Car crashes rank among the leading causes of death in the United States.

Unlicensed to Kill

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About the Sponsor

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Abstract

Previous studies by the AAA Foundation for Traffic Safety have found that approximately one in five fatal crashes involved an unlicensed or invalidly licensed driver. This study presents new data on unlicensed and invalidly licensed drivers in fatal crashes over years 2007–2009, and examines trends in crashes involving unlicensed or invalidly licensed drivers from 1990 through 2009. Multiple imputation was used to estimate the proportion of drivers of unknown license status (2.6% of all drivers) who likely lacked a valid license.

Results show that 87.2% of drivers involved in fatal crashes in years 2007–2009 had a valid license, 6.7% had a license that had had been suspended or revoked, 1.1% had a license that had expired or had been cancelled or denied, and 5.0% were unlicensed. Overall, 18.2% of fatal crashes involved a driver who was unlicensed or invalidly licensed; these crashes resulted in the deaths of 21,049 people. There was a significant increasing trend from 1990 through 2009 in the proportion of fatal-crash involved drivers who were unlicensed. It appears that this trend may have ended or even begun to reverse after 2007, however, this needs to be confirmed in future studies as data from subsequent years becomes available.

The proportion of fatal-crash involved drivers of any given age who were unlicensed decreased as age increased across the entire age spectrum, whereas young adults ages 21–34 were the most likely to have had a suspended or revoked license. Nearly half of all fatal crash involved drivers who lacked a valid license (unlicensed or license suspended/revoked/expired/cancelled/ denied) were ages 21–34 (48.8%). Fifty percent of all unlicensed and invalidly licensed drivers in fatal crashes had alcohol in their system, 43.0% had a blood alcohol concentration (BAC) equal to or greater than the legal limit of 0.08, and 25.1% of all drivers in fatal crashes with a BAC $\geq$ 0.08 lacked a valid license. Excluding drivers who were incapacitated or killed and thus could not have fled, an estimated 32.4% of fatal-crash involved drivers who lacked a valid license left the scene of the crash; and an estimated 51.2% of all drivers who left the scene of a fatal crash lacked a valid license. Estimates of the license status among drivers who left the scene of the crash are imprecise, however, because license status and other key data were unknown and thus imputed for nearly half of all drivers who left the scene.

Introduction

Previous research has found that unlicensed drivers and drivers whose licenses have been suspended or revoked are significantly more likely to be involved in fatal crashes than are validly-licensed drivers (1). A study published in 2000 by the AAA Foundation for Traffic Safety reported that 13.8% of all drivers involved in fatal crashes between the years of 1993 and 1997 had no driver's license, an invalid license, or was of unknown license status; and also reported that one in five fatal crashes between years 1993 and 1997 involved at least one such driver (2). Subsequent AAA Foundation studies have found that the proportion of fatal crashes that involved unlicensed drivers had not changed significantly through 2005 (3, 4). The purpose of the research reported here was to update these statistics using the most recent data available, and to refine previous estimates using statistical techniques to estimate the proportion of drivers of unknown licensed status who likely had a valid license vs. an invalid license or no license.

Methods

Data

The data analyzed for this study was the National Highway Traffic Safety Administration (NHTSA)'s Fatality Analysis Reporting System (FARS) database (5). FARS is a census of all motor vehicle traffic crashes that involve a motor vehicle in transport on a public roadway and result in the death of a person within 30 days of the crash. FARS provides information on all such crashes and all vehicles and people involved. Data in FARS are derived from police reports and reviewed by specially trained analysts.

Analysis was performed at the driver level. All drivers involved in fatal crashes in the United States during years 1990 – 2009 were included in the study. In the FARS data, there were 1,114,712 people coded as drivers during the study period, and an additional 1,240 vehicles coded as having been operated by a driver but in which none of the occupants was coded as the driver. For this study, driver records were created for these vehicles with unknown data elements (e.g., age, sex) filled with missing values which subsequently were imputed. Vehicles coded as driverless, for example a vehicle set in motion by an external force prior to the crash, were excluded (N=5,204).

