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Driving Under the Influence of Alcohol and Marijuana: Beliefs and Behaviors, United States, 2013-2015

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Title

Driving Under the Influence of Alcohol and Marijuana: Beliefs and Behaviors, United States, 2013-2015. (*May 2016*)

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About the Sponsor

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Executive Summary

The purpose of this study was to provide estimates of the prevalence of self-reported use and driving under the influence of alcohol and marijuana, and related perceptions and beliefs among drivers 18 and older in the United States, and to present an analysis of changes in these behaviors between 2013 and 2015. The data analyzed were collected via nationally-representative surveys administered during this period.

From 2013-2015, an estimated 14.0 percent of drivers drove with a BAC close to or over the legal limit in the past year, and 4.6 percent drove within an hour of using marijuana. Drivers are divided with regard to their perceptions of the effect of using marijuana an hour prior to driving on one's risk of causing a crash: 58.3 percent believe this risk is increased, 6.2 percent believe it is not affected, 3.6 percent believe it is decreased, and 31.8 percent indicated that they do not know how using marijuana an hour before driving affects crash risk. Drivers who reported using marijuana, and those who reported driving within an hour of use in the past year were less likely to believe that using marijuana increases crash risk, and more likely to believe that such use does not affect or decreases crash risk. Awareness of *per se* DUI laws for marijuana was low: in states that did have a *per se* law, only 48.5 percent were aware of it; in states without a *per se* law, 44.7 percent indicated incorrectly that their state had such a law. Irrespective of whether their state actually had a *per se* law for marijuana, more than half of all drivers reported that they did not know whether or not their state had such a law.

Methods

The data reported here were collected as part of the AAA Foundation's 2013-2015 *Traffic Safety Culture Index (TSCI)* surveys. The TSCI is an annual survey administered online to a sample of U.S. residents ages 16 years and older who were enrolled in a research panel recruited by research firm GfK using random-digit dial and address based sampling methods and designed to be representative of the United States population. The methodology of the TSCI is described in detail in AAA Foundation for Traffic Safety (2014, 2015, 2016); the design of the panel from which the sample was drawn is described in detail in GfK (2013).

The TSCI includes a core series of questions pertaining to the respondent's attitudes about traffic safety, perceptions of social norms, and self-reported driving behavior. Relevant to the current study, the core survey includes questions regarding respondents' frequency of drinking alcohol and using marijuana, and questions about the respondents' driving under the influence of alcohol and/or marijuana. The survey also includes questions regarding related beliefs and perceptions, and support for countermeasures designed to address alcohol- and marijuana-involved driving. Survey questions analyzed in this study included:

- *"How often do you consume beer, wine, liquor, or other drinks containing alcohol?"* (Responses: *a few times a week, a few times a month, one or two times a month, less than once a month, never*).

For the purpose of this study, respondents who reported that they drank alcohol at all (more often than "never") were classified as drinkers.

- *"In the past year, how often have you used marijuana?"* (*a few times a week, a few times a month, less than once a month, just once, never*).

Those who reported that they used marijuana at least once in the past year were categorized as users of marijuana.

- *"In the past year, how often have you driven..."*
 - *"when you thought your alcohol level might have been close to or possibly over the legal limit?"*
 - *"within 1 hour of using marijuana?"*
 - *"within one hour of consuming both marijuana and alcohol, even if you weren't drunk?"*

Response options were: *regularly, fairly often, rarely, just once, never*.

- *"In the state where you live, is it against the law for the driver to have more than a certain amount of marijuana in their system?"* (*yes, no, I don't know*).

States were coded as having a law that makes it illegal *per se* (in itself) to drive with a certain amount of marijuana in one's system, if such a law was in effect prior to each survey administration. Arizona, Delaware, Georgia, Illinois, Indiana, Iowa, Michigan, Nevada, Ohio, Pennsylvania, Rhode Island, Utah, Washington, and Wisconsin had *per se* laws for marijuana in effect for the entire study period.

Montana and Oklahoma had *per se* laws for marijuana become effective during the 2013 survey, thus, responses from respondents in these states were excluded in 2013 but coded as having a *per se* law in 2014 and 2015. Responses from respondents in North Carolina and South Dakota were excluded because they had *per se* laws only applicable to drivers under age 21. Responses from respondents in Colorado were excluded because the state has a specified threshold for impairment from marijuana but is not technically a *per se* law (Colo. Rev. Stat. Ann. § 42-4-1301 (6)). All other states were coded as not having a *per se* law for marijuana.

