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The characterization of drug and alcohol use among senior drivers fatally injured in U.S. motor vehicle collisions, 2008-2012

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Abstract

Objective—Adults 65 years of age and older comprise the fastest growing demographic in the United States. As substance use is projected to increase in this population, there is concern that more seniors will drive under the influence of impairing drugs. The purpose of this analysis was to characterize the drug and alcohol usage among senior drivers fatally injured (FI) in traffic collisions.

Methods—Data from the Fatality Analysis Reporting System were analyzed from 2008-2012. Commonly used classes and specific drugs were explored. Rates of drug use, multiple drugs, concomitant drug and alcohol use, and alcohol use alone were generated using Poisson regression with robust error variance estimation. Rates were compared to a reference population of FI middle-aged drivers (30 to 50 years old) using rate ratios.

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Results—Drug use among FI senior drivers occurred in 20.0% of those tested. Among drug-positive FI senior drivers, narcotics and depressants were frequent. The prevalence of testing positive for any drug, multiple drugs, combined drug and alcohol, and alcohol use alone among FI seniors were 47% less (RR=0.53, 95% CI 0.47, 0.62), 59% less (RR=0.41, 95% CI 0.34, 0.51), 87% less (RR=0.13, 95% CI 0.09, 0.19) and 77% less (RR=0.23, 95% CI 0.19, 0.28), respectively, compared to FI middle-aged drivers.

Conclusions—While overall drug use is less common among FI senior drivers relative to FI middle-aged drivers, driving under the influence of drugs may be a relevant traffic safety concern in a portion of this population.

Keywords

Prescription drugs; nonprescription drugs; traffic collisions; epidemiology; aged adults

INTRODUCTION

According to the National Center for Injury Prevention and Control, a person dies nearly every hour in the United States (U.S.) from a motor vehicle collision involving an impaired driver [Centers for Disease Control and Prevention (CDC) 2015]. Despite decades-worth of traffic safety campaigns and nearly 60 billion dollars of annual costs (CDC 2015) impaired driving still remains an important public health and traffic safety concern (Kelly, Darke et al. 2004). While the term ‘impairment’ traditionally referred to an individual's diminished driving ability from alcohol consumption, impairment now includes driving under the influence of drugs (DUID). DUID is not limited to recreationally used substances or substances that have no real medical benefit, which will be referred to as ‘illicit drugs’. Impairment can also be a result of common prescription and over-the-counter medications, which shall be referred to as ‘licit drugs’, whose effects interfere with one's cognitive, physical, or psychomotor ability to safely operate a motor vehicle (Carr 2000; Carr, Duchek et al. 2006). While licit substances can be obtained illegally, misused, or abused, the intent of use is often difficult to determine. Between 2007 and 2014, the National Highway Traffic Safety Administration (NHTSA) reported that alcohol-impaired driving declined while DUID increased 4% nationally (NHTSA 2015). Other studies also report increases in prescription drug use among fatally injured (FI) drivers (Wilson, Stimpson et al. 2014).

While DUID has steadily increased in the U.S., so has the number of licensed drivers over 65 years of age (i.e. seniors) (Federal Highway Administration 2011). Seniors comprise the most rapidly growing sub-group of the U.S. population (Shrestha and Heisler 2011) and are the largest consumers of both prescription and over-the-counter medications (Bushardt, Massey et al. 2008). The current generation of seniors also reports a higher prevalence of lifetime drug use (Colliver, Compton et al. 2006). Furthermore, it is projected that illicit drug use and non-medical use of prescription drugs will increase in this population through 2020 (Colliver, Compton et al. 2006).

