

Marijuana and DUI Fatal Crashes Differ by Time of Day & Day of Week

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Abstract

Marijuana and DUI fatal crashes by time of day are startlingly different. Marijuana fatal crashes dominates daytime **populated rush hour traffic - before and after standard work hours**. For 11 consecutive daytime one-hour time periods, 6am to 5pm, the percentage of marijuana crash fatalities exceeded DUI crash fatalities. DUI crashes dominate the evening hours **and occur during some of the least populated road times**. For 8 consecutive evening time periods, 8pm to 4am, the percentage of DUI crashes exceeded marijuana crashes.

The **top 4-hour period for marijuana-alone fatal crashes was 4 to 8 pm** during commute traffic hours after work. Marijuana Drivers also under the influence of alcohol have fatal crashes peak slightly later, 6-10 pm. This is in comparison to DUI-alone crashes being heaviest from 10pm to 2am. Day of week for Marijuana fatal crashes occur about equally daily, where DUI crashes occur more frequently on weekends.

Marijuana drivers killed more than 3,100 persons in the US, in 2015. Further, **73% marijuana drivers were killed** in the crash, and more than **1000 others (passengers, other drivers, pedestrians) were also killed** in the marijuana-induced crash. The nearly **10 marijuana driving fatalities occur each day** is the devastating result of increasing marijuana legalization.

The number of marijuana fatal crashes are nearly half the DUI level and are increasing due to marijuana legalization. Both recreational use states (CO and WA) have 24% of all crashes being marijuana fatalities, and are approaching the national level of 30% for alcohol fatal crashes. **Nationally, the percent of drivers tested for drugs is less than 50% and masks the true impact of marijuana driving**. In WA, there is a disturbing **decreasing** trend of blood being tested for drugs in fatal crashes.

Speeding (in 38%) and not using restraints (in 48%) are major factors in marijuana fatal crashes. Marijuana drivers in fatal crashes also had alcohol present, with 39% also DUI.

Law enforcement must adjust and develop strategies to detect marijuana drivers to combat **the emerging problem of daytime marijuana impaired driving**. The strategies include 1) early roadside screening with oral swabs and breath testing, 2) using standard field sobriety tests to determine driving impairment which has been found to be highly accurate for marijuana, and 3) knowledge that marijuana fatalities occur mostly in the day time and peak immediately before and after work hours.

Note that a smoked social marijuana high can be obtained in less than 2 minutes and the driving impairment effects can easily last up to 6-8 hours. Edible marijuana products have their effects begin 20-40 minutes after eating, peak effects occur 2-3 hours after ingestion and driving impairment last longer than smoked marijuana. Compared that to a 180-pound man who would have to consume 9 alcoholic drinks in a one-hour time period to be at the median BAC of fatal crash drivers of 0.18 BAC.

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Marijuana and DUI Fatal Crashes Differ by Time of Day & Day of Week

Marijuana Drivers are an Increasing Problem with more than 3000 Fatalities in 2015 The increasing legalization of marijuana for medical and then recreational use is impacting fatal crashes in the US. In 2015, the latest year for national data, and where less than half of all drivers are tested for drugs in a fatal crash. There were 3151 fatalities that involved a driver known to be impaired by the most common drug – marijuana. This is compared to the national data for DUI alcohol (DUI) fatal crashes in which 6952 persons were killed. Of those killed in marijuana crashes, 2038 were the marijuana driver and 1113 were victims of the impaired driving. Also of note, 73% of the marijuana drivers also died in the crashes.

As of 2015, only two states had implemented a program for recreational use of marijuana, WA and CO, with 24 states having a program for medical marijuana.

Marijuana Drivers in Fatal Crashes Differ by Time of Day

As shown in Table 1, statistical analysis of marijuana and DUI fatal crashes by time of day shows startling differences. Starting at 6am to 5pm, for 11 consecutive 1 hour time periods, the percentage of marijuana crashes exceeded DUI crashes. In the evening hours, starting at 8pm to 4am, for 8 consecutive time periods, the percentage of DUI crashes exceeded marijuana crashes. In addition, Marijuana fatal crashes had their heaviest 4 hr time period from 6 to 10 pm in the early evening compared to DUI crashes at 10pm to 2am.