- *“In general, how do you think using marijuana one hour before driving affects a person’s driving?” (it makes them much more likely to cause an accident, it makes them somewhat more likely to cause an accident, it does not affect their driving, it makes them somewhat less likely to cause an accident, it makes them much less likely to cause an accident, I don’t know).*
- *“In the United States, the legal limit for a driver’s blood alcohol concentration (a measure of the amount of alcohol in a person’s blood) is 0.08 grams of alcohol per deciliter of blood. In Australia, France, Italy, Spain, and several other countries, the limit is 0.05. How strongly do you support or oppose lowering the limit in the United States from 0.08 to 0.05?” (support strongly, support somewhat, oppose somewhat, oppose strongly).*
- *“How strongly do you support or oppose having a law making it illegal to drive with more than a certain amount of marijuana in your system?” (support strongly, support somewhat, oppose somewhat, oppose strongly).*
- *“How acceptable do you, personally, feel it is for a driver to...?”*
 - *“Drive when they think they may have had too much to drink”*
 - *“Drive one hour after using marijuana”*
 - *“Drive after using both marijuana and alcohol”**Response options were: completely acceptable, somewhat acceptable, somewhat unacceptable, and completely unacceptable.*

This study is based on data from respondents age 18 and older who reported that they had driven at least once in the 30 days before they completed the questionnaire. Some questions related to marijuana use and driving were not included in the 2014 TSCI. The AAA Foundation conducted another supplemental survey in 2014 using the same sample design which included these questions (hereafter referred to as *2014 supplement*). Questions about alcohol use and driving were included in the supplement so that responses to the questions about marijuana use and driving could be analyzed in relation to alcohol use. Unless otherwise noted, analyses are based on data from 6,612 respondents from the 2013 TSCI, 2014 supplement, and 2015 TSCI surveys. Estimated proportions of drivers with responses of interest for each item analyzed were tabulated in relation to driver demographic and other characteristics, as well as by year. Linear regression analyses were performed to test for trends by year across the study period. All analyses were performed on weighted data, all reported statistics (except sample size) are based on weighted data, and all analyses excluded non-responses.

The margin of error varies by question depending on the number of respondents that answered the question and the distribution of responses. The margin of error is larger in this survey than it would have been for a simple random sample of the same size due to the design of the panel from which the sample was drawn and stratification by Census Division. The approximate margin of error for statistics derived from all respondents from the 2013 TSCI, 2014 supplement, and 2015 TSCI is plus or minus 0.8, 1.1, 1.3, 1.4, and 1.4 percentage points for percentages near 90 or 10, 80 or 20, 70 or 30, 60 or 40, and 50, respectively; the margin of error is larger for items asked of only a subset of respondents. The margin of error reflects a range of percentages that would be expected to include the result that would be obtained if the survey were administered to the entire population from which the sample was drawn, rather than to a sample, 19 times out of 20. Note that the margin of error reflects only the statistical variability associated with using the survey sample to draw inferences about the entire population. It does not reflect errors related to systematic non-coverage of certain segments of the population (e.g., people who cannot read in English nor in Spanish), non-response (i.e., eligible respondents who either cannot be contacted or refuse to participate), differences in respondents' understanding of survey questions or response options, or deliberate misreporting of information (e.g., underreporting of behaviors that may be perceived as undesirable).

Results

Alcohol and marijuana use

Nearly two in three drivers (66.3%) reported that they drink alcohol at least occasionally; this percentage was relatively stable over the study period (Appendix

Table 1). One in ten drivers (10.0%) reported having used marijuana at least once in the past year; there was some year-to-year fluctuation in this percentage, but no evidence of a trend. Drivers ages 25-39 and those ages 40-59 were the most likely to report alcohol use, while those ages 18-24 were the most likely to report using marijuana at least once in the past year (21.0%). Male drivers were more likely than female drivers to report using alcohol and marijuana (both $p < 0.001$). There was significant regional variation in the proportion of drivers who reported drink alcohol ($p < 0.001$) and using marijuana ($p = 0.004$). Drivers who reported drinking alcohol were significantly more likely than non-drinkers to report also using marijuana, and similarly, drivers who reported having used marijuana in the past year were significantly more likely to report drinking alcohol (both $p < 0.001$). Both alcohol use and marijuana use were most prevalent among drivers who rated themselves as somewhat or much less careful compared to other drivers (76.0% and 41.2% for alcohol and marijuana, respectively) (Appendix

Table 1). With regard to speed compared to other drivers, drivers who reported driving somewhat or much faster than other drivers were the most likely to report alcohol use (79.2%), as well as marijuana use (17.1%).

Driving under the influence of alcohol and/or marijuana

Nearly one in seven drivers (14.0%) reported that, within the past year, they drove when their BAC was close to or over the legal limit at least once; this proportion was relatively stable over the study period (Table 2). Fewer drivers reported having driven within an hour of using marijuana (4.6%), or using both marijuana and alcohol (2.4%) during the same time period. The proportions of drivers who reported in engaging in each of the behaviors were relatively stable over the study period. Reported engagement in each of the behaviors generally increased with age ($p < 0.001$). Drivers ages 25-39 were the most likely to report having driven with a BAC close to or over the legal limit at least once in the past year (19.1%), while drivers ages 18-24 were the most likely to report having done this regularly or fairly often (4.1%), having driven within an hour of using marijuana (9.9%) or using both marijuana and alcohol (5.5%) at least once, and having done either regularly or fairly often (5.1% and 3.2%, respectively). Male drivers were more likely than females to report having driven with a BAC close to or over the legal limit at least once in the past year (18.4% vs. 10.0%), and having done this regularly or fairly often (2.8% vs. 1.2%) ($p < 0.001$ for both); while fewer drivers reported having driven after using marijuana, males were also more likely than females to report having driven within an hour of using marijuana (6.0% vs. 3.3%) or using both marijuana and alcohol (3.3% vs. 1.6%) at least once in the past year, and to have done the former regularly or fairly often (2.8% vs. 1.6%) ($p \leq 0.005$ for all). Drivers who rated themselves as somewhat or much less careful, or somewhat or much faster than other drivers, were consistently the most likely to have reported engaging in each of the impaired driving behaviors examined at least once within the past year, and to

have done so regularly or fairly often ($p \leq 0.002$ for all) (Table 2). The only behavior which varied with respect to region was driving within an hour of using marijuana at least once in the past year ($p = 0.05$): drivers in the Midwest were the most likely to report having driven within an hour of using marijuana in the past year, while those in the South were the least likely to report having done so.

