

Characteristics of Fatal Crashes Involving 16- and 17-Year-Old Drivers with Teenage Passengers

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Teens have the highest crash rate of any group in the United States.

Title

Characteristics of Fatal Crashes Involving 16-and 17-Year-Old Drivers with Teenage Passengers (October 2012)

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Abstract

Several studies have found that the presence of teenage passengers increases the crash risk of teenage drivers. Most U.S. states now have graduated driver licensing systems that limit the number of passengers that a young driver is allowed to carry in the vehicle during the first several months of licensed independent driving. The objective of this study was to document the proportion of fatal crashes of 16- and 17-year-old drivers in which passengers were present in relation to the age, sex, and number of passengers in the vehicle, and to examine the characteristics of these crashes in relation to specific combinations of passengers. State-by-state summary data are also provided.

Data on fatal crashes that occurred in the United States from 2005 through 2010 and involved a 16- or 17-year-old driver of a passenger vehicle (car, pickup truck, van, minivan, or sport utility vehicle) were analyzed. Crashes that occurred in the state of Virginia were excluded due to evident under-reporting of the presence of passengers who were not injured.

There were 3,667 16-year-old drivers and 5,911 17-year-old drivers involved in fatal crashes over the study period; 57% had at least one passenger. Most commonly, all passengers in the vehicle were aged 13-19; this was the case for 42% of all drivers in fatal crashes and 73% of those with any passengers. Of fatal-crash-involved drivers with teenage passengers and no passengers of other ages, 56% had one passenger, 24% had two, and 20% had three or more. The passengers were most frequently of the same sex as the driver and within one year of the driver's age.

Among fatal crashes of 16- and 17-year-old drivers, crash and injury risk factors of speeding, alcohol use, late-night driving, lack of a valid driver's license, seatbelt non-use, and responsibility for the crash were more prevalent when teenage passengers were present than when the driver was alone, and the prevalence of these risk factors generally increased as the number of teenage passengers increased. All risk factors except lack of a valid license were least prevalent when an adult passenger aged 30 or older was present.

Although most state graduated driver licensing systems now include a restriction on carrying passengers for the first several months of licensed independent driving, teenage passengers still are present in more than two of every five fatal crashes of 16- and 17-year-old drivers. The data presented in this report can help states identify remaining targets of opportunity to prevent fatal crashes that involve teenage drivers with teenage passengers through refinements to their graduated driver licensing programs as well as other means, such as enhanced enforcement of existing laws by police as well as by parents.

Introduction

Teenage drivers are involved in more crashes per mile driven than drivers of any other age group; drivers aged 16-17 are involved in about seven times as many crashes per mile driven as drivers in their forties, fifties, or sixties (General Estimates System, 2012; National Household Travel Survey, 2011). While the oldest drivers have a higher rate of driver deaths per mile driven—mostly attributable to their increased likelihood of dying if they are involved in a crash rather than elevated risk of crash involvement—teenage drivers have the highest rates of involvement in crashes that result in the death of other people, such as their passengers, pedestrians, or drivers and passengers in other vehicles (Tefft, 2008).

Several studies have shown that the presence of passengers increases teenage drivers' risk of involvement in severe or fatal crashes, especially when the passengers are also teenagers (Chen et al., 2000; Doherty, Andrey, & MacGregor, 1998; Preusser, Ferguson, & Williams, 1998; Rice, Peek-Asa, & Kraus, 2003; Tefft, Williams, & Grabowski, 2012). All of these studies also reported that this risk increases as the number of teenage passengers increases. Interestingly, the presence of young passengers seems to increase the risk of crashes that resulted in severe injury (Rice, Peek-Asa, & Kraus, 2003) or death (Chen et al., 2000; Tefft, Williams, & Grabowski, 2012) to a greater degree than it increases the risk of less severe crashes.

This elevated risk is believed to be attributable both to in-vehicle distractions and to risk taking related to characteristics associated with adolescent development (National Research Council, 1999; 2006). A study of police reports of fatal crashes that involved 16year-old drivers in the state of California identified cases in which passengers urged the driver to perform dangerous behaviors, cases in which passengers had physically interfered with the driver (e.g., by grabbing the steering wheel), as well as cases in which it was evident that the passengers had distracted the driver (Williams, Preusser, & Ferguson, 1998). A recent study that used in-vehicle cameras to monitor a sample of teens for their first six months of licensed driving found that although passengers did not often actively urge the driver to take risks, drivers were more likely to speed, tailgate, or show off when they had multiple teenage passengers in the vehicle (Goodwin, Foss, & O'Brien, 2012), suggesting that it was the mere presence of the passengers that affected the driver's behavior. Somewhat unexpectedly, in another study in which a different sample of newlylicensed teens was monitored using cameras and other in-vehicle data collection equipment, risky driving (as indicated by elevated g-force events, e.g., hard acceleration, braking, or swerving) was found to be less frequent in the presence of teen passengers (Simons-Morton et al., 2011).

In recent years, the predominant means by which jurisdictions have attempted to address the well-documented risks that young drivers face has been graduated driver licensing (GDL) systems. GDL systems seek to foster learning to drive under safe conditions by initially placing some restrictions on new drivers, and then relaxing the restrictions and granting more privileges as the young driver gains experience. Typically, a new driver first receives a learner's permit, and is only allowed to drive with a parent or another licensed adult in the vehicle. After holding the learner's permit for a certain amount of time, completing a specified amount of supervised driving practice, or both (specific requirements vary by state), the driver can receive an intermediate license (referred to in some states as a provisional license, a probationary license, or a junior operator's license), which allows driving without an adult in the car, but only under certain conditions. During the intermediate stage of licensure, most states prohibit driving during certain late-night hours and place a limit on the number of young passengers (e.g., under age 21) that the driver is allowed to have in the car. When the driver has had the intermediate license for a certain length of time (e.g., 6 months) or reaches a certain age (e.g., 18), the driver "graduates" to a full license with no such restrictions. It is well-established that GDL has been effective in reducing the crash involvement rates of young drivers (Shope, 2007). Studies that have investigated the effect of passenger restrictions specifically have consistently reported that they have been effective in reducing the crash involvement of young drivers carrying passengers (Chaudhary, Williams, & Nissen, 2007; McCartt et al., 2010; Fell et al., 2011).

As of the end of the study period (December 31, 2010), 42 U.S. states and the District of Columbia had some form of passenger restriction as a part of their GDL program (Insurance Institute for Highway Safety [IIHS], 2012) (Appendix A). In addition, two states—Michigan and Pennsylvania—implemented passenger restrictions between the end of the study period and the publication date of this report. As Appendix A shows, there is substantial variation among states in the number of passengers that a driver with an intermediate license is allowed to carry, as well as in the duration of the passenger restriction.

The objective of this study was to document the proportion of fatal crashes of 16- and 17year-old drivers in which passengers were present in relation to the age, sex, and number of passengers in the vehicle, and to examine the characteristics of these crashes in relation to specific combinations of passengers. In addition, summary data on the number of fatal crashes of 16- and 17-year-old drivers with various combinations of passengers are presented on a state-by-state basis to allow identification of targets of opportunity for improvement at the state level in the implementation, refinement, or enforcement of passenger restrictions as a part of each state's overall strategy to reduce the number of teenage drivers involved in fatal motor vehicle crashes.

Methods

Data

Data on 16- and 17-year-old drivers involved in fatal crashes were obtained from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS), a federal database of all motor vehicle crashes that occur on public roadways in the United States and result in a death within 30 days of the crash. Data from crashes that occurred in years 2005 – 2010 and involved a passenger vehicle (car, pickup truck, van, minivan, or sport utility vehicle) driven by a 16- or 17-year-old driver (referred to hereafter as *subject driver*) were analyzed.