While several recent studies have investigated drug and/or alcohol use patterns among FI drivers in the U.S. (Brady and Li 2013; Rudisill, Zhao et al. 2014; Wilson, Stimpson et al. 2014), very few studies have investigated these relationships specifically among senior

drivers (Higgins, Wright et al. 1996). A study of Level 1 trauma patients over 60 years of age who were drivers involved in motor vehicle collisions determined that ~14% of patients tested positive for alcohol and less than 1% tested positive for illicit drugs over the five year study period (Higgins, Wright et al. 1996). While the findings of this analysis suggest illicit drug and alcohol use may not be common among senior drivers, this analysis was limited to one hospital. The results of the 2007 National Roadside Survey revealed that 4% of drivers over 65 years of age tested positive for any type of drug; among those testing positive, sedatives were the most common class of medication (Lacey, Kelley-Baker et al. 2009). Illicit drug use and alcohol use were also low among senior drivers (Lacey, Kelley-Baker et al. 2009). However, the inherent limitation of roadside surveys is that participation is voluntary; those who may test positive for drugs and/or alcohol may refuse to take the survey or provide a biological sample for testing. Thus, the characterization of drug and/or alcohol use among senior drivers across the U.S. is incomplete. Therefore, the purpose of this analysis is to contribute to the extant literature by characterizing drug and alcohol usage among senior drivers who were fatally injured in motor vehicle collisions across the U.S. from 2008-2012. The advantage of utilizing a decedent population is that their drug and/or alcohol consumption can be determined if toxicological testing was conducted. For comparison purposes, rates of drug and alcohol use shall be compared to a reference population of fatally injured drivers aged 30-50 years.

METHODS

Data Source

Data for this analysis were obtained from the Fatal Analysis Reporting System (FARS). FARS is a publicly available database maintained by the NHTSA (NHTSA 2012). All 50 states and the District of Columbia are required to report traffic collisions to the NHTSA when at least one person injured in a traffic collision dies within 30 days of the incident (NHTSA 2012). Trained NHTSA analysts abstract the data from these state reported files using strict quality control procedures (NHTSA 2012). The FARS database contains over 100 variables relating to the crash, vehicles, and people involved in the incident (NHTSA 2012). Blood alcohol concentration (BAC) and up to three drug test results can be recorded for each individual involved in a collision. In cases of multiple drug involvement, drivers could potentially have more than three drugs detected in their system at time of collision, yet only the first three are reported. FARS lists drug test results in the following priority order: 1) narcotics, 2) depressants, 3) stimulants, 4) marijuana, and 5) other drugs (CDC 2006; NHTSA 2012). Nicotine, aspirin, and/or drugs administered to an individual as part of post-collision medical treatment are excluded from the drug test results (NHTSA 2010; NHTSA 2012). Drug testing can be performed using urine and/or blood. The consistency of drug testing varies greatly by and sometimes within states (NHTSA 2010). Some states routinely test fatally injured drivers for licit and illicit substances, while others do not (NHTSA 2010). Furthermore, states may not consistently report their results to the NHTSA (NHTSA 2010).

Study Population

Due to the variability in states' drug testing practices and reporting, for inclusion in this analysis, the state had to test and have a reportable drug result for at least 80% of all their FI

drivers (i.e. regardless of age) over the five year study period (2008-2012). The following states (n=14) met the inclusion criteria—Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia.

Because of potential biases due to the type of crash and the integrity of the biological specimen for toxicological testing, the study population was further limited to FI drivers of passenger vehicles who died within one hour of the collision from states meeting the inclusion criteria. The traffic collision must have also occurred between January 1, 2008 and December 31, 2012, which were the five most recent data years at time of initial analysis. The study population was also limited to those drivers 65 years of age or older at time of collision. For comparison purposes, middle-aged drivers (i.e. drivers 30-50 years) were included as the referent population for the analysis. The rationale of using 30-50 year olds as the referent group was because: 1) 30-50 year olds are generally safe drivers, and 2) they represent the average age of all drivers on the road (Foley, Heimovitz et al. 2002; Cheung and McCartt 2011). The overview of participant selection, along with sample sizes, is described in Figure A1 included in the Appendix.

