Use of Alcohol and Cannabis Among Adults Driving Children in Washington State

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ABSTRACT. Objective: It is unknown how many drivers are impaired by alcohol or cannabis with children as passengers (a situation known as driving under the influence child endangerment [DUI-CE]). This study examines the prevalence and patterns of alcohol and cannabis use among drivers with children on weekend nights and risk perceptions among these drivers. **Method:** Data came from 2,056 drivers (1,238 male) who participated in the Washington State Roadside Survey between June 2014 and June 2015. Oral fluid, blood, and breath samples were used to measure cannabis and alcohol use. Self-reported data were used to assess risk perceptions. Descriptive tabulations, weighted prevalence estimates, and chi-square tests were conducted. **Results:** Compared with other drivers, those who drove with a child were more likely to be driving during the daytime (46.6% vs. 36.3%, $p = .03$), less likely to be alcohol positive (0.2% vs. 4.5%, $p < .0001$), but as likely to be positive for Δ-9-tetrahydrocannabinol (THC) (14.1% vs. 17.7%, $p = .29$). Drivers with a child were less likely to report moderate to severe marijuana problems (3.3%) than those without a child (8.4%) ($p < .02$). Most drivers reported that cannabis use was very likely to impair driving. Among those who did not perceive any risk, 40.6% of drivers with a child and 28.9% of drivers without a child tested positive for THC. **Conclusions:** Although most drivers with children did not drink and drive, many tested positive for cannabis, although it is unclear how many drivers may have been impaired. There is a need to examine driving situations that may put children at risks beyond those related to alcohol. (*J. Stud. Alcohol Drugs, 80,* 196–200, 2019)

EACH YEAR, ABOUT 200 CHILDREN DIE in the United States and another 4,000 are physically injured while driven by a drinking adult (Kelley-Baker & Romano, 2014; Romano & Kelley-Baker, 2015). The number of children annually involved in alcohol-related crashes is likely much higher, as children who escaped from the crash with no physical harm are not included in these estimates. Unfortunately, these rates have remained stable over time (Kelley-Baker & Romano, 2014; Margolis et al., 2000; Quinlan et al., 2014; Romano & Kelley-Baker, 2015), despite significant vehicle and child restraint improvements over the same period and child-endangerment laws aimed at protecting children from being transported by drivers under the influence of alcohol (hereafter called driving under the influence child endangerment [DUI-CE] laws). Previous work examining DUI-CE laws found no evidence of their efficacy in reducing child fatalities in crashes (Kelley-Baker & Romano, 2016; Thomas et al., 2014).

Although DUI-CE crashes are a relatively small proportion of total alcohol-impaired driving crashes, they are persistent and devastating in their impact (Centers for Disease Control and Prevention, 2004; Kelley-Baker & Romano, 2014; Males, 2010; Mothers Against Drunk Driving, 2018; Quinlan et al., 2000, 2014; Romano & Kelley-Baker, 2015). Research does not account for the larger number of drivers who take the risk of DUI-CE but do not crash. Noncrash databases, such as the National Roadside Survey and the National Household Travel Survey, do not have information on both the presence of children in the vehicle and the drivers' blood alcohol concentration.

Weekends have the highest prevalence of drinking and driving (Voas et al., 2013). Although most drivers do not drive with a child on weekend nights, especially if they intend to drink (Kelley-Baker & Romano, 2014), the high prevalence of drinking and driving on weekends (particularly at night) raises questions about how many of those driving with children have been drinking alcohol or using cannabis. The recent availability of the Washington State Roadside Survey (Ramirez et al., 2016) allows for an examination of this issue.

The aims of this brief report are to (a) estimate the prevalence of alcohol and Δ-9-tetrahydrocannabinol (THC; the primary psychoactive compound in cannabis) among drivers with children on weekends (daytime and nighttime) and (b) assess how the presence of a child is related to the drivers' patterns of alcohol and cannabis use, risk perceptions, and other characteristics.