Drivers who reported that they drink alcohol were more likely than non-drinkers to report having driven within an hour after having used marijuana in the past year and to report having done so regularly or fairly often ($p < 0.001$ for both) (Table 2). Drivers who reported using marijuana were more likely than non-marijuana users to report having driven with a BAC close to or over the legal limit at least once in the past year (41.0% vs. 11.1%), and doing so regularly or fairly often (10.8% vs. 1.0%) ($p < 0.001$ for both). While 21.2 percent of drivers who drink alcohol reported driving with a BAC close to or over the legal limit in the past year, 46.8 percent of marijuana users reported having driven within an hour of using the drug in the same time period. The proportion of drivers who reported having driven within an hour after using marijuana or using both marijuana and alcohol did not vary significantly in relation to whether the state had a *per se* law for marijuana ($p \geq 0.2$ for both).

Knowledge of per se laws for marijuana

More than half of drivers (51.2%) stated that they did not know whether their state had a *per se* law for marijuana. Fewer than half of drivers (48.5%) in states with *per se* laws for marijuana are aware of the law, and only 2.8 percent of drivers in states without such laws correctly knew that their state did not have such a law. Knowledge of *per se* laws for marijuana was relatively stable over the study period. Drivers who reported using marijuana at least once in the past year were less likely than those who did not to believe that their state had a *per se* law for marijuana, and more likely to believe that their state did not have such a law ($p < 0.001$ for both). The proportion of respondents who stated that they did not know whether their state had such a law did not vary with respect to marijuana use ($p = 0.108$). Drivers who reported having driven within an hour of using marijuana in the past year were less likely than those who did not to believe that their state did have a *per se* law for marijuana (29.8% vs. 46.9%), and more likely to believe that their state did not have such a law (15.1% vs. 2.1%) ($p < 0.001$ for both). In states with *per se* laws for marijuana, drivers were equally likely to respond that they do not know whether their state has such a law as they were to respond correctly regarding the law (Table 3). Drivers in states without *per se* laws for marijuana were only slightly less likely than drivers in states with such laws to believe that their states did have such a law ($p = 0.015$), and equally likely to believe that their state did not have such a law ($p = 0.337$). While drivers in states with *per se* laws for marijuana were less likely than those in states without such laws to respond that they do not know whether their state has such a law ($p = 0.033$), the difference was small (49.1% vs. 52.4%). In states with *per se* laws for marijuana, drivers who reported using marijuana were less likely than drivers who did not to correctly report that their state has such a law, and more likely to believe, incorrectly, that their state did not have such a law ($p \leq 0.006$ for both) (Table 3). In states without *per se* laws for marijuana, drivers who reported using marijuana were more likely than non-users to correctly respond that their state does not have such a law (10.3% vs. 2.0%), and less likely to incorrectly believe that their states does have such a law (35.0% vs. 45.8%) ($p < 0.001$ for both).

Beliefs about effect of marijuana on driving

More than half of drivers (58.3%) report that they believe that, in general, driving within one hour of using marijuana makes one somewhat or much more likely to cause a crash, while nearly one in three drivers (31.8%) report that they do not know how driving within an hour of use affects one's crash risk, and one in ten reported that they believe such use does not affect (6.2%) or decreases crash risk (3.6%); these proportions were relatively stable over the study period (Table 4). Drivers age 40 and older were the most likely to believe that using marijuana within an hour of driving increases crash risk; those ages 18-24 were most likely to indicate that such use does not affect crash risk; drivers ages 25-39 were the most likely to indicate that such use decreases crash risk; and those age 75 and older were the most likely to indicate that they do not know how such use affects crash risk. Female drivers were more likely than male drivers to believe that using marijuana within an hour of driving increases crash risk, while males were more likely than females to believe that such use does not affect crash risk or decreases crash risk ($p < 0.05$ for all); however, differences in responses by gender were small. Male and female respondents were equally likely to indicate that they do not know how using marijuana within an hour of driving affects crash risk. Beliefs about the effect of using marijuana within an hour of driving did not vary regionally ($p = 0.286$).

Drivers who reported having used marijuana in the past year were much less likely than those who did not to believe that using marijuana within an hour of driving increases one's crash risk (37.9% vs. 60.5%), or to respond that they do not know (16.7% vs. 33.5%), and much more likely to believe that such use does not affect (29.4% vs. 3.7%) or decreases crash risk (16.1% vs. 2.3%) ($p < 0.001$ for all). These differences were even greater when comparing the responses of drivers who reported having driven within 1 hour of using marijuana in the past year versus those who reported having not done so in the past year. While the differences were small, drivers in states with *per se* laws for marijuana were more likely than drivers in states without such laws to believe that using marijuana within an hour of driving increases crash risk ($p = 0.002$), and less likely to respond that they do not know ($p = 0.017$); drivers in states with and without *per se* laws for marijuana were equally likely to believe that such use does not affect, or decreases crash risk ($p \geq 0.5$ for both).