Analysis

The data were tabulated in relation to the subject driver's age and sex, the age, sex, number of passengers in the subject driver's vehicle, and crash- and injury risk factors including the

time of day, the subject driver's seatbelt use, alcohol use, licensing status, whether the driver was coded as speeding, and whether the subject driver was coded as having been at least partially responsible for the crash. For the purpose of the study, the subject driver was considered to have been using alcohol if his or her blood alcohol concentration (BAC) was greater than zero. BAC values were based on the results of alcohol tests when they were available; in cases in which BAC tests were not performed or test results were not available, BAC values imputed by NHTSA (Rubin, Shafer, & Subramanian, 1998) were used. Classification of driver alcohol use was based on both known and imputed BAC values. Although the FARS data do not contain assignment of fault, for the purpose of the study, a driver was considered to have been at least partially responsible for the crash if the crash was a single vehicle crash (involved only the subject driver's vehicle) or if the subject driver was coded as having committed an improper action or error that contributed to the crash.¹

Data from the state of Virginia were excluded due to apparent under-reporting of the presence of passengers who were not injured. Under-reporting of uninjured passengers would bias results related to the age, sex, and number of passengers present in the subject driver's vehicle. Rice & Anderson (2009) examined FARS data from years 1996 to 2005 and found that data from several states appeared to exclude uninjured passengers. To investigate whether this problem was present in the years of data analyzed for the current study, the ratio of the proportions of passengers coded as uninjured to drivers (of any age, not limited to drivers aged 16-17) coded as uninjured was tabulated by state. The overall national ratio was 0.93, and the average state ratio was 0.95 (s.d. 0.19). Virginia, with a ratio of 0.05, was identified as likely under-reporting passengers who were not injured; the ratios ranged from 0.68 to 1.42 in all other states.

Results

There were 9,578 drivers ages 16-17 involved in fatal crashes in the United States (Virginia excluded) over the six years from 2005 through 2010. Overall, 43% had no passengers, 42% had 1 or more passengers aged 13-19 and no passengers of any other ages, and a combined 16% had any passengers younger than age 13 or older than age 19, alone or in combination with teen-aged passengers (Table 1). Although the total number of 16- and 17-year-old drivers involved in fatal crashes each year decreased by 44% over the study period—from 2,006 in 2005 to 1,124 in 2010—the proportion with teenage passengers was nearly

¹ Improper actions and errors considered indicative of at least partial responsibility for the crash included the following driver-related contributing factors coded in FARS: aggressive driving; failing to dim lights or have lights on when required; operating without required equipment; following improperly; improper or erratic lane changing; failure to keep in proper lane; illegal driving on road shoulder, sidewalk, or median; improper entry to or exit from trafficway; starting or backing improperly; opening vehicle closure into moving traffic or while vehicle was in motion; passing where prohibited; passing on wrong side; passing with insufficient distance or inadequate visibility; failing to yield to overtaking vehicle; operating vehicle in an erratic, reckless, careless, or negligent manner; speeding; failure to yield right of way; failure to obey traffic signs, traffic control devices, or traffic officers; passing through or around a barrier; failure to observe warnings or instructions on a vehicle displaying them; failure to signal; making improper turn; making right turn from left-turn lane or making left turn from right-turn lane; driving in the wrong direction on a one-way trafficway; stopping in the roadway; and over-correcting.

by rear, Month, Day of	i week, anu	Time of Da	ay, onneu	States, 20	005-2010	Cvirginia	Excludeuj.		
				Aged		Aged			
		All	All	<13	All	13-19			
	No	aged	aged	&	aged	&	At least 1	Other /	
	passengers	13-19	<13	13-19	20-29	20-29	aged 30+	unknown	Total
	(n=4071)	(n=3994)	(n=146)	(n=163)	(n=242)	(n=266)	(n=622)	(n=74)	(n=9578)
				Row pe	ercent				Ν
Total	43	42	2	2	3	3	6	<1	9578
Crash year									
2005	44	42	1	2	3	3	6	<1	2006
2006	44	41	1	2	2	2	6	<1	1971
2007	42	42	2	2	3	3	7	<1	1861
2008	43	42	2	1	2	3	7	<1	1394
2009	41	41	2	2	3	3	6	2	1222
2010	41	43	2	1	2	3	6	2	1124
Crash month									
Jan/Feb/Mar	42	43	2	2	2	3	6	<1	2112
Apr/May/Jun	42	42	1	2	2	3	8	<1	2432
Jul/Aug/Sep	42	40	2	2	3	3	7	1	2561
Oct/Nov/Dec	44	42	1	2	3	3	6	<1	2473
Crash day									
Friday-Sunday	40	44	1	2	3	3	7	<1	4999
Monday-Thursday	46	39	2	2	2	2	6	<1	4579
Crash time									
5 AM-10:59 PM	43	41	2	2	2	2	7	<1	7777
11 PM-4:59 AM	39	45	0	1	5	5	4	<1	1759

Table 1. 16- and 17-Year-Old Drivers Involved in Fatal Crashes in Relation to Combination of Passengers Present, by Year, Month, Day of Week, and Time of Day, United States, 2005-2010 (Virginia Excluded).

Row percents may not add to 100 due to rounding.

constant over the six-year period, ranging from 41% to 43% (Table 1). There was no apparent variation by season in the distribution of passengers present in the vehicles of fatal-crash involved young drivers. Among fatal-crash involved young drivers, those who crashed on Friday, Saturday, or Sunday were more likely to have had teen-aged passengers than were those who crashed on Monday through Thursday, and those who crashed late at night (11 PM – 4:59 AM) were more likely to have had teenage passengers than were those who crashed at other times of day.

Table 2 shows passenger combinations by driver age and sex for drivers involved in fatal crashes. In each of the four driver groups, the majority (57% in all) had one or more passengers. Overall, 16-year-old males were the most likely to have had teenage passengers in the vehicle at the time of the crash (46%), and 17-year-old females were the least likely to have had teenage passengers (35%). At both ages, males were more likely than females to have been carrying teenage passengers.

	Driver age 16		Driver	A 11	
	Male	Female	Male	Female	All
	(N=2311)	(N=1356)	(N=3899)	(N=2012)	(N=9578)
Ages of passengers		C	olumn perce	nt	
No passengers	39	41	43	47	43
All aged 13-19	46	41	43	35	42
All aged < 13	1	2	1	3	2
Ages <13 & 13-19	1	3	1	2	2
All aged20-29	2	2	3	3	3
Ages 13-19 & 20-29	2	2	3	4	3
At least one aged 30+	8	8	6	5	6
Other / unknown	1	1	1	1	1

Table 2. Drivers Involved in Fatal Crashes, by Driver Age, Sex, and Ages of Passengers, United States, 2005–2010 (Virginia Excluded).

Column percents may not add to 100 due to rounding.

Table 3 shows fatal crash involvements in which one or more teenage passengers and no passengers of any other ages were present, in relation to the number of teenage passengers. In the majority of cases (56% overall) only one passenger was present. These distributions changed little over the six-year period. When computed as a proportion of all young driver fatal crash involvements including those with no passengers and those with passengers of other ages, the one-teen-passenger scenario represented between 22-24% of all fatal crash involvements of 16- and 17-year-old drivers in 2005-2010; two teen passengers were present in 9-11%, and three or more were present in 7-9% of all fatal crash involvements.