Covariates

Covariates of interest are listed in Table 1. With the exception of the type of drug test administered, weather conditions at time of collision (e.g. clear weather included clear and cloudy conditions, while adverse included all other forms of precipitation such as snow, rain, blowing debris, etc.), and seat belt usage at time of collision, all variables were characterized similarly to previously published work (Brady and Li 2013). These variables helped elucidate whether there were fundamental differences between those FI senior drivers who tested positive for drugs compared to those testing negative.

Outcome Variables and Definitions

Several terms pertaining to the outcomes of this analysis presented throughout this paper include: any drug use, multiple drug use, drug and alcohol use, alcohol use only, other drugs, broad drug groups, specific/types of drugs, and cannabinoids. “Any drug use” was defined as testing positive for at least one licit or illicit drug. “Multiple drug use” was defined as testing positive for two or more drug groups. “Drug and alcohol use” was classified as testing positive for at least one drug and having a BAC ≥0.01 g/dl. “Alcohol use only” was characterized as testing negative for illicit and licit drugs but having a BAC ≥0.01 g/dl. “Broad drug categories” were overarching groups of drugs as classified by FARS, which included narcotics, depressants, cannabinoids, stimulants, hallucinogens, phencyclidine, anabolic steroids, inhalants, and “Other drugs”. “Other drugs” referred to illicit or licit drugs that could not be categorized by FARS as narcotics, depressants, cannabinoids, stimulants, hallucinogens, phencyclidine, anabolic steroids, or inhalants. “Specific/types of drugs” were narrower drug classifications as per FARS which included substances such as benzodiazepines, hydrocodone/oxycodone, barbiturates, cocaine, and methadone. The term “cannabinoids” referred to both tetrahydrocannabinol and other active or inactive cannabinoids.

Statistical Analyses

Since the focus of this study was to characterize drug usage among FI senior drivers, descriptive characteristics of FI senior drivers testing positive for at least one drug were compared to FI senior drivers testing negative. An additional analysis was conducted to quantify which covariates were associated with drug-positive results among FI senior drivers to characterize drug usage in this population; drug prevalence ratios for the different sub-groups of FI senior drivers were calculated using hierarchical Poisson regression with robust error variance estimation, where random effects were used to account for correlations among state reporting (Zou 2004).

To compare FI senior drivers to FI middle-aged drivers, drug prevalence rates were assessed for different outcomes (i.e. any drug use, multiple drug use, etc.). The drug prevalence rates were calculated by dividing the number of fatalities per drug group by the total number of drivers tested for each age group over the study period. The prevalence ratio was then determined by dividing the drug prevalence rates of FI senior drivers by the drug prevalence rates of FI middle-aged drivers for each drug category or class. Drug prevalence ratios were calculated using hierarchical Poisson regression with robust error variance estimation, where random effects were used to account for correlations among state reporting (Zou 2004). The proportions and frequencies of select broad drug categories and specific drugs were also explored in each age group. Fisher's exact tests were conducted to assess whether the type of drug or drug category differed between both groups of FI drivers. It should be noted that the *a priori* level of statistical significance was set at 0.05 and SAS/STAT ® software (SAS Institute 2010) version 9.3 was used for all analyses.

RESULTS

Of the 1,252 FI senior drivers included in this analysis, 250 (20.0%) were found drug-positive (Table 1). The sample consisted mainly of white, non-Hispanic males. Many of the FI drivers tested were found to have a zero blood alcohol concentration (88.5%). Of the FI drivers testing positive for drugs, 60.8% tested positive for only one drug, 21.6% tested positive for two drugs, and 17.6% had three or more drugs detected. As drivers aged, the prevalence of drug-positive tests decreased. There did not appear to be a statistically significant difference concerning sex, race, or ethnicity. Those testing positive for drugs were 43% more likely to not have worn a safety belt at time of collision.