The top 4 consecutive hours for marijuana fatal crashes without DUI are from 4:00 pm to 7:59 pm. This accounted for 23% of the Mj no DUI group. This is a significant difference from DUI (peak hours 11:00 pm to 3am) that is not widely known. The highest DUI period accounts for 32.2% of the DUI fatal crashes. When marijuana is combined with other substances (including alcohol), the peak marijuana (Mj)) hours were slightly later (6:00 pm to 9:59 pm) accounting for 22% of the Marijuana group. 61% of marijuana drivers were not DUI, with 39% also DUI.

Also note that **Marijuana fatal crashes from 7am to 1pm**, before the start of the average work day, are actually **higher than DUI** in raw numbers. **Six consecutive time periods** show fatal crashes for **marijuana higher than DUI**.

Table 1 Next page because of length

Table 1. Top Hours for Marijuana, MJ No DUI, and DUI Fatal Crashes, 2015 FARS				
Crash Hou	DUI	MJ	**MJ no DUI	*Stat. Diff Mj & DUI
4:00am-4:59am	224	88	38	NO
5:00am-5:59am	154	82	46	NO
6:00am-6:59am	150	99	68	YES,Mj >
7:00am-7:59am	97	104	79	YES,Mj >
8:00am-8:59am	45	68	57	YES,Mj >
9:00am-9:59am	39	69	62	YES,Mj >
10:00am-10:59am	47	73	60	YES,Mj >
11:00am-11:59am	63	83	78	YES,Mj >
12:00pm-12:59pm	62	75	62	YES,Mj >
1:00pm-1:59pm	95	95	79	YES,Mj >
2:00pm-2:59pm	117	98	80	YES,Mj >
3:00pm-3:59pm	154	112	94	YES,Mj >
4:00pm-4:59pm	201	124	89	YES,Mj >
5:00pm-5:59pm	292	142	98	NO
6:00pm-6:59pm	342	156	105	NO
7:00pm-7:59pm	351	158	105	NO
8:00pm-8:59pm	410	145	76	YES,DUI>
9:00pm-9:59pm	438	156	85	YES,DUI>
10:00pm-10:59pm	417	144	74	YES,DUI>
11:00pm-11:59pm	474	133	60	YES,DUI>
0:00am-0:59am	519	144	54	YES,DUI>
1:00am-1:59am	547	141	43	YES,DUI>
2:00am-2:59am	396	149	56	YES,DUI>
3:00am-3:59am	447	121	52	YES,DUI>
Unknown Hours	88	24	9	
Total	6169	2783	1709	

*2 x2 chi square, P < 01

Marijuana Drivers Differ by Day of Week

The preponderance of DUI crashes is week-end (Friday – Sunday) related whereas Marijuana fatal crashes are more evenly distributed during the week.

Table 2. Day of Week for DUI Fatal Crashes, All Marijuana and Marijuana Not DUI, 2015 FARS Data			
Day of Week	DUI	All Mj	Mj not DUI
Mon	477	342	242
Tues	571	343	223
Wed	605	346	227
Thurs	718	340	219
Mon-Thurs	2371	1371	911
% Mon-Thurs	38.4%	49.3%	53.3%
Fri	1169	456	284
Sat	1580	532	266
Sun	1049	424	248
Fri - Sun	3798	1412	798
%Fri-Sun	61.6%	50.7%	46.7%
Total	6169	2783	1709

Speeding and Not Restrained Major Factor in Marijuana Fatal Crashes

Contrary to popular belief, marijuana drivers in fatal crashes are found speeding more than the average fatal crash driver. The myth of driving slow popularized in movies leads some in to believe that marijuana impaired drivers are not a problem. Table 3 shows that speeding of marijuana fatal drivers are higher than all drivers, and that the Percent of drivers restrained is almost 50% , significantly higher than all drivers in fatal crashed. It is also interesting to note that the unrestrained marijuana driver is in the daylight more than 40% of the time, easily visible to enforcement.