Number of Passengers, Onited States, 2005–2010 (Virginia Excluded).								
	Drivera	age 16	Driver a	Driver age 17				
	Male	Female	Male	Female	7111			
	(N=1066)	(N=555)	(N=1667)	(N=706)	(N=3994)			
Number of								
passengers		С	olumn Percei	nt				
1	55	57	55	60	56			
2	24	24	24	22	24			
3+	21	19	21	18	20			

Table 3. Drivers with Only Teenage Passengers, by Driver Age, Sex, and Number of Passengers, United States, 2005–2010 (Virginia Excluded).

Table 4 shows a clear tendency for male teen drivers in fatal crashes to have been transporting other male passengers and for females to be transporting female passengers. Same-sex driver and passenger configurations were somewhat more likely to be the case for male drivers, especially 16-year-olds (65%) compared with 60% for 17-year-old males, and 57% for both 16- and 17-year-old female drivers.

	Male driver		Female	A 11	
	Age 16	Age 17	Age 16	Age 17	All
	(N=1066)	(N=1667)	(N=555)	(N=706)	(N=3994)
Number and sex of passengers	(olumn percei	nt	
1 male	41	37	17	19	32
2+ male	24	22	6	5	17
1 female	14	18	40	41	24
2+ female	5	5	17	16	8
2+ male and female	17	18	19	19	18

Table 4. Drivers with Only Teenage Passengers, by Number and Sex of Passengers, United States, 2005–2010 (Virginia Excluded).

Column percents may not add to 100 due to rounding.

Table 5 shows the ages of passengers in vehicles in which all passengers were teens, by single year of age, in relation to the age and sex of the driver. Passenger ages tended to cluster around the age of the driver—for all combinations of driver age and sex, more than 70% of all teenage passengers were within one year of the driver's age.

Table 5. Passengers in Vehicles in which All Passengers were Ages 13-
19, by Driver Age, Sex, and Single Year of Passenger Age, United States,
2005–2010 (Virginia Excluded).

	Driver a	age 16	Driver	age 17
	Male	Female	Male	Female
	(n=1897)	(n=947)	(n=2935)	(n=1185)
Passenger age		Colum	n percent	
13	4	3	2	2
14	9	8	7	6
15	23	20	15	15
16	35	37	23	22
17	19	19	32	32
18	7	8	16	17
19	4	3	5	5

Note: n's correspond to the total number of passengers with driver of age and sex shown, not the total number of drivers.

Column percents may not add to 100 due to rounding.

Table 6 shows driver and crash characteristics in relation to driver sex and passenger configuration for 16- and 17-year-old drivers involved in fatal crashes. All risk factors examined were more common among male drivers than among females. A clear pattern emerged in which drivers with teenage passengers were more likely to have been reported in FARS as speeding, at least partially responsible for the crash, and lacking a valid license. The proportion of fatal crashes that occurred late at night also increased as the number of teenage passengers increased. Driver alcohol use followed this pattern only for male drivers.

For drivers of both sexes, alcohol use, seatbelt non-use, lack of valid license, and late-night occurrence were all most prevalent in the presence of passengers aged 20-29, alone or in combination with teen-aged passengers. Speeding was also most prevalent among male drivers with passengers aged 20-29. The proportion of drivers classified as at least partially responsible for the crash was elevated to a similar extent in the presence of passengers ages 20-29 as in the presence of multiple teen passengers. All risk factors except lack of valid license were least prevalent in the presence of passengers ages 30 and older; lack of valid license was least prevalent among drivers with no passengers.

Data for individual states and the District of Columbia are presented in Tables 7 and 8. Table 7 displays, separately for 16- and 17-year-olds, the total number of drivers involved in fatal crashes over the study period, and the number and percentages of these drivers that had passengers of any age; teen passenger(s) only; and passengers of other ages (with or without teen passengers). There is considerable variation between states in the proportion of fatal-crash-involved teen drivers who were transporting passengers, but in general the state results reflect the national data. For example, among states in which the number of 16- and 17-year-old drivers involved in fatal crashes over the study period was at least 25, the percentage with any passengers ranged from 46% to 72%; in 14 states, 60% or more had passengers. The proportion of fatal-crash-involved drivers that had teenage passengers and no passengers of other ages ranged from 31% to 56%; the percentage was between 31% and 39% in 14 states, 40-44% in 18 states, and 45-49% in 10 states. The percentage of other passenger groupings in the vehicles of 16- and 17-year-old drivers involved in fatal crashes ranged from 10% to 29%.

Table 8 shows the number of passengers (one, two, more than two) for the drivers transporting teenage passengers only. Among fatal-crash-involved drivers ages 16 and 17 with teen passengers only, the proportion with only one passenger ranged from 31% to 71%. In seven states, the majority of drivers with any teen passengers in the vehicle had multiple teen passengers.

		Speeding	Responsible ^a	11 PM - 4:59 AM	Driver unbelted ^b	Unlicensed or invalid license	Driver BAC .01+ ^c
All drivers			•	Row pe	rcent ^d		
No passengers	(n=4071)	30	79	17	33	9	13
1 Passenger aged 13-19	(n=2235)	38	84	16	35	12	15
2 passengers aged 13-19	(n=956)	44	87	22	34	12	17
3+ passengers aged 13-19	(n=803)	48	91	28	36	17	18
All passengers aged 20-29	(n=242)	44	85	34	41	34	35
Passengers aged 13-19 & 20-29	(n=266)	47	88	34	48	27	32
All passengers aged 30+	(n=316)	15	68	9	18	19	9
Passenger aged 30+ and others	(n=306)	23	77	15	23	23	13
Other/unknown	(n=383)	29	81	8	31	21	8
Total	(n=9578)	35	82	18	33	13	15
Male driver							
No passengers	(n=2580)	32	81	19	36	12	15
1 Passenger aged 13-19	(n=1494)	43	86	19	39	14	17
2 passengers aged 13-19	(n=665)	47	89	23	37	14	18
3+ passengers aged 13-19	(n=574)	50	93	30	37	19	22
All passengers aged 20-29	(n=145)	53	90	40	44	48	43
Passengers aged 13-19 & 20-29	(n=157)	54	89	34	52	32	37
All passengers aged 30+	(n=212)	18	70	8	21	22	10
Passenger aged 30+ and others	(n=191)	27	77	19	26	25	16
Other/unknown	(n=192)	32	81	12	35	25	9
Total	(n=6210)	38	84	21	36	16	18
Female driver							
No passengers	(n=1491)	25	75	13	28	5	10
1 Passenger aged 13-19	(n=741)	29	81	11	27	8	10
2 passengers aged 13-19	(n=291)	36	83	22	28	9	13
3+ passengers aged 13-19	(n=229)	41	88	23	32	11	10
All passengers aged 20-29	(n=97)	30	78	25	36	14	23
Passengers aged 13-19 & 20-29	(n=109)	37	85	33	41	19	24
All passengers aged 30+	(n=104)	8	65	9	10	11	5
Passenger aged 30+ and others	(n=115)	17	77	9	17	19	8
Other/unknown	(n=191)	25	82	5	28	16	7
Total	(n=3368)	28	79	14	28	9	10

Table 6. Characteristics of Fatal Crashes Involving 16- and 17-Year-Old Drivers, by Driver Sex and Passenger Configuration, United States, 2005-2010 (Virginia Excluded).

a. Any driver coded as having committed one or more of selected actions or errors (see text) or involved in a single-vehicle crash responsible.

b. 7% of males and 5% of females had unknown seatbelt use, percentages based on cases with known seatbelt use only. Other column variables were missing in less than 1% of cases.

c. Based on measured and multiply-imputed values of BAC reported by NHTSA.

d. Drivers for whom column variable was present (e.g., driver speeding) as a percent of all drivers with passenger configuration in row. Column variables are not mutually exclusive, thus percents do not add to 100.