Drivers who reported that they drive somewhat or much less carefully than other drivers were the least likely to believe that using marijuana within an hour of driving increases crash risk ($p = 0.005$), and the most likely to believe that such use does not affect crash risk ($p = 0.05$). These drivers also appeared to be the most likely to believe that using marijuana within an hour of driving decreases crash risk, or to respond that they do not know, however, the differences were not statistically significant ($p \geq 0.1$ for both). While the proportion of drivers who believe that marijuana use increases crash risk did not vary with respect to self-rated speed, those who reported that they drive somewhat or much faster than other drivers were the most likely to believe that marijuana use does not affect or decreases crash risk, and the least likely to respond that they do not know ($p \leq 0.02$ for all).

Acceptance of impaired driving

Virtually all drivers report that they feel it is unacceptable to drive when one may have had too much to drink (97.9%), and to drive after using both marijuana and alcohol (98.0%), and most (91.7%) say the same about driving one hour after using marijuana (Table 5). The proportion of drivers reporting that they feel that it is unacceptable to drive when one may have had too much to drink generally increased with driver age, though the overwhelming majority of drivers in every age group agreed with this (Table 5). The proportion who feel it is unacceptable to drive one hour after using marijuana also increased with driver age ($p < 0.001$); drivers aged 18-24 were the least likely to report feeling that it is unacceptable to do so (87.9%), while those age 75 and older were the most likely to report the same (97.4%). Acceptability of driving after using both marijuana and alcohol did not vary significantly by age, as more than 97% of drivers in every age group rated this as unacceptable. Female drivers were significantly more likely than males to rate all three of these behaviors as unacceptable ($p \leq 0.006$ for all); however, differences in responses by gender were small. Acceptance of these behaviors did not vary by region of country ($p \geq 0.3$ for all). Drivers who rated themselves as somewhat or much less careful than most other drivers were much more accepting of driving after drinking too much alcohol or using marijuana individually (both $p < 0.001$), and appeared to also be slightly more accepting of driving after using both marijuana and alcohol, however, that difference was not statistically significant ($p = 0.252$). Differences in acceptance of these behaviors in relation to self-rated driving speed relative to other drivers were not large, but drivers who reported that they drive somewhat or much slower than other drivers were consistently the most likely to rate each of the behaviors as unacceptable. The proportions of drivers who believe it is unacceptable to drive one hour after using marijuana, and to drive after using both marijuana and alcohol, did not vary with respect to whether the drivers' state of residence had a *per se* law for marijuana ($p \geq 0.4$ for both).

Support for impaired driving countermeasures

There was majority support for both of the impaired driving countermeasures examined: 82.9 percent of drivers support having a *per se* law for marijuana, while 63.6 percent support reducing the *per se* BAC limit from 0.08 to 0.05 grams per deciliter (Table 6). While support for reducing the BAC limit was stable over the study period, support for having a *per se* law for marijuana fluctuated over the study period ($p = 0.004$); there was, however, no evidence of a trend in support for the latter by year. Support for lowering the BAC limit did not vary with respect to driver age ($p = 0.654$); in contrast, support for a *per se* law for marijuana did vary by age ($p < 0.001$), with drivers ages 25-39 the least likely to support such a law (77.2%) and those age 75 and older the most likely (92.0%). Female drivers were more likely than males to support each of the countermeasures ($p < 0.001$ for both). Drivers who rated themselves as somewhat or much more careful, or somewhat or much slower, compared to other drivers, were the most likely to support each of the countermeasures. Drivers in states with *per se* laws for marijuana were more likely than drivers in states without such laws to support reducing the BAC limit ($p = 0.002$); support for having a *per se* law for marijuana, however, did not vary with respect to whether a driver's state of residence had such a law. Support for reducing the BAC limit and having a *per se* law for marijuana both varied regionally ($p \leq 0.03$ for both); drivers in the West and South were the

most likely to support reducing the BAC limit, while drivers in the West were the most likely to support having a *per se* law for marijuana (Table 6).

Discussion

From 2013-2015, nearly one in seven drivers reported driving with a BAC close to or over the legal limit in the past year, and 4.6 percent reported driving within an hour using marijuana in the same time period. Drivers who were aged 25-39, male, and those who reported using marijuana were the most likely to report having driven with a BAC close to or over the legal limit. Drivers who were aged 18-24, male, and lived in the Midwest were the most likely to report having driven within an hour of using marijuana.

The proportion of drivers who reported driving after marijuana use did not vary with respect to whether a driver's state of residence had a *per se* law for marijuana; however, more than half of all drivers admitted that they did not know whether their state had such a law or not. Given respondents' low levels of awareness of their states' marijuana-related driving laws, a *post hoc* analysis was performed to investigate whether respondents' driving after using marijuana was associated with whether they *thought* that their state had a *per se* law for marijuana, and results showed a strong relationship. While only 2.7 percent of drivers believed that their state did not have a *per se* law for marijuana, fully one in four of these drivers (25.6%) reported having driven within one hour after having used marijuana in the past year and 13.8 percent reported doing so fairly often or regularly. In contrast, of the drivers who reported that they believed their state did have a *per se* law (46.1% of drivers), only 3.0% reported having driven within an hour after having used marijuana in the past year (1.8% fairly often or regularly). Of the 51.2 percent of respondents who reported that they did not know whether their state had a *per se* law for marijuana, 5.0 percent reported having driven within an hour after having used marijuana in the past year (1.9% fairly often or regularly). Thus, while self-reported driving after using marijuana was not associated with actual state *per se* laws regarding marijuana and driving, it was significantly associated with what people *thought* their states' laws were.