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Method

Data

Survey methods for the Washington State Roadside Survey were adapted from the 2013–2014 National Roadside Survey (Kelley-Baker et al., 2016). The Washington State Roadside Survey was conducted between June 2014 and June 2015 and included one 2-hour Friday daytime session (either 9:30–11:30 A.M. or 1:30–3:30 P.M.) and four 2-hour nighttime periods (10 P.M.–midnight and 1–3 A.M. on both Friday and Saturday nights) within six counties in Washington State. Researchers invited drivers at either a stoplight or a stop sign to turn in to the data collection location, and potential participants were given information about the voluntary, paid study. Informed consent was obtained from all participants, and participants could leave or end participation at any time. All data were collected anonymously and included observational and biological measures. The biological measures included breath samples from 2,423 drivers and oral fluid or blood samples from 2,313 drivers. To focus on adults driving children, only drivers age 21 or older were included in the analyses. A total of 2,056 drivers with lab information remained eligible for this study; of these, 151 (7.3%) had THC measures collected only from blood, 432 (21.0%) only from oral fluid, and 1,473 (71.6%) from both oral fluid and blood.

Researchers used the Mark V Alcovisor (PAS Systems; Morrisville, NC) for obtaining breath samples and the Quantisal (Immunalysis Corporation, Pomona, CA) for oral fluid collection, and blood was collected by a trained phlebotomist. Oral fluid and blood specimens were sent to a certified laboratory for drug testing. For this study, THC was recorded as positive if the drug was found in either oral fluid or blood. Information about the presence of a child was visually collected by the interviewers. Surveyors were instructed to exclude older teens. Data from this study came from 2,056 drivers age 21 years and older with child passenger data, alcohol information, and information on THC. In addition to biological information, drivers were asked to complete a questionnaire about their risk perceptions related to cannabis use and cannabis use and driving, and to complete the Drug Abuse Screening Test (Skinner, 1982). A detailed description of the Washington State Roadside Survey methods appears in Ramirez et al. (2016).

Analyses

Based on 2014 licensed driver population information and census data from each site, we applied chi-square tests with appropriate poststratification weights to reflect the overall population of Washington State. We used SAS Version 9.4 (SAS Institute Inc., Cary, NC) for our computations. We used the PROC SURVEYFREQ approach with weights adjusted to reflect the sampling design.

Results

Table 1 shows that of the 2,056 drivers in the sample, 238 (9.3%) were driving a child. Drivers ages 35–44 were more likely to be driving a child (17.5%) than drivers ages 21–34 (11.2%), 45–64 (5.8%), or 65 and older (3.3%), although only the comparison with the last two age groups was statistically significant. Women were more likely to be driving a child (10.8%) than men (7.9%). Compared with drivers who were not driving a child, those who were driving a child were significantly less likely to be at breath alcohol concentrations (BrACs) greater than or equal to .08 g/dl (0.0% vs. 0.9%) or even drinking at all (i.e., less likely to be BrAC > .00 g/dl) (0.2% vs. 4.5%). Among those who were driving with a child, 0.0% and 0.4% were alcohol positive (BrAC > .00 g/dl) during the daytime and nighttime, respectively. Among those who were not driving with a child, the likelihood of finding an alcohol-positive driver was substantially lower at daytime (0.7%) than at nighttime (6.7%).

The prevalence of THC-positive drivers was much higher than that of BrAC-positive drivers, regardless of whether the driver was driving with a child. The presence of a child did not "protect" drivers against using cannabis, as it did against alcohol: Those who were driving with a child were statistically as likely to be positive for THC (14.1%) as those who did not drive with a child (17.7%). Also, the prevalence of THC-positive drivers did not significantly vary between daytime and nighttime drivers. Among those who were driving with a child, 11.4% and 16.5% were THC positive during the daytime and nighttime, respectively.

