if driver is under influence
• THC limit can result in a driving violation
• THC limit can result in a DUI

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The data analyzed are from the Monitoring the Future (MFT) Study. Since 1975, the University of Michigan has surveyed nationally representative samples of U.S. middle school and high school students. Multistage sampling procedures are used to identify and select schools to administer confidential questionnaires during regular school hours (O’Malley et al., 2013). For a detailed description of the survey methodology, refer to Johnston et al., 2016.Unsafe driving behaviors were operationalized as reporting a vehicle accident after using alcohol, marijuana, or other drugs within the past 12 months, and driving or riding in a vehicle within the past 2 weeks after the driver had been using alcohol, marijuana, or other drugs. Harm perceptions of regular substance use were categorized as (1) no risk (0), slight risk, (2) moderate risk, and (3) high (great risk). We reported weighted frequencies on unsafe driving behaviors and conducted a logistic regression to examine the relationship between substance use harm perceptions and unsafe driving behaviors on our sample of mostly female (50.4%) and white (67.3%) high school seniors.

RESULTS

Figure 2. Percentage of high school seniors who rode or drove after using a substance from 2011 to 2015

Figure 3. Percentage of high school seniors who reported an accident after using a substance from 2011 to 2015

CONCLUSIONS

Despite the existing literature describing the effects marijuana use may have on driving performance after drinking (Shelley et al., 2004; Rigby et al., 2016; Sewell et al., 2008) and driving related outcomes (Li et al., 2012), there is no clear understanding of the consequences of reform.

Marijuana laws have been legalizing marijuana in recent years, the percentage of high school seniors reporting unsafe driving behaviors after using marijuana has remained relatively stable from years 2011 to 2015 (Figure 2).

While more states have been legalizing marijuana in recent years, the percentage of high school seniors reporting unsafe driving behaviors after using marijuana has remained relatively stable from years 2011 to 2015 (Figure 2).

In 2011, 23.0% of seniors reported driving after using marijuana or riding in a vehicle after the driver used marijuana, while in 2015, 20.9% of seniors reported driving or riding high (Figure 2). Fewer than 5% of seniors reported accident after using marijuana (Figure 3). Those who have a low harm perception of regular marijuana use are almost five times more likely to report driving a vehicle after using marijuana or riding in a vehicle after the driver used marijuana than those who have a high harm perception of regular marijuana use (Table 1).

Limitations

• The small number of cases that reported accidents after substance use limited our analysis plan.
• The cross-sectional nature of the data prohibits any causal interpretation of our results.
• Our sample was of high school seniors and therefore limits generalizability to the whole U.S. population.
• Due to the sensitive nature of the questionnaire items, reporting bias may have occurred.

Implications for Future Research

Further investigation into the role marijuana use and perceptions have on driving performance and accident risk is needed (Sewell, 2005). Qualitative development and design is needed to standardize marijuana measures and behavioral outcomes.

• Comprehensive and systematic surveillance is needed to better understand population behavior changes over the course of marijuana legislation.

Table 1. Associations between substance use harm perception and driving or riding while high among U.S. high school seniors, 2011-2015

<table>
<thead>
<tr>
<th>Substance Use</th>
<th>Low Harm Perception (%)</th>
<th>Moderate Harm Perception (%)</th>
<th>High Harm Perception (%)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>20.6 (18.4, 22.8)</td>
<td>21.8 (19.5, 24.1)</td>
<td>23.6 (21.3, 26.0)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
<tr>
<td>Marijuana</td>
<td>12.1 (10.3, 14.0)</td>
<td>13.3 (11.0, 15.5)</td>
<td>14.7 (12.1, 17.5)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
<tr>
<td>Other Drugs</td>
<td>15.7 (13.2, 18.3)</td>
<td>16.7 (14.0, 19.5)</td>
<td>18.3 (15.1, 21.8)</td>
<td>1.0 (1.0, 1.0)</td>
</tr>
</tbody>
</table>

AUTHORS

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