The prevalence of any drug use, multiple drug use, drug and alcohol use, and alcohol use alone were considerably lower among FI senior drivers compared to FI middle-aged drivers (Table 2). Additionally, the types of drugs found in each group vastly differed (Table 3). While FI senior drivers tended to test positive for “Other” drugs, narcotics and depressants, FI middle-aged drivers tended to test positive more for stimulants and cannabinoids (Table 3).

Narcotics and depressants were the most common broad drug groups used both separately and in combination among FI senior drivers (Table 4a). As for FI middle-aged drivers, cannabinoids and stimulants were the most common broad category of drugs used both separately and in combination (Table 4a). Hydrocodone (4.0%) and diazepam (3.3%) were

the most common medications among FI senior drivers whereas cannabis (33.8%), amphetamines (17.1%), and cocaine (10.9%) were the most common individual drugs among FI middle-aged drivers (Table 4b).

DISCUSSION

The principal finding of this study was that drug use among FI senior drivers was detected in 20.0% of those tested. Among the FI drivers testing positive, the majority were confirmed to have only consumed one or two drugs prior to collision. The prevalence of drug involvement, multiple drug use, drug and alcohol use, and alcohol use alone were considerably less in the FI senior drivers compared to FI middle-aged drivers included in this analysis. These findings suggest that while drug use may be less frequent among FI senior drivers compared to FI middle-aged drivers, other drugs, narcotic and depressant consumption is prevalent among drug-positive FI senior drivers.

The results of this analysis are partially explainable. In a national US study, it was estimated that approximately 81% of community dwelling individuals aged 57- 85 years consume one prescription medication daily (Qato, Alexander et al. 2008), while other studies estimate that ~20% of seniors use three or more prescriptions each day (Jorgensen, Johansson et al. 2001). In this analysis, the majority of FI senior drivers were found negative for drugs, which was surprising considering that prescription drug use generally increases with age. There may be several potential explanations for this result. First, previous research demonstrates that drivers self-regulate and alter their traffic behaviors when they feel that their driving is compromised due to poor health (Marottoli, Ostfeld et al. 1993; Martinez 1995; Kelly, Warke et al. 1999). Such drivers will typically avoid situations involving traffic congestion, complex intersections, adverse weather, driving alone and/or at night (Ball, Owsley et al. 1998; Blanchard, Myers et al. 2010). Because the individuals in this study were still driving, it is possible that the drivers included in this analysis were healthier and consuming fewer medications than their less healthy counterparts. A second explanation may involve the type of drug test conducted on the driver and/or the quality of the specimen collected for testing. While information is stored in FARS regarding the type of drug test that was administered and how long the individual survived post-collision, it is unknown if differences exist between states, individuals, etc. concerning the extent of toxicological testing conducted. It is possible that individuals may have tested negative because they weren't tested for as many substances, the quality of their specimens were poor, etc. It is also possible that an individual took a drug, possibly even a low dose, but it was rapidly metabolized and therefore undetectable by a drug test. Depending on the storage conditions of blood samples, antemortem blood alcohol levels can be skewed by postmortem ethanol production. A third explanation may involve gender differences. Women typically drive less and/or cease driving sooner than men (Stewart, Moore et al. 1993). Research also suggests that women typically consume more medications and have higher rates of multiple medication use (Jorgensen, Johansson et al. 2001). As the study population was comprised predominately of men, the prevalence of medication use may have been lower than if it were equally comprised of males and females. A fourth explanation for the number of negative drug tests, may have been the timing of the collisions and/or medication adherence. It is possible that some drivers had prescriptions, but did not yet take their medications or were non-adherent to their

medication regimen on the day of their collision. While age and gender are not believed to be predictors of medication adherence, the numbers of prescriptions are; medication adherence varies inversely with the number of prescriptions an individual takes each day (Hughes 2004). Hence, if an individual has multiple prescriptions, their medication adherence may be low.