	Driver age 16				Driver age 17				Total			
	Any passengers	All ages 13-19	Other	Total	Any	All ages 13-19	Other	Total	Any passengers	All ages 13-19	Other	Total
	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N
Alabama	96 (60)	56 (35)	40 (25)	159	91 (53)	54 (31)	37 (21)	173	187 (56)	110 (33)	77 (23)	332
Alaska	6 (55)	2 (18)	4 (36)	11	4 (36)	2 (18)	2 (18)	11	10 (45)	4 (18)	6 (27)	22
Arizona	52 (68)	37 (48)	15 (19)	77	71 (64)	52 (47)	19 (17)	111	123 (65)	89 (47)	34 (18)	188
Arkansas	33 (55)	26 (43)	7 (12)	60	53 (58)	41 (45)	12 (13)	91	86 (57)	67 (44)	19 (13)	151
California	114 (64)	86 (48)	28 (16)	178	245 (60)	173 (42)	72 (18)	410	359 (61)	259 (44)	100 (17)	588
Colorado	37 (62)	25 (42)	12 (20)	60	61 (67)	44 (48)	17 (19)	91	98 (65)	69 (46)	29 (19)	151
Connecticut	11 (55)	9 (45)	2 (10)	20	25 (57)	18 (41)	7 (16)	44	36 (56)	27 (42)	9 (14)	64
Delaware	2 (40)	2 (40)	0 (0)	5	16 (47)	10 (29)	6 (18)	34	18 (46)	12 (31)	6 (15)	39
District of Columbia	0	0	0	0	0 (0)	0 (0)	0 (0)	1	0 (0)	0 (0)	0 (0)	1
Florida	129 (57)	99 (44)	30 (13)	225	272 (58)	172 (37)	100 (21)	468	401 (58)	271 (39)	130 (19)	693
Georgia	98 (58)	70 (41)	28 (17)	169	125 (53)	89 (37)	36 (15)	238	223 (55)	159 (39)	64 (16)	407
Hawaii	3 (75)	2 (50)	1 (25)	4	4 (57)	1 (14)	3 (43)	7	7 (64)	3 (27)	4 (36)	11
Idaho	18 (56)	10 (31)	8 (25)	32	35 (73)	23 (48)	12 (25)	48	53 (66)	33 (41)	20 (25)	80
Illinois	108 (64)	89 (53)	19 (11)	168	91 (52)	69 (40)	22 (13)	174	199 (58)	158 (46)	41 (12)	342
Indiana	61 (53)	42 (36)	19 (16)	116	96 (59)	58 (35)	38 (23)	164	157 (56)	100 (36)	57 (20)	280
Iowa	37 (63)	26 (44)	11 (19)	59	34 (47)	21 (29)	13 (18)	73	71 (54)	47 (36)	24 (18)	132
Kansas	46 (64)	37 (51)	9 (13)	72	35 (49)	22 (31)	13 (18)	72	81 (56)	59 (41)	22 (15)	144
Kentucky	48 (64)	34 (45)	14 (19)	75	78 (50)	60 (38)	18 (12)	156	126 (55)	94 (41)	32 (14)	231
Louisiana	32 (54)	23 (39)	9 (15)	59	69 (57)	57 (47)	12 (10)	121	101 (56)	80 (44)	21 (12)	180
Maine	12 (55)	9 (41)	3 (14)	22	16 (50)	13 (41)	3 (9)	32	28 (52)	22 (41)	6 (11)	54
Marvland	22 (48)	15 (33)	7 (15)	46	54 (47)	42 (37)	12 (10)	115	76 (47)	57 (35)	19 (12)	161
Massachusetts	19 (68)	14 (50)	5 (18)	28	42 (55)	35 (46)	6 (8)	76	61 (59)	49 (47)	11 (11)	104
Michigan	73 (63)	60 (52)	13 (11)	116	100 (55)	74 (41)	26 (14)	181	173 (58)	134 (45)	39 (13)	297
Minnesota	47 (59)	37 (46)	10 (13)	80	52 (50)	40 (39)	12 (12)	103	99 (54)	77 (42)	22 (12)	183
Mississippi	50 (54)	33 (36)	17 (18)	92	62 (50)	40 (32)	22 (18)	125	112 (52)	73 (34)	39 (18)	217
Missouri	74 (52)	61 (43)	13 (9)	142	105 (56)	81 (43)	24 (13)	188	179 (54)	142 (43)	37 (11)	330
Montana	12 (60)	7 (35)	5 (25)	20	17 (71)	11 (46)	6 (25)	24	29 (66)	18 (41)	11 (25)	44
Nebraska	28 (44)	21 (33)	7 (11)	63	29 (52)	17 (30)	12 (21)	56	57 (48)	38 (32)	19 (16)	119
Nevada	24 (80)	14 (47)	10 (33)	30	25 (66)	15 (39)	10 (26)	38	49 (72)	29 (43)	20 (29)	68
New Hampshire	14 (74)	14 (74)	0 (0)	19	13 (65)	8 (40)	5 (25)	20	27 (69)	22 (56)	5 (13)	39
New Jersey	12 (71)	7 (41)	5 (29)	17	76 (61)	63 (50)	13 (10)	125	88 (62)	70 (49)	18 (13)	142
New Mexico	21 (68)	11 (35)	10 (32)	31	36 (61)	24 (41)	12 (20)	59	57 (63)	35 (39)	22 (24)	90
New York	39 (66)	27 (46)	12 (20)	59	129 (62)	103 (49)	26 (12)	209	168 (63)	130 (49)	38 (14)	268
North Carolina	104 (61)	75 (44)	29 (17)	170	121 (53)	91 (40)	30 (13)	228	225 (57)	166 (42)	59 (15)	398
North Dakota	11 (55)	8 (40)	3 (15)	20	14 (67)	6 (29)	8 (38)	21	25 (61)	14 (34)	11 (27)	41
Ohio	92 (57)	69 (43)	23 (14)	162	99 (51)	83 (42)	16 (8)	196	191 (53)	152 (42)	39 (11)	358
Oklahoma	52 (62)	37 (44)	15 (18)	84	68 (54)	52 (41)	16 (13)	126	120 (57)	89 (42)	31 (15)	210
Oregon	19 (58)	14 (42)	5 (15)	33	24 (59)	16 (39)	8 (20)	41	43 (58)	30 (41)	13 (18)	74
Pennsvlvania	61 (67)	46 (51)	15 (16)	91	148 (57)	118 (46)	30 (12)	258	209 (60)	164 (47)	45 (13)	349
Rhode Island	4 (80)	4 (80)	0 (0)	5	8 (47)	7 (41)	1 (6)	17	12 (55)	11 (50)	1 (5)	22
South Carolina	46 (60)	28 (36)	18 (23)	77	76 (54)	43 (30)	33 (23)	141	122 (56)	71 (33)	51 (23)	218
South Dakota	12 (63)	6 (32)	6 (32)	19	13 (45)	9 (31)	4 (14)	29	25 (52)	15 (31)	10 (21)	48
Tennessee	74 (60)	61 (50)	13 (11)	123	88 (49)	67 (38)	21 (12)	178	162(54)	128 (43)	34 (11)	301
Texas	212 (66)	154 (48)	58 (18)	319	277 (56)	192 (39)	85 (17)	497	489 (60)	346 (42)	143 (18)	816
Utah	21 (62)	18 (53)	3 (9)	34	27 (57)	18 (38)	9 (19)	47	48 (59)	36 (44)	12 (15)	81
Vermont	8 (73)	5 (45)	3 (27)	11	6 (60)	5 (50)	1 (10)	10	14 (67)	10 (48)	4 (19)	21
Washington	32 (59)	25 (46)	7 (13)	54	52 (57)	44 (48)	8 (9)	92	84 (58)	69 (47)	15 (10)	146
West Virginia	18 (60)	14 (47)	4 (13)	30	19(50)	12 (32)	7 (18)	38	37 (54)	26 (38)	11 (16)	68
Wisconsin	53 (55)	40 (42)	13 (14)	96	79 (59)	69 (52)	10 (8)	133	132 (58)	109 (48)	23 (10)	229
Wyoming	17 (68)	12 (48)	5 (20)	25	13 (62)	9 (43)	4 (19)	21	30 (65)	21 (46)	9 (20)	46
Total	2214 (60)	1621 (44)	593 (16)	3667	3293 (56)	2373 (40)	919 (16)	5911	5507 (57)	3994 (42)	1512 (16)	9578

Table 7. 16- and 17-Year-Old Drivers Involved in Fatal Crashes, by State and Passenger Configuration, United States, 2005-2010 (Virginia Excluded).