Table 2 examines specific characteristics of drivers with and without children in the vehicle. Most of the drivers had no marijuana use disorders identified by the Drug Abuse Screening Test (90.9% of all drivers with a child and 85.0% of those not driving a child). Drivers found driving with a child were less likely to report moderate to severe marijuana problems (3.3%) than those without a child (8.4%) ($p < .02$). The percentage of THC-positive drivers was higher among drivers with moderate to severe marijuana problems than among drivers with no reported marijuana use problems, both among drivers with and without children. However, these differences were not statistically significant.

With respect to risk perceptions, the majority of drivers considered the use of marijuana "very likely" to impair driving. This percentage was significantly higher among those driving with a child (62.0%) than among those not driving with a child (50.3%) ($p < .05$). Not surprisingly then, the percentage of drivers who tested positive for THC was significantly lower among those who perceived the risk "very likely" than among other drivers. Among those who perceived the risk as "very likely," 8.9% of drivers with a child and 13.9% of drivers without a child tested positive for THC. Among those who did not perceive a risk at all, 40.6% of those driving with a child were THC positive, compared

Table 1. Alcohol and cannabis use among drivers with and without children: % (*n*), [95% CI]

Variable	% Driving a child	Among those driving with a child			% NOT driving a child	Among those NOT driving with a child		
		BrAC > .00	BrAC ≥ .08	THC > .00		BrAC > .00	BrAC ≥ .08	THC > .00
All (total)	9.3% (238)	0.2% (1)	0.0% (0)	14.1% (36)	90.7% (1,818)	4.5% (90)	0.9% (22)	17.7% (313)
(*N* = 2,056)	[7.8%, 10.8%]	[0.0%, 0.6%]	n/a	[8.3%, 19.9%]	[89.2%, 92.2%]	[3.2%, 5.7%]	[0.4%, 1.3%]	[15.2%, 20.2%]
Driver age								
21–34 (*n* = 986)	11.2% (119)	0.6% (1)	0.0% (0)	15.0% (19)	88.8% (867)	7.2% (59)	2.0% (16)	19.8% (164)
	[9.0%, 13.4%]	[0.0%, 1.9%]	n/a	[8.3%, 21.7%]	[86.6%, 91.0%]	[5.2%, 9.3%]	[0.9%, 3.2%]	[16.5%, 23.2%]
35–44 (*n* = 431)	17.5% (79)	0.0% (0)	0.0% (0)	16.0% (11)	82.5% (352)	7.6% (18)	1.1% (4)	18.3% (60)
	[13.3%, 21.7%]	n/a	n/a	[4.3%, 27.6%]	[78.3%, 86.7%]	[3.3%, 11.8%]	[0.0%, 2.3%]	[13.6%, 23.1%]
45–64 (*n* = 529)	5.8% (35)	0.0% (0)	0.0% (0)	13.2% (6)	94.2% (494)	3.1% (13)	0.4% (2)	16.4% (71)
	[3.6%, 8.1%]	n/a	n/a	[2.0%, 24.4%]	[91.9%, 96.4%]	[1.0%, 5.1%]	[0.0%, 0.9%]	[11.9%, 20.9%]
≥65 (*n* = 110)	3.3% (5)	0.0% (0)	0.0% (0)	0.0% (0)	96.7% (105)	0.0% (0)	0.0% (0)	16.7% (18)
	[0.0%, 6.9%]	n/a	n/a	n/a	[93.1%, 100.0%]	n/a	n/a	[9.0%, 24.3%]
Driver sex								
Female (*n* = 816)	10.8% (125)	0.0% (0)	0.0% (0)	11.7% (18)	89.2% (691)	3.2% (27)	0.7% (6)	17.7% (110)
	[8.5%, 13.2%]	n/a	n/a	[6.0%, 17.5%]	[86.8%, 91.5%]	[1.7%, 4.7%]	[0.1%, 1.3%]	[13.6%, 21.9%]
Male (*n* = 1,238)	7.9% (112)	0.5% (1)	0.0% (0)	16.9% (18)	92.1% (1,126)	5.5% (63)	1.0% (16)	17.8% (203)
	[6.0%, 9.9%]	[0.0%, 1.4%]	n/a	[6.6%, 27.2%]	[90.1%, 94.0%]	[3.6%, 7.4%]	[0.4%, 1.7%]	[14.7%, 20.8%]
Time of the day								
Daytime (*n* = 610)	11.5% (98)	0.0% (0)	0.0% (0)	11.4% (9)	88.5% (512)	0.7% (6)	0.3% (3)	15.3% (73)
	[8.4%, 14.6%]	n/a	n/a	[1.5%, 21.3%]	[1.6%, 85.4%]	[0.0%,1.3%]	[0.0%, 0.8%]	[10.7%, 19.9%]
Nighttime (*n* = 1,446)	7.9% (140)	0.4% (1)	0.0% (0)	16.5% (27)	92.1% (1,306)	6.7% (84)	1.2% (19)	19.1% (240)
	[6.4%, 9.4%]	[0.0%, 1.2%]	n/a	[10.0%, 23.0%]	[0.8%, 90.6%]	[4.8%, 8.6%]	[0.6%, 1.8%]	[16.2%, 22.0%]