The main outcome measure was the driver's license status of drivers involved in fatal crashes. License status was classified as valid, suspended, revoked, expired, cancelled, denied, or unlicensed. For the purpose of the main analysis, categories were combined as:

- Valid license
- Unlicensed
- Suspended or revoked
- Expired, cancelled, or denied.

Classification of license status was based only on the status of the driver's non-commercial driver's license. Because the purpose of the study was to determine the proportion of fatal-crash involved drivers who lacked a valid license, a driver's license status was considered valid if he or she possessed a valid non-commercial driver's license but was driving under conditions not permitted under the license (e.g., driving a truck for which a commercial driver's license [CDL] was required without a valid CDL, driving a motorcycle without a valid motorcycle endorsement, or driving a car with a valid learner's permit but without a licensed adult passenger). The category *denied* indicates that the driver had attempted to obtain, extend, or renew his or her license but the driver's request for the license, extension, or renewal was denied by the licensing agency.

Missing data

The status of the driver's license was unknown for 29,548 drivers (2.6%). Multiple imputation (6) was used to estimate the proportions of drivers of unknown license status likely had a valid license; a suspended or revoked license; an expired/cancelled/denied license; and no license. Imputation is a statistical technique in which the missing values of a variable are replaced by values from the distribution of non-missing values of the same variable in other crashes that are similar with respect to other variables included in the imputation model. In the present study, values of license status were treated as "missing" when license status was coded in FARS as unknown. When multiple imputations are performed independently, the variability between imputations can be taken into account to reflect the uncertainty associated with the imputation process. The objective of imputation is not to predict the actual values of missing variables for each individual driver, but to estimate the distribution of the missing values overall and in relation to the other variables included in the imputation model. In the case of the current study, for example, imputation cannot be used to determine *which* drivers of unknown license status were unlicensed, but it can be used to obtain a valid estimate of *how many* were unlicensed.

Imputation was performed using the method of chained equations (14) implemented in statistical software Stata (7–10). For imputation, license categories suspended, revoked, expired, cancelled, and denied were combined into the single category *invalid license*. Imputed values of license status were valid license, invalid license, and unlicensed. Variables included in the imputation model were: driver age and sex, blood alcohol concentration (BAC), vehicle type, number of vehicles in the crash, hit-and-run status (whether or not the driver in question left the scene), crash time of day, day of week, state of crash, and binary indicator variable representing whether the driver's state of license/residence was the same state in which the crash occurred or a different state. The day of week, number of vehicles in the crash, hit-and-run status, and state of crash had no missing values. One or more other variables in the imputation model (other than license status) were also missing in 27,934 driver records (2.5% of all drivers) and were imputed. In records where driver BAC was unknown, the multiply-imputed values published by NHTSA (11) were used. Imputation was performed separately by year for each year from 1990 through 2009 to preserve any possible changes over time in the relationships between license status and the other variables in the imputation model. Ten imputed data sets were created.

Statistical analysis

The driver's license status of drivers involved in fatal crashes from 2007 through 2009 was analyzed to determine the prevalence of unlicensed and invalidly licensed drivers in fatal crashes. License status was analyzed in relation to driver age, sex, blood alcohol concentration; vehicle type, time of day and day of week of the crash, number of vehicles involved in the crash, and whether the driver remained at the scene of the crash or fled.

Trends over time (1990–2009) were analyzed using univariate Poisson regression with time modeled using linear and quadratic terms. The statistical significance of trends over time was evaluated at the 95% confidence level. The Bonferroni correction (15) was used when evaluating the statistical significance of trends within subgroups to mitigate the increased probability of obtaining statistically significant results solely due to random variability when conducting a large number of statistical tests. In the case of significant quadratic trends that changed direction over the study period, the direction and statistical significance reported here are those for 2009—the most recent year for which data were available. Graphical illustrations of trends are based on three-year moving averages to reduce noise and to facilitate visual inspection; however, analysis of the statistical significance of trends was performed using the original data.