Table 3. Percent of Drivers Speeding and Not Restrained by Driver Group, 2015 FARS		
Drivers	Percent Not Restrained	Speeding
All	26.4%*	26.6%*
DUI	59.4%	42.3%
Mj	47.7%*	37.6%*
MJ not DUI	60.8%	31.8%

* Mj higher than All Drivers for speeding and less than for restraint use.

Marijuana Fatal Crashes Increasing Due to Legalization

Data in Table 4 show the increasing involvement of marijuana in fatal crashes – to being seen in 18.1% in all states in 2015 regardless of legal status. Medical marijuana states showed a 4.3% increase in use from 2014 to 2015. Note that as marijuana usage is more liberalize (moving from non-legal status to medical to recreational status), there is an increase in the percentage of marijuana driving fatalities (from an average over the past 2 years of data: 15% in non-legal states to 18% in medical states to 22% in recreational states). Further, since only 47% of drivers in fatal crashes are tested for drugs (alcohol, slightly higher at 56%), and the different state standards for reporting marijuana involvement; the actual marijuana involvement in crashes is probably much higher and closer to the alcohol levels. Washington state has reduced the percentage of marijuana blood testing in driving fatalities from 64% in 2013 to 52.2% in 2015 (Table 5).

Table 4 on next page due to length

**Table 4. Marijuana Use by State of Passenger Vehicle Drivers in Fatal Crashes
by Marijuana Law, 2014 and 2015 FARS Data**

Medical & Recreational* Marijuana States				Non-legal Status Marijuana States			
State	% MJ Fatalities in 2014	% MJ Fatalities in 2015	% change	State	% MJ Fatalities in 2014	% MJ Fatalities in 2015	% change
Alaska	28.1%	22.2%	-5.8%	Alabama	14.8%	14.6%	-0.2%
Arizona	10.5%	17.6%	7%	Arkansas	21.9%	22%	0.1%
California	18.4%	21.1%	2.8%	Florida	10.5%	11.6%	1.1%
Colorado*	20.5%	23.8%	3.4%	Georgia	18.1%	14.6%	-3.5%
Connecticut	10.8%	11.3%	0.5%	Idaho	19.1%	16.4%	-2.7%
Delaware	35.4%	27.5%	-7.9%	Indiana	11.6%	9.3%	-2.3%
DC	11.1%	25%	13.9%	Iowa	18.6%	19.6%	1%
Hawaii	16%	22%	6%	Kansas	12.3%	12.9%	0.6%
Illinois	17.2%	18.9%	1.7%	Kentucky	17.6%	13.9%	-3.7%
Maine	5.3%	20%	14.7%	Louisiana	21.2%	13.7%	-7.5%
Maryland	1.9%	0.5%	-1.3%	Mississippi	6.4%	16%	9.6%
Massachusetts	19.6%	26.7%	7.1%	Missouri	24.5%	25.2%	0.7%
Michigan	20.8%	21.7%	1.1%	Nebraska	13%	25.8%	12.8%
Minnesota	8.5%	15%	6.5%	N Carolina	0%	7.1%	7.1%
Montana	21.5%	18.2%	-3.3%	N Dakota	3.8%	4.1%	0.3%
Nevada	15.4%	16.8%	1.4%	Ohio	18%	21.7%	3.7%
New Hampshire	18.7%	24.4%	5.7%	Oklahoma	8.4%	11.9%	3.5%
New Jersey	13.7%	14.1%	0.4%	Pennsylvania	10.3%	11.8%	1.5%
New Mexico	17.5%	13.8%	-3.7%	So Carolina	21.2%	25.3%	4.1%
New York	13.7%	23.5%	9.8%	So Dakota	6.1%	7.7%	1.6%
Oregon*	21.7%	17.2%	-4.5%	Tennessee	14.5%	12.4%	-2.1%
Rhode Island	23.5%	26.1%	2.6%	Texas	15.3%	17.3%	2%
Vermont	26.1%	36%	9.9%	Utah	11.6%	13.9%	2.3%
Washington*	27.7%	24.4%	-3.3%	Virginia	11.1%	16.9%	5.8%
				West Virginia	12.1%	17.8%	5.7%
Ave all MJ States	17.6%	20.3%	2.7%	Wisconsin	17.5%	21.8%	4.3%
Ave MJ Recreational	23.3%	21.8%	-1.5%	Wyoming	15.9%	29.3%	13.4%
Ave Medical MJ States	16.8%	20.1%	4.3%	Ave Non-Legal MJ States	13.9%	16.1%	2.4%
				Ave MJ Fatalities in ALL states	15.7%	18.1%	2.4%