Notes: N and *n* denote number of drivers (unweighted). % denotes weighted percentage of drivers. Drivers were ages 21 or older. Children were visually identified as less than 15 years of age. For each percentage in the table, its 95% confidence interval (CI) appears immediately below. The abbreviation "n/a" denotes none or too few records for estimating CI. BrAC = breath alcohol concentration; THC = Δ-9-tetrahydrocannabinol. BrAC > .00, BrAC ≥ .08, and THC > .00 denote the percentage of drivers with (without) children at BrAC > .00 g/dl, at BrAC = .08 g/dl or higher, and positive for cannabis (THC > .00 ng/ml) in an oral fluid sample. For example, of the 2,056 drivers in the file, 9.3% (*n* = 238) were driving at least one child, and only 0.2% of 238 registered a BrAC > .00 g/dl. Percentage estimates for BrAC > .00 g/dl include those for BrAC ≥ .08 g/dl. Separate characteristics do not always add up to total due to missing information (e.g., because of missing sex information on two drivers, the total number of males and females in the file add up to 2,054, rather than 2,056).

with 28.9% of those without a child. However, these differences between drivers with and without children were not statistically significant.

There were few significant differences regarding trip initiation or destination. Most participants had initiated their trip at their own home (27.2% and 27.4% among drivers with and without children, respectively) or were heading toward their own home (58.4% and 56.6% among drivers with and without children, respectively). However, 3.1% of drivers without children had initiated their trip at a bar, tavern, or club, whereas only 0.2% of those with children had initiated their trip at these places. The proportion of THC-positive drivers did not seem to be affected by the trip's origin or destination among those driving without children (ranging between 15.9% and 20.2% by trip origin and between 11.8% and 19.3% by trip destination). The percentage of THC-positive drivers coming from a bar, tavern, or club was higher among drivers without children (15.9%) than among those with children, where none was THC positive (0.0%).

Discussion

DUI-CE is a persistent but relatively understudied problem. To a large extent, the persistency of the problem relates to a dearth of data precluding the design of effective interventions and countermeasures. Extant information on DUI-CE comes largely from crash data. As reviewed by a recent report by the National Academy of Sciences, Engineering, and Medicine (2018), there is a need for more granular data on DUI-CE events leading to crashes both in general as well as in specific driving situations. This study examines a specific driving situation: weekends. Of particular interest is the examination of DUI-CE on weekend nights, when the prevalence of drinking and driving is high. As expected, our study found that on weekend nights, most drivers did not drive with children. Encouragingly, we also found that among those with children, most did not drink and drive. However, although most weekend drivers with children did not drink and drive, some of them (more than 1 in 10) did use cannabis. This finding requires further consideration.