All tests of statistical significance accounted for the variability between imputed data sets as well as the variability within each imputed data set using the method of Rubin (6). For presentation of counts of drivers in tables, imputed values from the ten imputed data sets were averaged and were rounded to the nearest whole number. All statistics are based on the observed and imputed data combined except where noted otherwise.

Results

Nationwide, from 2007 through 2009, a total of 151,820 drivers were involved in fatal crashes. Of these, 130,358 (85.9%) were known to have a valid driver's license, 9,395 (6.2%) had a suspended or revoked license, 6,702 (4.4%) were unlicensed, 1,477 (0.97%) had a license that had expired or had been cancelled or denied, and the license status of 3,888 drivers (2.6%) was unknown.

Using multiple imputation, an estimated 2,052 of the 3,888 drivers (52.8%) whose license status was unknown had a valid license, 832 (21.4%) had a suspended or revoked license, 886 (22.8%) were unlicensed, and 118 (3.0%) had a license that had expired or had been cancelled or denied.

Analyzing the original and multiply-imputed data together, an estimated 132,410 drivers (87.2%) involved in fatal crashes from 2007 through 2009 had a valid license, 10,227 (6.7%) had a suspended or revoked license, 7,588 (5.0%) were unlicensed, and 1,595 (1.1%) had a license that had expired or had been cancelled or denied (Table 1).

Due to the small proportion of fatal-crash involved drivers whose licenses were expired, cancelled, or denied, these drivers are not discussed in detail in the remainder of this report. These drivers are included in statistics that refer to fatal-crash involved drivers who lacked a

Table 1. Driver's license status of drivers involved in fatal crashes, United States, 2007–2009.

	Original		Imputed[a]	
	N	%	N	%
Valid license[b]	130,358	85.9	132,410	87.2
Unlicensed	6,702	4.4	7,588	5.0
Suspended/revoked license	9,395	6.2	10,227	6.7
Expired/cancelled/denied license	1,477	1.0	1,595	1.1
Unknown license status	3,888	2.6	–	–
Total	151,820	100.0	151,820	100.0

Data: Fatality Analysis Reporting System, 1990-2009. National Highway Traffic Safety Administration.
a. Counts shown in table reflect averages from 10 independent imputations and are rounded.
b. Based on non-commercial driver's license status only. Includes drivers with valid non-commerical driver's license who lacked the proper license for the class of vehicle being driven. Also includes drivers operating a vehicle for which no license was required irrespective of drivers' actual licensing status.

valid license; however, separate statistics are reported only for unlicensed drivers and drivers with suspended or revoked licenses.

Unlicensed drivers involved in fatal crashes

From 2007 through 2009, an estimated 7,588 drivers involved in fatal crashes—5.0% of all drivers involved in fatal crashes over this period—were unlicensed.

An estimated 15.0% of unlicensed drivers involved in fatal crashes from 2007 through 2009 left the scene of the crash, as compared to only 1.7% of validly licensed drivers (Table 2). Fatal-crash involved drivers who were unlicensed were 8.8 times as likely as validly licensed drivers to have left the scene of the crash, and similarly, drivers who left the scene of a fatal crash were 5.6 times as likely as drivers who remained at the scene to have been unlicensed. Excluding drivers who were incapacitated or killed and thus were likely unable to have fled, 35.2% of unlicensed drivers, as compared to 3.7% of validly licensed drivers left the scene of the crash (not in table), indicating that among fatal-crash involved drivers who were not incapacitated or killed, unlicensed drivers were 9.5 times as likely as validly licensed drivers to have left the scene.