Table 5 shows the increase in marijuana fatal crashes in WA, one of the two states with recreational use of marijuana. Note that testing for both drugs and alcohol are declining. A declining test rate for drugs and alcohol will mask the true extent of the problem.

Table 5. WA State Comparison of Marijuana and DUI Fatal Crashes, 2013,2014,& 2015, NHTSA FARS Data				
Group	2013	2014	2015	Comment
Total Fatal Crash Drivers	592	623	788	Increase*
Alcohol Tested	379	347	411	
% Tested	64.0%	55.7%	52.2%	Decline*
08+ found	118	104	100	
% 08+	31.1%	30.0%	24.3%	
Drug Tested	370	342	400	
% Tested	62.5%	54.9%	50.8%	Decline*
Mj Found	66	87	92	
% Mj	17.8%	25.4%	23.0%	

* student t test, Statistical difference, p< .01

New Enforcement Strategies to Protect the Public from Marijuana Drivers Must be Developed

The first significant issue in determining the extent of the marijuana driving problem must include increased drug testing of fatal crash drivers which is **47% nationally** and 56% for alcohol. Current marijuana fatal crash figures are nearly half the percentage of DUI, however, marijuana fatalities are increasing due to legalization of marijuana for medical & recreational use. Both CO and WA, recreational use states for 3 years (2013 – 2015), already have 24% of fatal crashes with marijuana involvement approaching the national level of 30% for DUI fatal crashes. Also another concerning trend that has developed in Washington – decreased blood testing for marijuana by 11.8% over the same time period.

Law enforcement must adjust to and develop strategies to combat the emerging problem of marijuana impairment. A 2016 study by R Hartman, et al in Accident Analysis and Prevention reported that Drug Recognition Expert Officers can accurately detect marijuana in driver with a 96.7% accuracy rate. They only needed to use four common field sobriety tests known to all officers – the one-legged stand, the finger to nose, the walk and turn, and a Modified Romberg balance test looking for eyelid tremors. “This study shows that DRE trained officers are NOT needed to detect marijuana, since none of the extra tests performed by those officers were statistically significant in determining marijuana presence”, say Phillip Drum, Pharm. D. co-author of this report.

The Salas Case in Bakersfield has allowed for the use of oral swab testing to perform a quick inexpensive screen for drugs in California. Also reaching the end of field testing by Hounds Lab is a combination non-invasive breath testing device to detect the presence of either marijuana and/or alcohol in a suspect.

Additional enforcement patrol strategies must take into account that significant marijuana driver impairment is occurring earlier daily during rush hour traffic and later into the evening when combined with alcohol. Both the unbelted and speeding driver are clearly visible by enforcement in the daylight hours. This is significantly different than DUI driving alone which commonly occurs on the weekends and around midnight.

To avoid the risk of marijuana traffic fatalities, users should heed the recent warnings from the document Monitoring Health Concerns Related to Marijuana in Colorado 2016. This report was generated by the Colorado Department of Public Health & Environment which recommends that the marijuana smokers should wait 6 hours or more after using 18 mg or less of THC. Marijuana edible users of 18 mg THC or less should wait 8 hours or more until driving. For most marijuana drivers this would be an impractical solution.