Virtually all drivers feel it is unacceptable to drive when one may have had too much to drink and after using both marijuana and alcohol; nearly one in ten feels it is acceptable to drive one hour after using marijuana. Drivers who reported using marijuana, and those who reported driving within an hour of use in the past year were less likely to believe that using marijuana increases crash risk, and more likely to believe that such use does not affect or decreases crash risk. A majority of drivers support reducing the BAC limit from 0.08 to 0.05 grams per deciliter and support having a *per se* law for marijuana.

The Substance Abuse and Mental Health Services Administration (SAMHSA) conducts an annual survey, and while the methods and questions differ somewhat from those of the AAA Foundation surveys, the estimates of alcohol and marijuana use, and driving under the influence of alcohol or illicit drugs generally agree with those of the present study. The 2013 and 2014 SAMSHA surveys estimated that 70.9 percent of persons aged 18 or older reported drinking alcohol in the past year, 11.7 percent reported "driving under the influence of alcohol" in the past year, 12.9 percent reported having used marijuana in the past year, and 4.0 percent of drivers reported driving under the influence of illicit drugs,

including marijuana, in the past year (Center for Behavioral Health Statistics and Quality, 2015), all of which were very similar to the results of the current study. (Note that the SAMHSA estimates include non-drivers, which the present study does not. In the current study, 87.1 percent of all respondents aged 18 and older were drivers.)

Previous research has shown that young drivers, in particular, view driving after using marijuana as more acceptable and less risky than driving after using alcohol, and are more willing to drive after using marijuana than alcohol. Among various samples of young drivers examined, driving after marijuana use was nearly as common or more common than driving after alcohol use (Asbridge, 2014; Danton et al., 2003; McCarthy et al., 2007). In the present study, a smaller proportion of the youngest drivers (aged 18-24) said they feel it is unacceptable to drive one hour after using marijuana (87.9%) than said the same with regard to driving when one may have had too much to drink (95.9%). These drivers were also the least likely to believe that using marijuana within an hour of driving increases one's crash risk, and the most likely to believe such use does not affect crash risk. In the present study, only nineteen-year-old drivers were more likely to report having driven within an hour of using marijuana than with a BAC close to or over the legal limit in the past year (15.1% vs. 12.9%).

In the present study, drivers who used marijuana were significantly less likely than those who did not to believe that using marijuana within an hour of driving increases one's crash risk, and much more likely to believe that such use does not affect or decreases crash risk. These findings align with previous surveys which have demonstrated that, among drivers who have used marijuana and/or driven after use, some perceive that their driving was negatively affected, typically minimally, while others perceive no effect or report improved driving (Lacey et al., 2012; Pacific Institute for Research and Evaluation, 2014; Terry & Wright, 2005). Research on the relationship between marijuana use and risk of crash involvement, which typically relies on the detection of THC, the main active component of marijuana, has been inconclusive. While some studies have found that THC was associated with significantly elevated crash risk, others, including a recent study by the National Highway Traffic Safety Administration, have found that, after controlling for factors associated with a driver's crash risk, THC was not significantly associated with elevated crash risk (Asbridge et al., 2012; Compton & Berning, 2015; Elvik, 2013).

This study demonstrated that many drivers are unaware of whether their state has a *per se* law for marijuana and driving. We were unable to identify prior research that has examined driver knowledge of *per se* laws for marijuana, or other drugs excluding alcohol, however, a lack of awareness of the effects of drugs on driving among the public is evident (Cafaro, 2010; Government Accountability Office, 2015). Surveys by the AAA Foundation for Traffic Safety have repeatedly demonstrated that, while most drivers view drivers drinking alcohol as a very serious threat (65.9-71.1% during the study period), slightly fewer express the same concern with regard to people driving after using illegal drugs (56.2-61.5%) (AAA Foundation for Traffic Safety, 2014, 2015, 2016). A survey conducted by Gallup in 2015 showed similar results, with many more drivers rating drivers impaired by alcohol as a very serious problem (79%) than expressing the same concern about those impaired by marijuana (29%) (Ander & Swift, 2015). There is no conclusive evidence that *per se* laws for drugs other than alcohol reduce drug-impaired driving or traffic fatalities, although the lack of sufficient data has limited such research (Anderson & Rees, 2015; Goodwin et al., 2015; Government Accountability Office, 2015; Lacey et al., 2010). If drug

per se laws are, in fact, ineffective, it may be due, at least in part, to a lack of awareness of the laws.