Table 2. Drivers's license status of drivers involved in fatal crashes in relation to selected driver, vehicle, and crash characteristics, 2007-2009. Missing values were multiply-imputed.[a]

	Unlicensed	Suspended/Revoked	Expired/Cancelled/Denied	Valid License[b]	Unlicensed	Suspended/Revoked	Expired/Cancelled/Denied	Valid License[b]	Unlicensed	Suspended/Revoked	Expired/Cancelled/Denied	Valid License[b]
	Number of Drivers				Row %				Column %			
All Drivers	7,588	10,226	1,595	132,410	5.0	6.7	1.1	87.2	100.0	100.0	100.0	100.0
Age												
<14	126	6	0	24	80.8	3.8	0.0	15.4	1.7	0.1	0.0	0.0
14-15	304	15	2	214	56.8	2.8	0.4	40.0	4.0	0.1	0.1	0.2
16	277	34	4	1,549	14.9	1.8	0.2	83.1	3.7	0.3	0.3	1.2
17	359	83	13	2,590	11.8	2.7	0.4	85.1	4.7	0.8	0.8	2.0
18	362	163	30	3,780	8.4	3.8	0.7	87.2	4.8	1.6	1.9	2.9
19-20	758	639	61	7,407	8.6	7.2	0.7	83.6	10.0	6.2	3.8	5.6
21-24	1,436	1,823	187	13,278	8.6	10.9	1.1	79.4	18.9	17.8	11.7	10.0
25-34	2,199	3,414	407	23,916	7.3	11.4	1.4	79.9	29.0	33.4	25.5	18.1
35-44	983	2,218	375	23,380	3.6	8.2	1.4	86.7	13.0	21.7	23.5	17.7
45-54	494	1,270	265	23,270	2.0	5.0	1.0	92.0	6.5	12.4	16.6	17.6
55-64	187	382	125	16,437	1.1	2.2	0.7	95.9	2.5	3.7	7.8	12.4
65+	104	179	127	16,565	0.6	1.1	0.7	97.6	1.4	1.8	8.0	12.5
Sex												
Male	6,255	8,695	1,241	96,692	5.5	7.7	1.1	85.7	82.4	85.0	77.8	73.0
Female	1,333	1,532	354	35,718	3.4	3.9	0.9	91.7	17.6	15.0	22.2	27.0
Vehicle type												
Car/pickup	6,768	8,551	1,356	105,005	5.6	7.0	1.1	86.3	89.2	83.6	85.0	79.3
Motorcycle	473	1,364	178	13,483	3.1	8.8	1.1	87.0	6.2	13.3	11.2	10.2
Large truck/bus	109	183	42	12,406	0.9	1.4	0.3	97.4	1.4	1.8	2.6	9.4
Other	238	128	20	1,516	12.5	6.7	1.1	79.7	3.1	1.3	1.3	1.1
Day of week												
Monday-Friday	4,442	6,291	1,005	89,768	4.4	6.2	1.0	88.4	58.5	61.5	63.0	67.8
Saturday-Sunday	3,146	3,935	590	42,643	6.3	7.8	1.2	84.8	41.5	38.5	37.0	32.2
Time of day												
5AM–6:59PM	3,585	4,470	822	83,542	3.9	4.8	0.9	90.4	47.2	43.7	51.5	63.1
7PM–11:59PM	2,082	3,016	416	29,841	5.9	8.5	1.2	84.4	27.4	29.5	26.1	22.5
Midnight–4:59AM	1,921	2,740	357	19,027	8.0	11.4	1.5	79.1	25.3	26.8	22.4	14.4
Number of vehicles in crash												
1	4,137	5,742	816	50,737	6.7	9.3	1.3	82.6	54.5	56.2	51.2	38.3
2+	3,451	4,484	779	81,673	3.8	5.0	0.9	90.4	45.5	43.8	48.8	61.7
Hit-and-run status												
Remained at scene	6,448	9,143	1,463	130,169	4.4	6.2	1.0	88.4	85.0	89.4	91.7	98.3
Left scene	1,140	1,083	132	2,242	24.8	23.6	2.9	48.8	15.0	10.6	8.3	1.7
Blood alcohol concentration[c]												
0.00	4,130	4,603	924	102,362	3.7	4.1	0.8	91.4	54.7	45.2	58.1	77.3
0.01–0.07	516	726	108	5,196	7.9	11.1	1.6	79.4	6.8	7.1	6.8	3.9
0.08+	2,902	4,855	559	24,784	8.8	14.7	1.7	74.9	38.4	47.7	35.1	18.7

Data: Fatality Analysis Reporting System, 1990-2009. National Highway Traffic Safety Administration.