While alcohol and illicit drug use appears atypical in this population, the occurrence of "Other" drugs, narcotics, and depressant use among FI senior drivers is not unprecedented given retail drug sales and how frequently these drugs are prescribed. Among all written prescriptions, cardiovascular, central nervous system, and gastrointestinal medications are typically the most prevalent pharmacologic agents prescribed to older individuals (Jorgensen, Johansson et al. 2001; Qato, Alexander et al. 2008). It is possible that the medications listed as "Other" were these types of pharmacological agents; it is also possible that these substances were over-the-counter medications as elderly adults are the largest consumer of such products based on retail drug sales (Fulton and Allen 2005). As for the prevalence of opioid analgesics and depressants, their use in the U.S. has dramatically increased over the past two decades (Paulozzi, Ballesteros et al. 2006). The retail sales of oxycodone and hydrocodone rose almost 600% and 200%, respectively, between 1997 and 2005 (Manchikanti 2007). The number of emergency department visits due to opioid and benzodiazepine use increased 111% and 89%, respectively, between 2004 and 2008 (Centers for Disease Control and Prevention 2010), which may be partially attributed to the concomitant use of these medications (Jones, Mogali et al. 2012). Because these substances are commonly prescribed in healthcare, it is not unexpected that they would be detected, especially since both classes of medication are known to potentially affect driving ability (Dassanayake, Michie et al. 2011).

While licit drugs were detected in a portion of this population, the findings of this analysis are not suggesting causation. The fundamental challenge of studying the association between licit drugs and driving ability is that the relationship is not always as clear compared to alcohol (National Highway Traffic Safety Administration 2010). First, drugs may affect individuals differently. This could be attributed to a myriad of factors such as an individual's genetics (Daly 2014), current health status (Bushardt, Massey et al. 2008), drug dosage and half-life (Brown, Milavetz et al. 2013), drug interactions (Bushardt, Massey et al. 2008), or developed tolerance (Stein and Baerwald 2014). Secondly, not all drugs affect driving ability. Although, several drugs, including some of those found in this analysis, have been linked to increased motor vehicle collisions including barbiturates (Christensen, Nielsen et al. 1990), insulin (Hours, Fort et al. 2008), antihistamines (Verster and Volkerts 2004), narcotics (Bachs, Engeland et al. 2009), antipsychotics (Carr 2000), and muscle relaxants (Carr 2000). Third, disease-medication relationships are nearly impossible to distinguish. It is possible that disease may be affecting an individual's driving ability and not the medication taken to mitigate symptoms of disease progression. Several medical conditions have been associated with increased risk of motor vehicle collision including sleep apnea (Ellen, Marshall et al. 2006) dementia (Brown and Ott 2004), arthritis (Cross, McGwin et al. 2009), diabetes (Hansotia and Broste 1991), epilepsy (Hansotia and Broste 1991), anxiety (Sagberg 2006), depression (Sagberg 2006), and Parkinson's disease (Uc,

Rizzo et al. 2006). Given the decedent nature of the population, these points could not be explored.

Strengths and Limitations

The strengths of this analysis were the use of multi-state data over a 5-year period. The weaknesses of this study were the limitations of the FARS data (Berning and Smither 2014). Due to differences in drug testing and reporting, not all states were included in this analysis as to avoid bias. While this study was limited to states with testing rates higher than 80%, a portion of drivers were still not tested for drugs. FARS does not list every drug in existence; many substances are listed as “Other”. Therefore, it is unknown what type of pharmacologic agent (i.e. over-the-counter, prescription, etc.) an “Other” drug was. A second limitation of the FARS data involves metabolites. FARS lists the drugs detected in individuals; some of these reportable substances may be metabolites. It may be difficult to determine the parent drug based on the metabolite reported, particularly if the parent drug was not detected or if a pharmacologic agent is a metabolite of more than one drug. Additionally, a maximum of three drugs can be reported per person in FARS, which could be a bias in cases of multiple-drug involvement. Furthermore, the results of this analysis also do not prove that the drugs identified were the cause for collision or that—in the case of legal, prescription drugs—they were being misused or abused by the driver. Also, this study only investigated drug and alcohol usage in FI drivers. It is possible that differences in drug and/or alcohol use could exist between those drivers who were injured or uninjured compared to those fatally injured in a motor vehicle collision. As mentioned previously, this study also did not account for the quantitative aspects of drug use (i.e. amount detected in toxicology sample, drug dosage, half-life, etc.) or the driver's health status or frailty as this information was unknown. Also, the study population included more males than females; future studies could investigate gender differences in drug use among senior drivers injured or killed in motor vehicle collisions.