Although experimental studies have shown a clear association between the use of cannabis and measures of driving performance (Hartman & Huestis, 2013), epidemiological and traffic-based data present a less clear picture of crash risk (e.g., Sewell et al., 2009). Thus, our finding that among drivers with children, the prevalence of cannabis is much higher than that of alcohol does not necessarily mean those drivers were impaired. Nevertheless, the possibility that at least some of those drivers were impaired is a source of concern, particularly given the wave of legal and social norm changes reshaping the use of cannabis in the country.

Although our study was not able to assess impairment, our findings suggest that the use of THC among drivers depends on both the perceived risk and the presence of a

Table 2. Characteristics of drivers in the sample, and percentage who were THC-positive at each level

	Driver with a child			Driver NOT with a child		
Variable	*n*	% (column) [95% CI]	% THC-positives at each level	*n*	% (column) [95% CI]	% THC-positives at each level
Drug Abuse Screening Test						
Moderate to severe (ref.)	12	3.3% [1.3%, 5.2%]	27.1% [0.5%, 53.7%]	201	8.4% [6.9%, 9.9%]	23.9% [15.8%, 32.0%]
No problems reported	211	**90.9%** [87.0%, 94.7%]	14.2% [8.0%, 20.4%]	1,478	**85.0%** [82.9%, 87.1%]	16.8% [14.1%, 19.5%]
Low	15	5.9% [2.6%, 9.2%]	5.4% [0.0%, 16.0%]	139	6.5% [5.0%, 8.1%]	22.3% [11.9%, 32.8%]
Likelihood of driving impairment by cannabis						
Very likely (ref.)	127	62.0% [54.2%, 69.7%]	8.9% [1.2%, 16.7%]	829	50.3% [47.0%, 53.7%]	13.9% [10.7%, 17.1%]
Not likely at all	18	**6.1%** [3.1%, 9.2%]	**40.6%** [15.3%, 65.8%]	205	**9.8%** [8.0%, 11.7%]	**28.9%** [20.2%, 37.5%]
Somewhat likely	45	**17.0%** [11.5%, 22.5%]	24.6% [10.5%, 38.8%]	385	**21.5%** [18.6%, 24.4%]	23.7% [16.8%, 30.7%]
Likely to be impaired	37	**14.9%** [9.4%, 20.4%]	15.5% [3.1%, 27.9%]	319	**18.3%** [15.8%, 20.9%]	15.8% [10.6%, 20.9%]
Time of the day						
Nighttime (ref.)	140	53.4% [44.9%, 61.9%]	16.5% [10.0%, 23.0%]	1,306	63.4% [59.9%, 66.8%]	19.1% [16.2%, 22.0%]
Daytime	98	46.6% [38.1%, 55.1%]	11.4% [1.5%, 21.3%]	512	**36.3%** [32.2%, 40.1%]	15.3% [10.7%, 19.9%]
Place trip started						
Own home (ref.)	68	27.2% [20.0%, 34.4%]	15.3% [6.0%, 24.7%]	503	27.4% [24.6%, 30.2%]	17.2% [12.9%, 21.5%]
Bar/tavern/club	1	**0.2%** [0.0%, 0.6%]	0.0% n/a	63	**3.1%** [2.1%, 4.1%]	15.9% [4.3%, 27.5%]
Someone else's home	45	17.2% [10.7%, 23.6%]	16.5% [3.9%, 29.0%]	269	**12.0%** [10.2%, 13.7%]	20.2% [13.6%, 26.8%]
Restaurant/eating place	19	**5.7%** [2.9%, 8.5%]	11.9% [0.0%, 27.6%]	124	**6.5%** [4.9%, 8.1%]	20.1% [10.3%, 29.9%]
Other	105	49.7% [41.4%, 58.1%]	13.9% [4.3%, 23.5%]	859	**51.1%** [47.8%, 54.4%]	17.3% [13.5%, 21.0%]
Destination						
Own home (ref.)	142	58.4% [50.1%, 66.8%]	12.9% [4.8%, 21.1%]	1,029	56.6% [53.4%, 59.8%]	18.4% [14.9%, 21.9%]
Bar/tavern/club	0	0.0% n/a	0.0% n/a	22	**0.7%** [0.4%, 1.0%]	17.7% [0.6%, 34.8%]
Someone else's home	28	**10.6%** [6.0%, 15.2%]	22.7% [5.4%, 40.0%]	179	**8.8%** [7.2%, 10.5%]	11.8% [6.8%, 16.9%]
Restaurant/eating place	6	**4.2%** [0.0%, 9.5%]	7.6% [0.0%, 24.6%]	77	**4.3%** [2.8%, 5.7%]	19.3% [7.2%, 31.3%]
Other	62	**26.8%** [19.4%, 34.2%]	14.3% [4.8%, 238%]	511	**29.6%** [21.5%, 27.1%]	17.9% [13.4%, 22.4%]