Percents based on total of fewer than 25 drivers (shown in gray) may be unstable and should be interpreted with caution.

1. Includes any driver with passengers younger than 13 or older than 20, irrespective of presence of teenage passengers.

		Driver ag	ge 16		Driver age 17			Total				
	1	2	3+	Total	1	2	3+	Total	1	2	3+	Total
	N (%)	N (%)	N (%)	Ν	N (%)	N (%)	N (%)	Ν	N (%)	N (%)	N (%)	Ν
Alabama	36 (64)	10 (18)	10 (18)	56	28 (52)	14 (26)	12 (22)	54	64 (58)	24 (22)	22 (20)	110
Alaska	1 (50)	1 (50)	0 (0)	2	2 (100)	0 (0)	0 (0)	2	3 (75)	1 (25)	0 (0)	4
Arizona	23 (62)	5 (14)	9 (24)	37	29 (56)	11 (21)	12 (23)	52	52 (58)	16 (18)	21 (24)	89
Arkansas	14 (54)	5 (19)	7 (27)	26	27 (66)	11 (27)	3 (7)	41	41 (61)	16 (24)	10 (15)	67
California	40 (47)	23 (27)	23 (27)	86	80 (46)	47 (27)	46 (27)	173	120 (46)	70 (27)	69 (27)	259
Colorado	11 (44)	5 (20)	9 (36)	25	30 (68)	6 (14)	8 (18)	44	41 (59)	11 (16)	17 (25)	69
Connecticut	5 (56)	2 (22)	2 (22)	9	6 (33)	8 (44)	4 (22)	18	11 (41)	10 (37)	6 (22)	27
Delaware	1 (50)	0 (0)	1 (50)	2	5 (50)	4 (40)	1 (10)	10	6 (50)	4 (33)	2 (17)	12
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0
Florida	56 (57)	20 (20)	23 (23)	99	104 (60)	41 (24)	27 (16)	172	160 (59)	61 (23)	50 (18)	271
Georgia	38 (54)	22 (31)	10 (14)	70	55 (62)	17 (19)	17 (19)	89	93 (58)	39 (25)	27 (17)	159
Hawaii	0 (0)	0 (0)	2 (100)	2	1 (100)	0 (0)	0 (0)	1	1 (33)	0 (0)	2 (67)	3
Idaho	7 (70)	2 (20)	1 (10)	10	16 (70)	3 (13)	4 (17)	23	23 (70)	5 (15)	5 (15)	33
Illinois	45 (51)	19 (21)	25 (28)	89	38 (55)	17 (25)	14 (20)	69	83 (53)	36 (23)	39 (25)	158
Indiana	23 (55)	10 (24)	9 (21)	42	29 (50)	19 (33)	10 (17)	58	52 (52)	29 (29)	19 (19)	100
Iowa	15 (58)	5 (19)	6 (23)	26	12 (57)	4 (19)	5 (24)	21	27 (57)	9 (19)	11 (23)	47
Kansas	16 (43)	14 (38)	7 (19)	37	16 (73)	2 (9)	4 (18)	22	32 (54)	16 (27)	11 (19)	59
Kentucky	18 (53)	9 (26)	7 (21)	34	41 (68)	9 (15)	10 (17)	60	59 (63)	18 (19)	17 (18)	94
Louisiana	11 (48)	7 (30)	5 (22)	23	32 (56)	16 (28)	9 (16)	57	43 (54)	23 (29)	14 (18)	80
Maine	5 (56)	3 (33)	1 (11)	9	8 (62)	2 (15)	3 (23)	13	13 (59)	5 (23)	4 (18)	22
Maryland	10 (67)	2 (13)	3 (20)	15	20 (48)	11 (26)	11 (26)	42	30 (53)	13 (23)	14 (25)	57
Massachusetts	9 (64)	4 (29)	1 (7)	14	17 (49)	6 (17)	12 (34)	35	26 (53)	10 (20)	13 (27)	49
Michigan	32 (53)	14 (23)	14 (23)	60	37 (50)	23 (31)	14 (19)	74	69 (51)	37 (28)	28 (21)	134
Minnesota	23 (62)	9 (24)	5 (14)	37	23 (58)	10 (25)	7 (18)	40	46 (60)	19 (25)	12 (16)	77
Mississinni	18 (55)	12 (36)	3 (9)	33	21 (53)	15 (38)	4 (10)	40	39 (53)	27 (37)	7 (10)	73
Missouri	38 (62)	11 (18)	12 (20)	61	48 (59)	19 (23)	14 (17)	81	86 (61)	30 (21)	26 (18)	142
Montana	2 (29)	2 (29)	3 (43)	7	6 (55)	0 (0)	5 (45)	11	8 (44)	2 (11)	8 (44)	18
Nebraska	16 (76)	4 (19)	1 (5)	, 21	11 (65)	2 (12)	4 (24)	17	27 (71)	6 (16)	5 (13)	38
Nevada	8 (57)	3 (21)	3 (21)	14	9 (60)	1 (7)	5 (23)	15	17 (59)	4 (14)	8 (28)	29
New Hampshire	8 (57)	5 (24)	1 (7)	14	5 (63)	2 (25)	1 (13)	8	17 (59)	7 (32)	2 (9)	22
New Jersey	2 (29)	4 (57)	1 (7) 1 (14)	7	29 (46)	18 (29)	16 (25)	63	31 (44)	22 (31)	17 (24)	70
New Mexico	Z (25) S (45)	2 (27)	2 (27)	, 11	25 (46) 11 (46)	8 (22)	5 (21)	24	16 (46)	11(31)	8 (23)	25
New York	17 (63)	7 (26)	3 (11)	27	45 (44)	28 (27)	30 (29)	103	62 (48)	35 (27)	33 (25)	130
North Carolina	17 (03)	10 (25)	9 (11) 9 (11)	27 75	43 (44) 54 (59)	18(20)	10(21)	01	102(40)	35(27)	27 (16)	166
North Dakota	F (62)	1 (12)	2 (25)	/ J 0	J4 (67)	1 (17)	1 (17)	51	102 (01) 9 (64)	2 (14)	27 (10)	100
Obio	3 (03)	20 (29)	2 (23)	0 60	4 (07) 56 (67)	10 (22)	1 (17) 8 (10)	83	9 (64)	2 (14) 39 (26)	3 (21) 18 (12)	152
Oklahoma	22 (62)	20 (29)	10(14)	27	22 (62)	17(23)	10(10)	52	55 (03)	16 (10)	10(12) 17(10)	132
Okialiolila	23 (02)	7 (19) 4 (20)	7 (19)	57 14	33 (63) 10 (62)	9 (17)	2 (12)	52 16	56 (63) 16 (E2)	10 (10)	6 (20)	20
Doppeylyania	0 (43) 22 (49)	4 (29)	4 (29)	14	10 (65) 67 (57)	4 (25) 24 (20)	2(13)	10	10 (53)	0 (27) 25 (21)	0 (20) 40 (24)	50 164
Pennsylvania Dhodo Jolond	22 (40) 1 (25)	2 (75)	13 (20)	40	67 (37) E (71)	24 (20)	27 (23)	110	69 (54)	35 (21) 4 (26)	40 (24)	104
Kiloue Islaliu	1 (25)	3 (75) 7 (25)	0 (0)	4	5 (71) 22 (F1)	1 (14)	I (14)	/	0 (55) 20 (FF)	4 (30)	1 (9) 12 (10)	11
South Dalasta	2 (50)	7 (25) 2 (22)	4 (14)	28	22 (51)	12 (28)	9 (21)	43	39 (55)	19 (27)	13 (18)	1
South Dakota	3 (50)	2 (33)	I (17)	0	8 (89)	0(0)	I (11)	9	11 (73)	2(13)	2 (13) 17 (12)	13
Tennessee	38 (62)	14(23)	9 (15)	61 154	49 (73)	10 (15)	8 (12)	6/ 102	87 (68)	24 (19) 74 (21)	1/(13)	128
Texas	89 (58)	32 (21)	33 (21)	154	107 (56)	42 (22)	43 (22)	192	196 (57)	/4 (21)	76 (22)	346
Utan	6 (33)	2 (11)	10 (56)	18	5 (28)	6 (33)	7 (39)	18	11 (31)	8 (22)	1/(4/)	36
Vermont	Z (40)	3 (60)	0(0)	5	3 (60)	1 (20)	1 (20)	5	5 (50)	4 (40)	1 (10)	10
Washington	15 (60)	3 (12)	7 (28)	25	24 (55)	15 (34)	5 (11)	44	39 (57)	18 (26)	12 (17)	69
West Virginia	8 (57)	5 (36)	1 (7)	14	7 (58)	3 (25)	2 (17)	12	15 (58)	8 (31)	3 (12)	26
Wisconsin	21 (53)	13 (33)	6 (15)	40	34 (49)	23 (33)	12 (17)	69	55 (50)	36 (33)	18 (17)	109
Wyoming	5 (42)	4 (33)	3 (25)	12	5 (56)	2 (22)	2 (22)	9	10 (48)	6 (29)	5 (24)	21
Total	901 (56)	392 (24)	328 (20)	1621	1334 (56)	564 (24)	475 (20)	2373	2235 (56)	956 (24)	803 (20)	3994