References

- AAA Foundation for Traffic Safety. (2014). 2013 Traffic Safety Culture Index. Washington, DC: AAA Foundation for Traffic Safety.
- AAA Foundation for Traffic Safety. (2015). 2014 Traffic Safety Culture Index. Washington, DC: AAA Foundation for Traffic Safety.
- AAA Foundation for Traffic Safety. (2016). 2015 Traffic Safety Culture Index. Washington, DC: AAA Foundation for Traffic Safety.
- Ander, S. & Swift, A. (2015). More Say Alcohol Threatens Auto Safety Than Pot, Pills. Washington, DC: Gallup, Inc. Retrieved March 29, 2016, from <http://www.gallup.com/poll/183878/say-alcohol-threatens-auto-safety-pot-pills.aspx>
- Anderson, D. M., & Rees, D. I. (2015). Per se drugged driving laws and traffic fatalities. *International Review of Law and Economics*, 42, 122–134.
- Asbridge M., Hayden, J. A., & Cartwright, J. L. (2012). Acute cannabis consumption and motor vehicle collision risk: A systematic review of observational studies and meta-analysis. *BMJ*, 344:e536.
- Berning A., Compton, R., & Wochinger, K. (2015). Results of the 2013-2014 National Roadside Survey of Alcohol and Drug Use by Drivers. (Report No. DOT HS 812 118). Washington, DC: National Highway Traffic Safety Administration.
- Cafaro, T. W. (2010). Slipping through the cracks: Why can't we stop drugged driving? *Western New England Law Review*, 32 32(1 Article 2).
- Center for Behavioral Health Statistics and Quality. (2015). 2014 National Survey on Drug Use and Health: Detailed Tables. Substance Abuse and Mental Health Services Administration, Rockville, MD.
- Compton, R. P. & Berning, A. (2015). Drug and Alcohol Crash Risk. (Report No. DOT HS 812 117). Washington, DC: National Highway Traffic Safety Administration.
- Danton, K., Misselke, L., Bacon, R., & Done, J. (2003). Attitudes of young people toward driving after smoking cannabis or after drinking alcohol. *Health Education Journal*, 62(1), 50–60.
- Elvik, R. (2013). Risk of road accident associated with the use of drugs: A systematic review and meta-analysis of evidence from epidemiological studies. *Accident Analysis & Prevention*, 60: 254-267.
- GfK (2013). *Knowledge Panel® Design Summary*. Retrieved October 7, 2015, from [http://www.knowledgenetworks.com/knpanel/docs/knowledgepanel\(R\)-design-summary-description.pdf](http://www.knowledgenetworks.com/knpanel/docs/knowledgepanel(R)-design-summary-description.pdf)

- Goodwin, A., Thomas, L., Kirley, B., Hall, W., O'Brien, N., & Hill, K. (2015). Countermeasures that work: A highway safety countermeasure guide for State highway safety offices, Eighth edition. (Report No. DOT HS 812 202). Washington, DC: National Highway Traffic Safety Administration.
- Government Accountability Office. (2015). Drug-Impaired Driving: Additional Support Needed for Public Awareness Initiatives (Report to Congressional Committees No. GAO-15-293). United States Government Accountability Office.
- Lacey, J., Brainard, K., & Snitow, S. (2010). Drug Per Se Laws: A Review of Their Use in States. (Report No. DOT HS 811 317). Washington, DC: National Highway Traffic Safety Administration.
- Lacey, J. H., Kelley-Baker, T., Romano, E., Brainard, K., & Ramirez, A. (2012). Results of the 2012 California Roadside Survey of Nighttime Weekend Drivers' Alcohol and Drug Use. Calverton, MD: Pacific Institute for Research and Evaluation.
- McCarthy, D. M., Lynch, A. M., & Pederson, S. L. (2007). Driving after use of alcohol and marijuana in college students. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, 21(3), 425–430.
- Pacific Institute for Research and Evaluation. (2014). Washington State Roadside Survey. Calverton, MD.
- Terry, P., & Wright, K. A. (2005). Self-reported driving behaviour and attitudes towards driving under the influence of cannabis among three different user groups in England. *Addictive Behaviors*, 30(3), 619–626.

Appendix

Table 1. Self-reported alcohol and marijuana use by year and driver demographic and other characteristics, drivers 18+, United States, 2013-2015.

	N	Drink alcohol (%)	Use marijuana (%)
All drivers	6,612	66.3	10.0
Year			
2013	2,012	67.4	9.7
2014	2,207	66.8	12.1
2015	2,393	64.9	8.6
Driver age			
18-24	861	60.0	21.0
25-39	1,459	72.5	13.7
40-59	2,340	68.3	8.1
60-74	1,574	60.8	5.6
75+	378	57.8	0.8
Driver sex			
Male	3,288	69.4	12.1
Female	3,324	63.3	8.0
Region			
Northeast	1,231	72.0	10.1
Midwest	1,560	69.7	10.6
South	2,359	62.9	8.1
West	1,462	64.1	12.2
Alcohol use			
Yes	4,308	-	12.8
No	2,296	-	4.3
Marijuana use			
Yes	643	85.5	-
No	5,937	64.2	-
Carefulness compared to other drivers			
Somewhat or much more careful	5,445	65.0	8.9
About the same	1,070	72.1	12.8
Somewhat or much less careful	86	76.0	41.2
Speed compared to other drivers			
Somewhat or much faster	1,214	79.2	17.1
About the same	3,791	65.8	9.2
Somewhat or much slower	1,581	57.6	6.2

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: drivers with missing values for row variables were excluded where relevant

Table 2. Self-reported driving under the influence of alcohol and/or marijuana in the past year by year and driver demographic and other characteristics, representative sample of drivers 18+, United States, 2013-2015.