While the prevalence of drug use was considerably less among FI senior drivers compared to FI middle-aged drivers included in this analysis, nearly 20% of the FI senior drivers consumed commonly prescribed medications which are known to affect driving ability. From a public health perspective, patient education, particularly among older adult drivers, may be needed. As the U.S. population ages and many seek to maintain their mobility, interventions to increase awareness that commonly prescribed medications may affect driving ability are likely warranted.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1

Characteristics of fatally injured drivers 65 years of age and older with known drug test results, United States[a], 2008-2012.

Characteristic	Drivers ≥65 years who tested negative for drugs (N=1,002)		Drivers ≥65 years who tested positive for drugs (N=250)		Total Drivers ≥65 years with known test results (N=1,252)		Prevalence of drug positive results by sub-group	Prevalence Ratio (95% CI)[d]
	No. of drivers	%	No. of drivers	%	No. of drivers	%	Per 1,000	
Age (in years)								
65-69	291	29.0	86	34.4	377	30.1	228.1	1.00 (Reference)
70-79	378	37.7	103	41.2	481	38.4	214.1	0.94 (0.71, 1.25)
80-89	291	29.0	58	23.2	349	27.9	166.2	0.73 (0.52, 1.02)
≥90	42	4.2	3	1.2	45	3.6	66.7	0.29 (0.10, 0.92)
Gender								
Male	679	67.8	168	67.2	847	67.7	198.3	1.00 (Reference)
Female	323	32.2	82	32.8	405	32.3	202.5	1.02 (0.78, 1.33)
Race								
White	707	89.6	182	92.4	889	90.2	204.7	1.00 (Reference)
African American	55	6.9	10	5.1	65	6.6	153.8	0.75 (0.40, 1.42)
Asian	19	2.4	1	0.5	20	2.0	50.0	0.24 (0.03, 1.74)
Native American	8	1.0	4	2.0	12	1.2	333.3	1.63 (0.60, 4.38)
Unknown	213		53		266			
Ethnicity								
Hispanic	34	4.3	4	2.0	38	3.9	203.4	0.52 (0.19, 1.39)
Non-Hispanic	756	95.7	193	98.0	949	96.2	105.3	1.00 (Reference)
Unknown	212							
Type of drug test given								
Urine	62	6.3	8	3.2	70	5.7	114.3	0.62 (0.30, 1.25)
Blood	900	90.9	204	82.6	1,104	89.3	184.8	1.00 (Reference)
Urine & Blood	28	2.8	35	14.2	63	5.1	555.6	3.01 (2.10, 4.30)
Unknown	12		3		15			
Blood alcohol concentration (g/dl)								
0	888	89.0	213	86.6	1,101	88.5	193.5	1.00 (Reference)
≥0.01	110	11.0	33	13.4	143	11.5	230.8	1.19 (0.83, 1.72)
Missing	4		4		8			
Number of drugs detected at time of crash[b]								
0	1,002	100.0	N/A		1,002	80.0	N/A	N/A
1	N/A		152	60.8	152	12.1	N/A	N/A
2	N/A		54	21.6	54	4.3	N/A	N/A
3	N/A		44	17.6	44	3.5	N/A	N/A