Table 8. 16- and 17-Year-Old Drivers in Fatal Crashes With Only Teenage Passengers, by State and Number of Passengers, United States, 2005-2010 (Virginia Excluded).

Percents based on total of fewer than 25 drivers (shown in gray) may be unstable and should be interpreted with caution.

Discussion

In 1995, there were 2,667 drivers aged 16-17 involved in fatal crashes. In 2010, there were 1,150 (FARS, 2012), representing a decrease of 57% over this period. The raw number of fatal crashes of teen drivers who were carrying teenage passengers has decreased similarly, but the proportion of fatal-crash-involved 16- and 17-year-old drivers who had teenage passengers decreased only slightly over the same period, from 46% in 1995 to 43% in 2010. "Teens with teens" clearly remains a dominant fatal crash scenario, despite numerous states introducing passenger restrictions or upgrading existing ones during this period.

One goal of the present study was to provide a fuller picture of the involvement of passengers in teen driver crashes than has been available before, providing a focus on the remaining part of the problem that most states have attempted to address through various forms of restrictions. This was done by computing counts of drivers in crashes with different combinations of passengers, by age and sex of drivers and passengers. There were few surprises. Aside from crashes in which no passengers were present, crashes in which all passengers were teenagers were by far the most common: of fatal-crash-involved drivers with any passengers, 73% of 16-year-old drivers and 72% of 17-year-olds were carrying only teenage passengers, with no young children and no adults aged 20 or older in the vehicle. Male drivers tended to have mostly male passengers, female drivers most commonly had female passengers, and roughly 70% of all teenage passengers were within one year of the age of the driver. In the majority of such crashes, the driver had only one teenage passenger in the vehicle, but drivers with two or more teenage passengers represented close to half of all fatal-crash-involved drivers with any teenage passengers overall, and more than half in several states.

Drivers transporting passengers ages 30 and older were less likely than drivers alone or with younger passengers of any age to have been reported to have been speeding, unbelted, to have had detectable alcohol, to have crashed late at night, or to have committed an unsafe action or error suggestive of at least some degree of responsibility for the crash. These low risk profiles seem to be indicative of more responsible driving when traveling with parents and other adults, consistent with the finding of Tefft, Williams, & Grabowski (2012) that deaths per mile driven of 16- and 17-year-old drivers were more than 60% lower when an adult passenger (defined in that study as aged 35 or older) was present than when the driver was alone.

Consonant with the known increased crash risk when transporting teen passengers, particularly multiple passengers, many of these risk factors (speeding, late night driving, crash responsibility, lack of valid license, and alcohol use) were more likely to be present with teen passengers present, and increased as the number of teen passengers increased. Somewhat unexpectedly, however, several of these risk factors—specifically speeding, late night driving, seatbelt nonuse, lack of valid license, and alcohol use—were most prevalent in the presence of passengers aged 20-29. Chen et al. (2000) reported that crashes of teenage drivers carrying passengers in their twenties tended to be more severe (the rate of driver deaths per police-reported crash was higher), and Ouimet et al. (2010) reported elevated risk of fatal crash involvement per mile driven in the presence of a passenger aged 20-29. However, the presence of passengers aged 20-29 in the vehicles of fatal-crashinvolved drivers aged 16-17 was very rare: they were present alone or in combination with younger passengers in a total of only 5% of all fatal crashes of drivers aged 16-17, whereas all passengers were aged 13-19 in over 40% of cases.

A second purpose of the study was to provide state-by-state data on the prevalence of fatal crashes involving teen drivers with teen passengers. The data generally indicate that passengers are present in a large proportion of teen driver fatal crashes in all states. States without passenger restrictions can use the data presented here to examine the extent to which the fatal crashes of 16- and 17-year olds involve various combinations of passengers. States with passenger restrictions can use these data to examine the overall contribution of crashes involving passengers, and the extent to which they do or do not fall under the provisions of their law. Note, however, that these data are intended only to help states to assess the magnitude of the safety problem posed by teenage drivers carrying teenage passengers and to identify targets of opportunity for improvement. These data alone are insufficient to draw conclusions regarding the effectiveness of existing state laws, due to limitations of the data as well as complexities of many states' laws.

It could not be determined from the data analyzed in this study whether a given individual driver was in violation of applicable passenger restrictions. One reason for this is that several states have different restrictions applicable to different drivers, usually depending on the amount of time the driver has held a license (e.g., no more than one passenger allowed during the first 6 months of licensed driving, then up to three passengers allowed during months 6-12, and no limits imposed after 12 months of licensed driving); thus, it is not possible to determine from available information (i.e., age and licensing status) what passenger restriction, if any, was applicable to many of the drivers in the data. In addition, most states allow drivers who are otherwise covered by a passenger restriction to transport members of their family, including teenage siblings. The data analyzed in the current study contains no information about the relationship between the driver and passengers; thus, in a state that allows a driver bound by a passenger restriction to transport his or her siblings, it was not possible to determine whether or not the presence of teenaged passengers constituted a violation of any possibly-applicable restriction.