		BAC close to or over legal limit		Within 1 hr of using marijuana		Within 1 hr of using marijuana and alcohol		
		At least once	Regularly or fairly often	At least once	Regularly or fairly often	At least once	Regularly or fairly often	
		(%)	(%)	(%)	(%)	(%)	(%)	
All drivers		6,612	14.0	2.0	4.6	2.2	2.4	1.0
Year								
	2013	2,012	13.4	2.0	4.1	1.8	2.0	0.8
	2014	2,207	15.1	2.4	5.6	2.6	3.1	1.1
	2015	2,393	13.8	1.6	4.5	2.1	2.3	1.1
Driver age								
	18-24	861	15.1	4.1	9.9	5.1	5.5	3.2
	25-39	1,459	19.1	3.0	7.2	3.7	4.2	1.8
	40-59	2,340	13.6	1.4	3.6	1.4	1.5	0.3
	60-74	1,574	9.5	1.0	1.9	0.7	0.8	0.3
	75+	378	9.3	0.5	0.2	0.2	0.2	0.0
Driver sex								
	Male	3,288	18.4	2.8	6.0	2.8	3.3	1.2
	Female	3,324	10.0	1.2	3.3	1.6	1.6	0.8
Region								
	Northeast	1,231	14.8	2.3	5.0	1.7	3.1	0.9
	Midwest	1,560	15.4	1.3	5.7	2.7	2.7	0.7
	South	2,359	12.8	1.7	3.6	2.1	1.7	1.0
	West	1,462	14.1	2.8	5.0	2.2	2.7	1.4
Alcohol use								
	Yes	4,308	21.2	3.0	5.9	2.6	3.4	1.5
	No	2,296	-	-	2.2	1.2	0.4	0.0
Marijuana use								
	Yes	643	41.0	10.8	46.8	21.8	24.2	10.0
	No	5,937	11.1	1.0	-	-	-	-
Carefulness compared to other drivers								
	Somewhat or much more careful	5,445	12.3	1.5	3.9	1.7	1.8	0.6
	About the same	1,070	20.0	3.1	6.0	3.1	3.9	2.0
	Somewhat or much less careful	86	50.7	18.1	32.8	18.2	23.8	12.3
Speed compared to other drivers								
	Somewhat or much faster	1,214	25.8	4.2	8.8	4.0	4.8	2.0
	About the same	3,791	12.2	1.5	4.3	2.1	2.2	1.0
	Somewhat or much slower	1,581	9.5	1.3	2.2	0.7	1.0	0.2
State per se law for marijuana								
	Yes	1,985	13.5	1.2	4.2	2.1	2.1	0.7
	No	3,657	14.4	2.4	4.7	2.1	2.6	1.2
State per se law for marijuana x marijuana use								
	Per se law x marijuana user	199	37.9	5.2	44.1	21.9	22.1	7.2
	Per se law x non-user	1,985	11.0	0.8	-	-	-	-
	No per se law x marijuana user	398	42.0	14.6	48.2	21.6	25.9	11.7
	No per se law x non-user	3,655	11.4	1.1	-	-	-	-

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: drivers with missing values for row variables were excluded where relevant

Table 3. Knowledge of *per se* laws for marijuana by year, state law status, and marijuana use, representative sample of drivers 18+, United States, 2013-2015.

	N	Per se law for marijuana		
		Yes	No (Row %)	"I don't know "
All drivers	6,612	46.1	2.7	51.2
Year				
2013	2,012	45.0	2.6	52.4
2014	2,207	47.2	3.3	49.5
2015	2,393	46.4	2.5	51.1
State per se law for marijuana				
Yes	1,985	48.5	2.4	49.1
No	3,657	44.7	2.8	52.4
Marijuana use				
Yes	643	36.4	9.1	54.6
No	5,937	47.3	2.0	50.7
Drove within 1 hr of using marijuana in past year				
Yes	286	29.8	15.1	55.2
No	6,313	46.9	2.1	50.9
State per se law for marijuana x marijuana use				
Per se law x marijuana user	200	37.5	7.7	54.9
Per se law x non-user	1,985	49.7	1.8	48.5
No per se law x marijuana user	398	35.0	10.3	54.7
No per se law x non-user	3,657	45.8	2.0	52.2
State per se law for marijuana x drove within 1 hr of using marijuana in past year				
Per se law x drove after use	80	32.6	12.8	54.6
Per se law x did not drive after use	2,111	49.2	1.9	48.9
No per se law x drove after use	186	29.1	17.2	53.7
No per se law x did not drive after use	3,881	45.5	2.1	52.4

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: drivers with missing values for row variables were excluded where relevant

Table 4. Beliefs about the effect of driving within one hour of using marijuana on crash risk by year and driver demographic and other characteristics, representative sample of drivers 18+, United States, 2013-2015.