Characteristic	Drivers ≥65 years who tested negative for drugs (N=1,002)		Drivers ≥65 years who tested positive for drugs (N=250)		Total Drivers ≥65 years with known test results (N=1,252)		Prevalence of drug positive results by sub-group	Prevalence Ratio (95% CI)[d]
	No. of drivers	%	No. of drivers	%	No. of drivers	%	Per 1,000	
DWI conviction within past 3 years[c]								
No	987	99.6	247	100.0	1,234	99.7	200.2	N/A
Yes	4	0.4	0	0.0	4	0.3	0.0	N/A
Unknown	11		3		14			
Crash within past 3 years								
No	830	86.6	193	91.5	1,023	87.5	188.7	1.00 (Reference)
Yes	128	13.4	18	8.5	146	12.5	123.3	0.65 (0.40, 1.06)
Unknown	44		39		83			
Day of crash								
Friday-Sunday	389	38.8	112	44.8	501	40.0	223.6	1.22 (0.95, 1.56)
Monday-Thursday	613	61.2	138	55.2	751	60.0	183.8	1.00 (Reference)
Time of crash								
Day (7:00am-6:59pm)	805	80.3	195	78.0	1,000	79.9	195.0	1.00 (Reference)
Night (7:00pm-6:59am)	197	19.7	55	22.0	252	20.1	218.3	1.12 (0.83, 1.51)
Number of vehicles involved								
1	397	39.6	112	44.8	509	40.7	220.0	1.18 (0.92, 1.52)
≥2	605	60.4	138	55.2	743	59.4	185.7	1.00 (Reference)
Seat belt usage								
Yes	638	66.8	131	56.0	769	64.7	170.4	1.00 (Reference)
No	317	33.2	103	44.0	420	35.3	245.2	0.69 (0.54, 0.90)
Missing	47		16		63			
Weather conditions at time of crash[d]								
Clear	896	89.4	225	90.0	1,121	89.5	200.7	1.00 (Reference)
Adverse	106	10.6	25	10.0	131	10.5	190.8	0.95 (0.63, 1.43)
Year of crash								
2008	242	24.2	38	15.2	280	22.4	135.7	1.00 (Reference)
2009	186	18.6	52	20.8	238	19.0	218.5	1.61 (1.06, 2.45)
2010	205	20.5	40	16.0	245	19.6	163.3	1.20 (0.77, 1.88)
2011	191	19.1	61	24.4	252	20.1	242.1	1.78 (1.19, 2.67)
2012	178	17.8	59	23.6	237	18.9	248.9	1.83 (1.22, 2.76)

[a] States included in this analysis are. Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia

[b] N/A=not applicable

[c] DWI=driving while intoxicated

[d] CI=confidence interval

Table 2

Prevalence rates and ratios of drug involvement in fatally injured drivers ≥65 years of age with known drug test results compared to a control group of fatally injured drivers 30-50 years of age with known drug test results, United States[a], 2008-2012.

Drug Category	Drivers ≥65 years (No. Drivers Tested=1,252)		Drivers 30-50 years (No. Drivers Tested=3,075)		
	No. Positive	rate/1,000	No. Positive	rate/1,000	Rate ratio[b], (95% CI[c])
Any drug usage	250	199.7	1,140	370.7	0.53 (0.47, 0.62)
Multiple drug groups detected	55	43.9	320	104.1	0.41 (0.34, 0.51)
Drug and alcohol use	33	26.4	601	195.4	0.13 (0.09, 0.19)
Alcohol use only	143	114.2	1,503	488.8	0.23 (0.19, 0.28)

[a]States included in this analysis are Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia

[b]Rates and ratios were attained through Poisson regression with robust error variance and controlled for the random effects of state

[c]CI=confidence interval

Table 3

Proportions of broad drug categories and specific drugs identified in fatally injured drivers that tested positive for licit and/or illicit drug use, United States[a], 2008-2012