Although most U.S. states now have some form of passenger restriction in effect for some young drivers, many of these are rather weak. A few states have nominal restrictions that allow a young driver to carry two or even three passengers. Tefft, Williams, & Grabowski (2012) showed that compared to having no passengers, having two passengers under age 21 (and no older passengers) approximately doubles a 16- or 17-year-old driver's risk per mile driven of being killed in a crash, and having three or more passengers under age 21 more than quadruples the risk.

In addition, the ages of passengers covered by passenger restrictions varies by state. Eighteen states restrict passengers of all ages, 1 state only restricts passengers under age 17, 10 states restrict passengers under age 18, three states restrict passengers under age 19, five states restrict passengers under age 20, five states restrict passengers under age 21, and 1 state restricts passengers under age 25 (see Appendix). From the standpoint of safety, restricting all passengers—including adults—does not appear justified. Tefft, Williams, and Grabowski (2012) found that having an adult passenger aged 35 or older in the vehicle decreased a young driver's risk per mile driven of being killed in a crash by 62% and decreased the risk of involvement in any crash by 46% compared to driving with no passengers. On the other hand, Chen et al. (2000) did find that teen drivers' crashes were more likely to be fatal when passengers aged 20-29 were present, and the current study found that several risk factors, including late-night driving, speeding, and driver alcohol use were more prevalent in fatal crashes of teen drivers when passengers aged 20-29 were present. Unfortunately, no research exists comparing the effects of passenger restrictions applicable to passengers of different ages. AAA recommends that state GDL programs should allow no more than one passenger under age 21 for the first six months of driving (AAA, 2012).

The Insurance Institute for Highway Safety (2012a) recommends that passenger restrictions should be applicable to all drivers under age 18. In most states, many drivers graduate from the passenger restriction prior to their 18th birthday, and in some states, some drivers can graduate from the passenger restriction prior to their 17th birthday. In 11 states, graduation from passenger restrictions is permitted at an earlier age than graduation from restrictions on nighttime driving; only one state allows earlier graduation for the nighttime driving restriction. Many states specify a time period for the passenger restriction, such as the first 6 or 12 months of the intermediate period, so depending on the age at which a person obtains an intermediate license, he or she could be subject to the restrictions well beyond the minimum age.

Strengthening passenger restrictions can involve a tradeoff with compliance. That issue has received most attention in regard to the number of young passengers allowed. Prohibiting all young passengers theoretically is stronger than allowing one passenger, but the relationship between the number of passengers allowed under the law and compliance with the law is unknown. If young people are less likely to comply with a passenger restriction that does not allow any passengers than with a passenger restriction that allows one, this would at least partially blunt the effectiveness of the law. In one national study, a 21% reduction in the fatal crash rate of 13- to 17-year-olds was found when beginners were prohibited from having any passengers, whereas allowing one passenger reduced the rate by only 7% (McCartt et al., 2010). In contrast, another national study found maximum safety benefits when one passenger was permitted, but found no benefits associated with passenger restrictions that prohibited all passengers (Masten, 2011). While it is wellestablished that passenger restrictions as a whole have been associated with decreases in fatal crashes of young drivers, more research is needed to determine what specific form of passenger restriction is optimal (e.g., number of passengers allowed, ages of passengers exempted, whether family members are exempted, duration of passenger restriction, etc.)

Siblings of the driver are exempted from passenger restrictions in almost all states, partly because of likely noncompliance and primarily to make the law more palatable to legislators. It is not clear the extent to which siblings affect crash risk compared with teen friends of the driver. One study of crashes in which child passengers were riding with teen drivers found that the child passenger was less likely to be injured if the driver was a sibling than if the driver was another teenager, although the risk was much higher in either case than when the driver was an adult (Senserrick, Kallan, & Winston, 2007). Another study that used in-vehicle cameras to monitor a sample of newly-licensed drivers found that potentially-risky driving behaviors and high g-force events (e.g., hard acceleration, braking, swerving) were elevated to a smaller degree when young passengers were siblings than when they were non-sibling peers (Goodwin, Foss, & O'Brien, 2012).

Although more research is needed to determine what specific form of passenger restriction is optimal, it seems logical to expect that strengthening the restrictions, e.g., by allowing fewer passengers (especially in the case of states that presently allow as many as three or more) and keeping the restrictions in effect for a longer period of time would be beneficial. Of note, a recent national survey of parents of 15- to 18-year-olds found that 89% approved of passenger restrictions in general, and of this group, about half thought they should remain in effect until age 18 (Williams, Braitman, & McCartt, 2011).

References

AAA. 2012. Graduated Driver Licensing. Available: <u>http://exchange.aaa.com/safety/teen-driver-safety/safety-advocates/</u>

Chaudhary NK, Williams AF, Nissen W. Evaluation and compliance of passenger restrictions in a graduated licensing program. 2007; Report No. DOT HS 810 781. Washington DC: National Highway Traffic Safety Administration.

Chen L-H, Baker SP, Braver ER, Li G. Carrying passengers as a risk factor for crashes fatal to 16-and 17-year-old drivers. JAMA. 2000; 283: 1578-1582.

Doherty ST, Andrey JC, MacGregor C. The situational risks of young drivers: the influence of passengers, time of day and day of week on accident rates. Accid Anal Prev. 1998; 30: 45-52.

Fatality Analysis Reporting System [Data files]. 2012. (Updated February 3, 2012. February 23, 2012. Available at: <u>ftp://ftp.nhtsa.dot.gov/fars</u>) Washington, DC: National Highway Traffic Safety Administration.

Fell JC, Todd M, Voas R. A national evaluation of nighttime and passenger restriction components of graduated driver licensing. J Saf Res. 2011; 42: 283-290.

General Estimates System. [Data files]. 2012. (Updated February 13, 2012. Accessed February 28, 2012. Available at: <u>ftp://ftp.nhtsa.dot.gov/ges</u>). Washington, DC: National Highway Traffic Safety Administration.

Goodwin AH, Foss RD, O'Brien NP. The effect of passengers on teen driver behavior. 2012; Report No. DOT HS 811 540. Washington DC: National Highway Traffic Safety Administration.

Insurance Institute for Highway Safety (2012) Effective dates of graduated licensing laws. Available: <u>http://www.iihs.org/laws/Graduated Licensing introduction.aspx</u>

Insurance Institute for Highway Safety (2012a) Young driver licensing laws. Available: <u>http://www.iihs.org/laws/</u> Summary table: young driver licensing systems in the U.S.

Masten SV. National study of teen diver licensing systems and graduated driver licensing program core components. Ph. D. thesis, 2011. Chapel Hill NC: U North Carolina.

McCartt AT, Teoh ER, Fields M, Braitman KA, Hellinga LA. Graduated licensing laws and fatal crashes of teenage drivers: a national study. Traffic Inj Prev. 2010; 11: 240-248.

National Highway Traffic Safety Administration, 2010 Fatality Analysis Reporting System (FARS) Coding and Validation Manual. Report No. DOT HS 811 530. Washington DC.

National Household Travel Survey 2009. [Data file]. 2011. (Updated February 2, 2011. Accessed December 16, 2011. Available at: <u>http://nhts.ornl.gov/</u>).Washington, DC: Federal Highway Administration. National Research Council & Institute of Medicine. Adolescent decision making: implications for prevention programs; 1999. Washington DC: National Academies Press.

National Research Council & Institute of Medicine. A study of interactions: emerging issues in the science of adolescence; 2006. Washington DC: National Academies Press.

Ouimet MC, Simons-Morton BG, Zador PL, Lerner ND, Freedman M, Duncan GD, Wang J. Using the US National Household Travel Survey to estimate the impact of passenger characteristics on young drivers' relative risk of fatal crash involvement. Accid Anal Prev. 2010; 42: 689-694.