		N	Increases crash risk	Does not affect crash risk (Row %)	Decreases crash risk	Don't know
All drivers		6,612	58.3	6.2	3.6	31.8
Year						
	2013	2,012	58.0	6.5	3.1	32.4
	2014	2,207	59.4	6.2	4.5	30.0
	2015	2,393	57.8	6.1	30.0	32.7
Driver age						
	18-24	861	54.1	10.5	4.6	30.8
	25-39	1,459	54.9	8.3	5.5	31.3
	40-59	2,340	60.7	5.6	3.6	30.1
	60-74	1,574	60.0	4.0	1.7	34.3
	75+	378	59.9	1.2	0.4	38.4
Driver sex						
	Male	3,288	56.7	7.5	4.2	31.7
	Female	3,324	59.9	5.1	3.1	32.0
Region						
	Northeast	1,231	60.2	5.5	3.4	31.0
	Midwest	1,560	59.9	6.6	3.3	30.2
	South	2,359	56.2	5.9	3.6	34.3
	West	1,462	58.8	7.0	4.2	30.2
Alcohol use						
	Yes	4,308	57.8	7.1	3.9	31.3
	No	2,296	59.4	4.6	3.0	33.0
Marijuana use						
	Yes	643	37.9	29.4	16.1	16.7
	No	5,937	60.5	3.7	2.3	33.5
Drove within an hour of using marijuana in past year						
	Yes	286	19.9	43.6	26.8	9.8
	No	6,313	60.2	4.4	2.5	32.9
Carefulness compared to other drivers						
	Somewhat or much more careful	5,445	59.3	5.9	3.5	31.3
	About the same	1,070	54.0	7.7	3.5	34.7
	Somewhat or much less careful	86	47.3	13.0	14.0	25.7
Speed compared to other drivers						
	Somewhat or much faster	1,214	58.7	9.4	5.1	26.8
	About the same	3,791	57.8	6.0	3.6	32.6
	Somewhat or much slower	1,581	59.6	4.4	2.5	33.5
State per se law for marijuana						
	Yes	1,985	61.3	6.0	2.9	29.7
	No	3,657	56.7	6.4	3.7	33.2

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: drivers with missing values for row variables were excluded where relevant

Table 5. Acceptance of impaired driving behaviors by year and driver demographic and other characteristics, representative sample of drivers 18+, United States, 2013-2015.

	N	Unacceptable to drive when one may have had too much to drink (%)	Unacceptable to drive 1 hour after using marijuana (%)	Unacceptable to drive after using both marijuana and alcohol (%)
All drivers	6,871	97.9	91.7	98.0
Year				
2013	2,012	97.5	91.1	98.2
2014	2,466	98.7	92.7	98.2
2015	2,393	97.4	91.1	97.5
Driver age				
18-24	1,033	95.9	87.9	97.4
25-39	1,436	96.7	88.4	97.2
40-59	2,516	98.4	91.5	98.1
60-74	1,501	99.1	96.0	98.8
75+	385	98.3	97.4	98.4
Driver sex				
Male	3,401	97.1	90.0	97.4
Female	3,470	98.6	93.2	98.5
Region				
Northeast	1,328	97.6	91.3	97.5
Midwest	1,613	97.9	90.8	97.7
South	2,393	98.3	92.2	98.1
West	1,537	97.2	91.9	98.4
Carefulness compared to other drivers				
Somewhat or much more careful	5,660	98.4	92.0	98.1
About the same	1,114	96.7	91.6	97.8
Somewhat or much less careful	80	79.4	65.9	91.6
Speed compared to other drivers				
Somewhat or much faster	1,227	95.6	86.1	96.3
About the same	3,911	98.2	92.4	98.2
Somewhat or much slower	1,701	98.9	94.3	98.9
State <i>per se</i> law for marijuana				
Yes	2,175	98.0	91.3	98.0
No	4,340	97.7	92.0	98.0

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: based on data from the 2013, 2014, and 2015 TSCI surveys; drivers with missing values for row variables were excluded where relevant

Table 6. Support for impaired driving countermeasures by year and driver demographic and other characteristics, representative sample of drivers 18+, United States, 2013-2015.

		Support reducing the legal BAC limit to 0.05 g/dL (%)	Support having a marijuana per se law (%)
	N		
All drivers	6,871	63.6	82.9
Year			
	2013	2,012	63.9
	2014	2,466	63.6
	2015	2,393	63.4
Driver age			
	18-24	1,033	62.8
	25-39	1,436	62.8
	40-59	2,516	63.6
	60-74	1,501	65.5
	75+	385	61.6
Driver sex			
	Male	3,401	58.4
	Female	3,470	68.7
Region			
	Northeast	1,328	60.7
	Midwest	1,613	58.5
	South	2,393	66.3
	West	1,537	66.6
Carefulness compared to other drivers			
	Somewhat or much more careful	5,660	64.5
	About the same	1,114	60.3
	Somewhat or much less careful	80	51.8
Speed compared to other drivers			
	Somewhat or much faster	1,227	56.4
	About the same	3,911	64.2
	Somewhat or much slower	1,701	67.5
State per se law for marijuana			
	Yes	2,175	60.3
	No	4,340	65.0

Base: drivers 18+ who reported driving in the past 30 days, weighted to reflect the US population

Note: based on data from the 2013, 2014, and 2015 TSCI surveys; drivers with missing values for row variables were excluded where relevant