Note: N's should add to column totals, and row and column percents to 100.0%, but in some cases may not due to rounding.

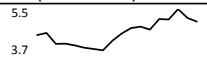
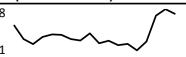
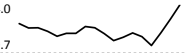
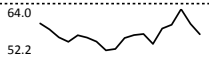
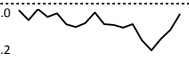
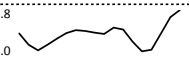
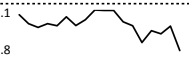
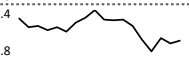
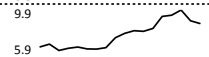
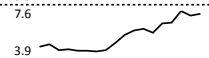
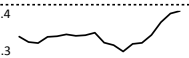
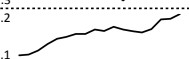
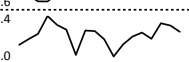
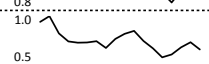
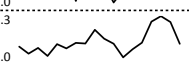
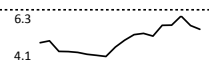
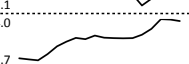
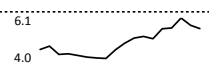
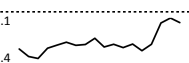
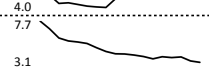
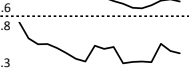
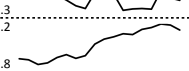
a. Missing values of age (n=2,575), gender (n=2,263), vehicle type (1,889), time of day (937), and driver's license status (3,892) were replaced with imputed values. Counts shown in table reflect averages from 10 independent imputations and are rounded.

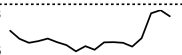
b. Based on non-commercial driver's license status only. Includes drivers with valid non-commerical driver's license who lacked the proper license for the class of vehicle being driven. Also includes drivers operating a vehicle for which no license was required irrespective of drivers' actual licensing status.

c. Includes 76,722 missing values imputed by National Highway Traffic Safety Administration; excludes 155 drivers for whom imputed values of blood alcohol concentration were not available.

Nearly half (45.2%) of unlicensed drivers involved in fatal crashes had alcohol in their system (blood alcohol concentration [BAC] > 0.00) at the time of the crash; 38.4% had a BAC of 0.08 or greater—the *per se* legal limit in all US states and the District of Columbia (Table 2). Unlicensed drivers were twice as likely as validly licensed drivers to have had a BAC of 0.08 or greater, and similarly, fatal-crash involved drivers with a BAC of 0.08 or greater were 2.4 times as likely as drivers with a BAC of 0.00 to have been unlicensed. There was a statistically significant increasing trend from 1990 through 2009 in the proportion of fatal-crash involved drivers with a BAC ≥ 0.08 who were unlicensed (Table 3).

Table 3. Trends in drivers's license status of drivers involved in fatal crashes, 1990–2009, in relation to selected driver, vehicle, and crash characteristics.[a]

	% Unlicensed 3-Year Moving Average (1992-2009)[b]	Trend[c]	% Suspended/Revoked 3-Year Moving Average (1992-2009)[b]	Trend[c]
All Drivers		↑		–
Age				
<14		–		–
14-15		–		–
16		↑		–
17		↑		–
18		–		–
19-20		↑		–
21-24		↑		–
25-34		↑		↑
35-44		↑		↑
45-54		–		↑
55-64		–		–
65+		–		–
Sex				
Male		–		–
Female		–		↑
Vehicle type				
Car / light truck / van		–		–
Motorcycle		↓		↓
Large truck / bus		–		–
Other		–		↑