Notes: n denotes number of drivers (unweighted). % (column) denotes the column percentage (i.e., weighted percent of *n* drivers in the specific category). % THC-positives at each level denotes the percentage of the category's *n* drivers that were THC-positives. For instance, among the 211 drivers with a child who reported no problem (90.9% of all drivers), 14.2% were THC-positives. For each percentage in the table, its 95% confidence interval (CI) appears immediately below. Estimates appearing in **bold** denote statistical significance ($p < .05$) with the reference level (ref.). For instance, among those who were driving a child, the percentage of THC-positives was significantly higher among those who said that there was zero likelihood of driving impaired by cannabis ("not likely at all," 40.6%) than among those who said the likelihood of impairment was very high ("very likely", the ref. level, 8.9%). The abbreviation "n/a" denotes none or too few records for estimating CI. THC = Δ-9-tetrahydrocannabinol.

child in the vehicle. Our findings seem to be in line with reports indicating that most Americans perceive driving after consuming cannabis to be significantly less risky than driving after drinking (Eichelberger, 2016). As such, our study highlights the need to examine driving situations that put children at risk beyond those related to alcohol, and to expand our examination to include driving situations not typically related to the transportation of children (such as weekend nights in this case).

Although novel, this effort is not free of limitations. First, it uses data from a single state (Washington). There might be particularities associated with this state that are not generalizable to others. For instance, since the legalization of recreational marijuana use (law passed by popular vote in 2012) and implementation of retail sales of marijuana (effective July 2014) in Washington, there has been a statistically significant increase in the use of cannabis among daytime (but not nighttime) drivers (Ramirez et al., 2016; Table ES-3), a finding that may explain why we failed to find statistically significant differences in THC prevalence by time of day. Drivers in other states may show a different pattern of use. Second, we focused on presence or absence of THC, rather than THC levels. Third, prevalence of THC does not necessarily imply impairment. Last, given that participation was voluntary, it is possible that some alcohol- and THC-positive drivers and/or some driving with children refused to enter the survey bay or, once in the bay, declined participation.

To our knowledge, this is the first study that examined alcohol use among drivers with children based on actual driving data (rather than on crashes) and examined cannabis in addition to alcohol. As such and despite the noted limitations, this article provides novel information and calls attention for a more detailed examination of the DUI-CE problem, particularly considering that more states have now legalized recreational use of marijuana.

References

Centers for Disease Control and Prevention. (2004). Child passenger deaths involving drinking drivers—United States, 1997-2002. *Morbidity and Mortality Weekly Report, 53,* 77–79.