Preusser DF, Ferguson SA, Williams AF. The effect of teenage passengers on the fatal crash risk of teenage drivers. Accid Anal Prev. 1998; 30: 217-222.

Rice TM, Peck-Asa C, Kraus JF. Effects of the California graduated licensing system. J Saf Res. 2004; 35: 375-381.

Rice TM, Anderson CL. The effectiveness of child restraint systems for children aged 3 years or younger during motor vehicle collisions: 1996 to 2005. Am J Public Health. 2009; 99: 252-257.

Rubin, DB, Schafer JL, Subramanian R. Multiple Imputation of Missing Blood Alcohol Concentration (BAC) Values in FARS. Report No. DOT HS 808 816. Washington, DC: National Highway Traffic Safety Administration.

Senserrick TM, Kallan MJ, Winston FK. Child passenger risk in sibling vs. non-sibling teen driver crashes: a US study. Injury Prev. 2009; 13: 207-210.

Shope JT. Graduated driver licensing: review of evaluation results since 2002. J Saf Res. 2007; 38:165-175.

Simons-Morton BG, Ouimet MC, Zhang Z, Klauer SE, Lee AE, Wang J, Chen R, Albert P, Dingus TA. The effect of passengers and risk taking friends on risky driving and crashes/near crashes among novice teenagers. J Adolescent Health. 2011; 49: 587-593

Tefft BC. Risks older drivers pose to themselves and to other road users. J Saf Res. 2008; 39: 577-582.

Tefft BC, Williams AF, Grabowski JG. Teen Driver Risk in Relation to Number and Age of Passengers. 2012. Washington, DC: AAA Foundation for Traffic Safety.

Williams AF, Preusser DP, Ferguson SA. Fatal crashes involving 16-year-old drivers: narrative descriptions. J Traffic Med. 1998; 26: 11-17.

Williams AF, Braitman KA, McCartt AT. Views of teenagers about licensing policies: a national survey. Traffic Inj Prev. 2011; 12:1-8.

Appendix

Passenger Restrictions in Intermediate Stage of Graduated Driver Licensing System in U.S. Jurisdictions (as of April 2012).

		# Passengers Allowed		
	Minimum Age	(age of passengers		Minimum Age to
	for	restricted [if not all ages])		Graduate from
	Intermediate	(duration of passenger	Effective	Passenger
Jurisdiction	License	restriction)	Date	Restriction
Alabama	16	1	7/10 ¹	17
Alaska	16	0	1/05	16/6 mos.
Arizona	16	1 (under 18) (6 mos.)	7/08	16/6 mos.
Arkansas	16	1	8/99	18
California	16	0 (under 20) (limited exception for immediate family)	1/06 ²	17
Colorado	16	0 (1 st 6 mos.); 1 (2 nd 6 mos.)	7/05	17
Connecticut	16	Only parents allowed (1 st 6 mos.); Only immediate family allowed (2 nd 6 mos.)	8/083	17
Delaware	16/6 mos.	1	9/064	17
District of Columbia	16/6 mos.	0 (1 st 6 mos.); then 2	1/01	18
Florida	16	No restriction		
Georgia	16	0 (1 st 6 mos.); 1 (under 21) (2 nd 6 mos.); then 3	7/065	18
Hawaii	16	1 (under 18)	1/06	17
Idaho	15	1 (under 17)	5/07	15/6mos.
Illinois	16	1 (under 20) (12 mos.)	$1/08^{6}$	17
Indiana	16/6mos.	0 (6 mos.)	7/097	17
Iowa	16	No restriction		
Kansas	16	1 under 18 (6 mos.)	1/10	16/6mos.
Kentucky	16/6mos.	1 (under 20)	4/07	17
Louisiana	16	1 (6PM–5AM only; no restriction 5AM–6PM)	1/11	17
Maine	16	0 (6 mos.)	9/03	16/6mos
Maryland	16/6 mos.	0 (under 18) (5 mos.)	10/05	16/11mos.
Massachusetts	16/6 mos.	0 (under 18) (6 mos.)	11/98	17
Michigan	16	1 (under 21)	3/11	17

¹ 1/05-7/10: 3 passengers allowed

- ⁶ 6/04-1/08: 1 (under 20) (6 mos.)
- ⁷ 7/98-7/09: 0 (1st 3 mos.)

 $^{^{2}}$ 1/03-1/06: 0 (under 20) (1st 6 mos.); 0 (midnight-5am only) (2nd 6 mos.) (unless supervised by 25-year-old driver)

³ 10/05-10/08: 0 (except parents) (1st 3 mos.); 0 (except family) (2nd 3 mos.);

^{10/03-10/05: 0 (}except 1 parent) (1st 3 mos.)

⁴ 7/99 to 9/06: 2

⁵ 1/02-7/06: 0 (1st 6 mos); then 3 (under 21)

Minnesota	16	5 1 (under 20) (1 st 6 mos.); 3 (under 20) (2 nd 6 mos.)		17
Mississippi	16	No restriction		
Missouri	16	1 (under 19) (1 st 6 mos.); then 3 (under 19)	9/06	17/11mos.
Montana	15	1 (under 18) (1 st 6 mos.); 3 (under 18) (2 nd 6 mos.)	7/06	16
Nebraska	16	1 (under 19) (6 mos.)	1/08	16/6mos.
Nevada	16	0 (under 18) (6 mos.)	10/078	16/6mos.
New Hampshire	16	1 (under 25) (6 mos.)	1/03	16/6mos.
New Jersey	17	1 (driver's dependents excepted)	5/109	18
New Mexico	15/6mos.	1 (under 21)	1/00	16/6mos.
New York	16/6mos.	1 (under 21)	3/1010	17
North Carolina	16	1 (under 21)	12/02	16/6mos.
North Dakota	15	No restriction		
Ohio	16	1	4/07	17
Oklahoma	16	1	11/05	6/6mos.
Oregon	16	0 (under 20) (1 st 6 mos.); then 3 (under 20)	3/00	17
Pennsylvania	16/6mos.	1 (under 18) (1 st 6 mos.); then 3 (under 18)	12/11	17
Rhode Island	16/6mos.	1 (under 21) (12 mos.)	7/05	17/6mos.
South Carolina	15/6mos.	2 (under 21)	3/02	16/6mos.
South Dakota	14/3mos.	No restriction		
Tennessee	16	1	7/01	17
Texas	16	1 (under 21)	1/02	17
Utah	16	0 (6 mos.)	7/01	16/6mos.
Vermont	16	0 (no exceptions) (1 st 3 mos.) 0 (siblings excepted) (2 nd 3 mos.)	7/00	16/6mos.
Virginia	16/3	1 (under 18) (1 st 12 mos.); then 3 (under 18)	7/03	18
Washington	16	0 (under 20) (1 st 6 mos.); 3 (under 20) (2 nd 6 mos.)	7/01	17
West Virginia	16	0 (under 20) (1 st 6 mos.); 1 (under 20) (2 nd 6 mos.)	7/09	17
Wisconsin	16	1	9/00	16/9mos.
Wyoming	16	1 (under 18)	9/05	16/6 mos.

Source: Insurance Institute for Highway Safety (2012).

⁸ 1/05-10/05: 0 (under 18) (6 mos.); 7/01-10/05: driver younger than 16: 0 (under 18); driver aged 16-17: 0 (under 18) (60 days); driver aged 17-18: 0 (under 18) (30 days) ⁹ 1/01-5/10: 1 (household members excepted)

¹⁰ 9/03-3/10: 2 (under 21)