	% Unlicensed 3-Year Moving Average (1992-2009)[b]	Trend[c]	% Suspended/Revoked 3-Year Moving Average (1992-2009)[b]	Trend[c]
Day of week				
Monday-Friday		–		–
Saturday-Sunday		–		–
Time of day				
5AM–6:59PM		–		–
7PM–11:59PM		–		–
Midnight–4:59AM		–		–
Number of vehicles in crash				
1		–		–
2+		↑		–
Hit-and-run status				
Remained at scene		↑		–
Left scene		–		–
Blood alcohol concentration[d]				
0.00		–		–
0.01–0.07		–		–
0.08+		↑		–

Data: Fatality Analysis Reporting System, 1990-2009. National Highway Traffic Safety Administration.

a. Missing values of age (n=19,366; 1.7% of all drivers), gender (n=16,370; 1.5%), vehicle type (12,320; 1.1%), time of day (6,578; 0.59%), and driver's license status (29,548; 2.6%) were replaced with imputed values. Counts shown in table reflect averages from 10 independent imputations and are rounded.

b. Figures are drawn only to illustrate trends over time within each row. Use caution if comparing figures in different rows.

c. ↑ denotes increasing trend, ↓ denotes decreasing trend, – denotes trend not significant at 95% confidence level. Significance levels account for multiple comparisons using Bonferroni adjustment.

d. Includes 603,695 missing values (54.1% of all drivers) imputed by National Highway Traffic Safety Administration; excludes 1,240 drivers (0.11%) for whom imputed values of blood alcohol concentration were not available.

The proportion of fatal-crash involved drivers who were unlicensed decreased as age increased across the entire age spectrum: 80.8% of drivers under age 14 (generally ineligible for licensure), 8.5% of drivers ages 18-24, and 0.6% of drivers ages 65 and older were unlicensed (Table 2). Nearly half (47.9%) of all unlicensed drivers involved in fatal crashes were ages 21-34. There were statistically significant increasing trends over years 1990–2009 in the proportion of fatal-crash involved drivers who were unlicensed for drivers ages 16, 17, 19-20, 21-24, 25-34, and 35-44.

While men outnumbered women among validly licensed drivers involved in fatal crashes—73.0% of validly licensed drivers in fatal crashes were men—the margin was even greater among unlicensed drivers: 82.4% of unlicensed drivers were men (Table 2). While there was a statistically significant increasing trend in the proportion of fatal-crash involved drivers who were unlicensed overall, there were no significant gender-specific trends (Table 3).

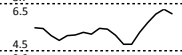
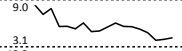
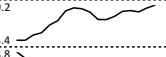
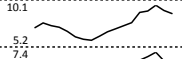
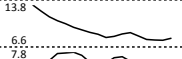
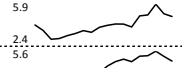
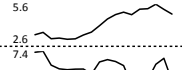
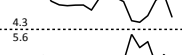
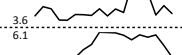
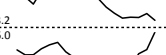
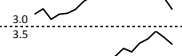
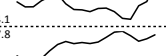
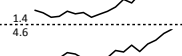
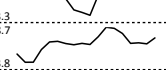
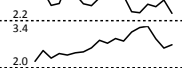
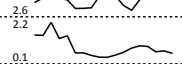
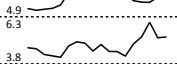
Drivers of passenger vehicles (i.e., cars, pickup trucks, vans, and SUVs) accounted for 89.2% of all unlicensed drivers involved in fatal crashes, and among fatal-crash involved drivers, drivers of passenger vehicles (5.6%) were more likely than drivers of motorcycles (3.1%) or large trucks or buses (0.9%) to have been unlicensed (Table 2). Drivers of other types of vehicles were the most likely to have been unlicensed (12.5%); the category *other vehicle type* included motor homes, farm equipment, golf carts, snowmobiles, three-wheeled mopeds, all-terrain vehicles (ATVs), and various other types of vehicles. There was a large, statistically significant downward trend in the proportion of fatal-crash involved motorcyclists who were unlicensed, from 7.7% in 1990–1992 to 3.1% in 2007–2009 (Table 3).