Eichelberger, A. H. (2016). *Survey of U.S. drivers about marijuana, alcohol, and driving.* Arlington, VA: Insurance Institute for Highway Safety. Retrieved from http://www.iihs.org/frontend/iihs/documents/masterfiledocs.ashx?id=2126

Hartman, R. L., & Huestis, M. A. (2013). Cannabis effects on driving skills. *Clinical Chemistry, 59,* 478–492. doi:10.1373/clinchem.2012.194381

Kelley-Baker, T., & Romano, E. (2014). Child passengers killed in reckless and alcohol-related motor vehicle crashes. *Journal of Safety Research, 48,* 103–110. doi:10.1016/j.jsr.2013.12.008

Kelley-Baker, T., & Romano, E. (2016). An examination of the effectiveness of child endangerment laws in preventing child fatalities in alcohol-involved motor vehicle crashes. *Journal of Studies on Alcohol and Drugs, 77,* 828–833. doi:10.15288/jsad.2016.77.828

Kelley-Baker, T., Lacey, J., Berning, A., Ramirez, A., Moore, C., & Brainard, K., . . . Pell, K. (2016). *2013–2014 National Roadside Study of Alcohol and Drug Use by Drivers: Methodology (Report No. DOT HS 812 294).* Washington, DC: National Highway Traffic Safety Administration.

Males, M. (2010). Traffic crash victimizations of children and teenagers by drinking drivers age 21 and older. *Journal of Studies on Alcohol and Drugs, 71,* 351–356. doi:10.15288/jsad.2010.71.351

Margolis, L. H., Foss, R. D., & Tolbert, W. G. (2000). Alcohol and motor vehicle-related deaths of children as passengers, pedestrians, and bicyclists. *JAMA, 283,* 2245–2248. doi:10.1001/jama.283.17.2245

Mothers Against Drunk Driving. (2018). *2018 Child Endangerment Report* [Brochure]. Retrieved from https://www.madd.org/get-help/concerned-citizen/#childendangerment

National Academies of Sciences, Engineering, and Medicine. (2018). *Getting to zero alcohol-impaired driving fatalities: A comprehensive approach to a persistent problem.* Washington, DC: The National Academies Press. doi:10.17226/24951

Quinlan, K. P., Brewer, R. D., Sleet, D. A., & Dellinger, A. M. (2000). Characteristics of child passenger deaths and injuries involving drinking drivers. *JAMA, 283,* 2249–2252. doi:10.1001/jama.283.17.2249

Quinlan, K., Shults, R. A., & Rudd, R. A. (2014). Child passenger deaths involving alcohol-impaired drivers. *Pediatrics, 133,* 966–972. doi:10.1542/peds.2013-2318

Ramirez, A., Berning, A., Carr, K., Scherer, M., Lacey, J. H., Kelley-Baker, T., & Fisher, D. A. (2016). *Marijuana, other drugs, and alcohol use by drivers in Washington State (Report No. DOT HS 812 299).* Washington, DC: National Highway Traffic Safety Administration.

Romano, E., & Kelley-Baker, T. (2015). Child passengers injured in motor vehicle crashes. *Journal of Safety Research, 52,* 1–8. doi:10.1016/j.jsr.2014.10.001

Sewell, R. A., Poling, J., & Sofuoglu, M. (2009). The effect of cannabis compared with alcohol on driving. *American Journal on Addictions, 18,* 185–193. doi:10.1080/10550490902786934

Skinner, H. A. (1982). The drug abuse screening test. *Addictive Behaviors, 7,* 363–371. doi:10.1016/0306-4603(82)90005-3

Thomas, S., Kelley-Baker, T., Romano, E., Treffers, R., & Cannon, C. L. (2014). Transporting young passengers while impaired: The state of the law. *Health Behavior and Policy Review, 1,* 265–277. doi:10.14485/HBPR.1.4.2

Voas, R. B., Lacey, J. H., Jones, K., Scherer, M., & Compton, R. (2013). Drinking drivers and drug use on weekend nights in the United States. *Drug and Alcohol Dependence, 130,* 215–221. doi:10.1016/j.drugalcdep.2012.11.007