Drug Category or Type	Drivers ≥65 years old (No. Positive=250)		Drivers 30-50 years old (No. Positive=1,140)	
	No. Positive	Proportion[b] (%)	No. Positive	Proportion (%)
Broad drug categories				
Others	156	62.4	305	26.8*
Narcotics	63	25.2	229	20.1*
Depressants	65	26.0	193	16.9
Cannabinoid	15	6.0	372	32.6*
Stimulants	13	5.2	369	32.4*
Specific drugs				
Benzodiazepines	41	16.4	157	13.8*
Hydrocodone/Oxycodone	31	12.4	145	12.7*
Barbiturates	7	2.8	9	0.8
Cocaine	4	1.6	163	14.3*
Methadone	1	0.4	41	3.6*

[a] States included in this analysis are Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia

[b] Proportions will not equal 100% as drivers may have tested positive for multiple drugs

* Specifies statistical significance (P<0.05) between age groups for each drug category or type by Fisher's Exact tests

TABLE 4a

Most commonly encountered broad drug categories and combinations identified in fatally injured drivers with positive drug test results ≥65 years of age compared to a control group 30-50 years of age, United States[a], 2008-2012

Drivers ≥65 years (N=250)		Drivers 30-50 years (N=1,140)	
Broad Drugs or Broad Drug Combinations Most Frequently Detected	**No. (%)**	**Broad Drugs or Broad Drug Combinations Most Frequently Detected**	**No. (%)**
1 Drug Detected	152 (60.8)	1 Drug Detected	724 (63.5)
Other	89 (58.6)	*Cannabinoid*	245 (33.8)
Narcotic	23 (15.1)	*Stimulant*	208 (28.7)
Depressant	22 (14.5)	*Other*	144 (19.9)
Cannabinoid	10 (6.6)	*Narcotic*	65 (9.0)
Stimulant	8 (5.3)	*Depressant*	44 (6.1)
2 Drugs Detected	54 (21.6)	2 Drugs Detected	273 (23.9)
2 Other	19 (35.2)	*Stimulant and Cannabinoid*	51 (18.7)
Depressant and Other	9 (16.7)	*Cannabinoid and Other*	30 (11.0)
Narcotic and Depressant	6 (11.1)	*Stimulant and Other*	28 (10.3)
Narcotic and Other	6 (11.1)	*Narcotic and Depressant*	23 (8.4)
2 Depressants	5 (9.3)	*Narcotic and Stimulant*	22 (8.1)

b: Other indicates that the drug(s) detected was not classified as a narcotic, depressant, stimulant, hallucinogen, cannabinoid, phencyclidine, anabolic steroid, or inhalant.

[a]States included in this analysis are Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia

TABLE 4b

Most commonly encountered specific drugs and combinations identified in fatally injured drivers with positive drug test results ≥65 years of age compared to a control group 30-50 years of age, United States[a], 2008-2012

Drivers ≥65 years (N=250)		Drivers 30-50 years (N=1,140)	
Specific Drugs or Specific Drug Combinations Most Frequently Detected	**No. (%)**	**Specific Drugs or Specific Drug Combinations Most Frequently Detected**	**No. (%)**
1 Drug Detected	152 (60.8)	1 Drug Detected	724 (63.5)
Other	89 (58.6)	*Cannabis*	245 (33.8)
Cannabis	10 (6.6)	*Other*	144(19.9)
Hydrocodone	6 (4.0)	*Amphetamine*	124 (17.1)
Diazepam	5 (3.3)	*Cocaine*	79 (10.9)
2 Drugs Detected	54 (21.6)	2 Drugs Detected	273 (23.9)
2 Other drugs	19 (35.2)	*Cannabis and Other*	30 (11.1)
Hydrocodone and Other	3 (5.6)	*Amphetamine and Cannabis*	30 (11.0)
		Cocaine and Cannabis	21 (7.7)

b: Other indicates that the drug(s) detected was not classified as a narcotic, depressant, stimulant, hallucinogen, cannabinoid, phencyclidine, anabolic steroid, or inhalant.

[a]States included in this analysis are Alaska, California, Maryland, Montana, Nevada, New Hampshire, New Jersey, New Mexico, North Dakota, Ohio, Rhode Island, Vermont, Washington, and West Virginia