While the majority of all fatal crashes occurred on weekdays, drivers involved in fatal crashes on Saturday and Sunday were more likely to have been unlicensed compared to drivers involved in fatal crashes on weekdays (Table 2). Drivers involved in crashes between the hours of 7 PM and 11:59 PM were approximately 50% more likely to have been unlicensed, and drivers involved in fatal crashes between midnight and 4:59 AM were twice as likely to have been unlicensed, compared to drivers who crashed between 5 AM and 6:59 PM (Table 2).

Most validly licensed drivers involved in fatal crashes (61.7%) were involved in multiple-vehicle crashes; however, 54.5% of unlicensed drivers were involved in single vehicle crashes (Table 2).

Ten states experienced statistically significant increasing trends from 1990 through 2009 in the proportion of fatal-crash involved drivers who were unlicensed; three experienced statistically significant decreasing trends (Table 4).

Table 4. Trends in drivers's license status[a] of drivers involved in fatal crashes, 1990–2009, by state.

	% Unlicensed 3-Year Moving Average (1992-2009)[b]	Trend[c]	% Suspended/Revoked 3-Year Moving Average (1992-2009)[b]	Trend[c]
United States		↑		–
Alabama		–		–
Alaska		–		–
Arizona		–		–
Arkansas		↓		↑
California		–		↓
Colorado		↑		–
Connecticut		–		↓
Delaware		↑		–
District of Columbia		–		–
Florida		–		–
Georgia		↑		–
Hawaii		–		–
Idaho		–		↓
Illinois		–		–
Indiana		↑		↑
Iowa		↑		–
Kansas		–		↑
Kentucky		↑		–
Louisiana		↑		↑
Maine		–		–
Maryland		↑		↑
Massachusetts		–		–
Michigan		–		↑
Minnesota		–		–
Mississippi		↓		↓
Missouri		–		↑
Montana		–		–
Nebraska		–		–
Nevada		–		–
New Hampshire		–		–
New Jersey		–		–
New Mexico		–		↓
New York		↓		–
North Carolina		↑		↑
North Dakota		–		–
Ohio		–		↑
Oklahoma		–		↓
Oregon		–		–
Pennsylvania		–		–
Rhode Island		–		–
South Carolina		–		↑
South Dakota		–		–
Tennessee		–		↓
Texas		–		–
Utah		–		–
Vermont		–		–
Virginia		–		↑
Washington		–		–
West Virginia		–		↑
Wisconsin		↑		↑
Wyoming		–		–

Data: Fatality Analysis Reporting System, 1990-2009. National Highway Traffic Safety Administration.

a. Missing values of driver's license status (n=29,548; 2.6% of all drivers) were replaced with imputed values from 10 independent imputations.

b. Figures are drawn only to illustrate trends over time within each row. Use caution if comparing figures in different rows.

c. ↑ denotes increasing trend, ↓ denotes decreasing trend, – denotes trend not significant at 95% confidence level. Significance levels account for multiple comparisons using Bonferroni adjustment.

Drivers with suspended or revoked licenses involved in fatal crashes

From 2007 through 2009, an estimated 10,227 drivers involved in fatal crashes—6.7% of all drivers involved in fatal crashes over this period—were unlicensed.

An estimated 10.6% of drivers with suspended or revoked licenses who were involved in fatal crashes left the scene, as compared to only 1.7% of validly licensed drivers (Table 2). Fatal-crash involved drivers with a suspended or revoked license were 6.2 times as likely as validly licensed drivers to have left the scene, and similarly, drivers who left the scene were 3.8 times as likely as drivers who remained at the scene to have had a suspended or revoked license. Excluding drivers who were incapacitated or killed and thus were unlikely able to flee, 31.2% of fatal-crash involved drivers with suspended or revoked licenses, as compared to 3.7% of validly licensed drivers left the scene of the crash (not in table), indicating that among fatal-crash involved drivers who were not incapacitated or killed, drivers with a suspended or revoked license were 8.4 times as likely to have left the scene compared to validly licensed drivers.

Over half (54.8%) of fatal-crash involved drivers with suspended or revoked licenses had alcohol in their system at the time of the crash; nearly half (47.7%) had a BAC of 0.08 or greater. Fatal-crash involved drivers driving with a suspended or revoked license were 2.5 times as likely as validly licensed drivers to have had a BAC $\geq$ 0.08, and similarly, fatal-crash involved drivers with a BAC of 0.08 or greater were 3.6 times as likely as drivers with a BAC of 0.00 to have had a suspended or revoked license (Table 2).

Whereas the proportion of fatal-crash involved drivers who were unlicensed decreased as age increased across the entire age spectrum, drivers ages 25-34 were the most likely to have had a suspended or revoked license. One in three (33.4%) of all fatal-crash involved drivers with a suspended or revoked license was aged 25-34; nearly three of four (72.9%) were aged 21-44 (Table 2). There were statistically significant increasing trends over years 1990–2009 in the proportion of fatal-crash involved drivers who had suspended or revoked licenses for drivers ages 25-34, 35-44, and 45-54 (Table 3).

Male drivers involved in fatal crashes were nearly twice as likely as females to have had a suspended or revoked license (Table 2); however, there was a statistically significant increasing trend over years 1990–2009 in the proportion of fatal-crash involved female drivers with suspended or revoked licenses (Table 3).

While the large majority of fatal-crash involved drivers with suspended or revoked licenses were driving passenger vehicles (83.6%), drivers of motorcycles were slightly more likely to have been driving with a suspended or revoked license at the time of the crash (Table 2). Drivers of large trucks and buses were much less likely than drivers of other types of vehicles to have had a suspended or revoked license. There was a large, statistically significant downward trend in the proportion of fatal-crash involved motorcyclists whose licenses were suspended or revoked (Table 3).

While the majority of all fatal crashes occurred on weekdays, drivers involved in fatal crashes on Saturday and Sunday were slightly more likely to have been driving with a suspended or revoked

license, compared to drivers involved in fatal crashes on weekdays (Table 2). Drivers involved in crashes between the hours of 7 PM and 11:59 PM were approximately 77% more likely to have had a suspended or revoked license, and drivers involved in fatal crashes between midnight and 4:59 AM were 2.4 times as likely to have had a suspended or revoked license, compared to drivers who crashed between 5 AM and 6:59 PM (Table 2).

While most validly licensed drivers involved in fatal crashes (61.7%) were involved in multiple-vehicle crashes; 56.1% of drivers with suspended or revoked licenses were involved in single vehicle crashes (Table 2).

Fourteen states experienced statistically significant increasing trends from 1990 through 2009 in the proportion of fatal-crash involved drivers with suspended or revoked licenses; seven experienced statistically significant decreasing trends (Table 4).

Crashes that involved an unlicensed or invalidly licensed driver

In total, from 2007 through 2009, there were 102,280 fatal crashes in the United States that involved at least one vehicle that was operated by a driver.[1] Of these, 18,642 (18.2%) involved at least one driver with an invalid license or no license. Crashes that involved a driver with an invalid license or no license resulted in 21,049 deaths, 18.7% of all deaths that occurred in motor vehicle crashes in the United States from 2007 through 2009.

Of the 21,049 people killed in crashes that involved an unlicensed or invalidly licensed driver, 10,388 (49.4%) were the unlicensed or invalidly licensed drivers themselves, 4,776 (22.7%) were passengers riding in vehicles driven by unlicensed or invalidly licensed drivers, and 3,462 (16.4%) validly licensed drivers or passengers riding with a validly licensed driver, and 2,423 (11.5%) were non-motorists such as pedestrians and bicyclists.

Discussion

From years 2007 through 2009, 12.8% of all drivers involved in fatal crashes—approximately one of every eight—lacked a valid driver's license. Nearly one in five fatal crashes (18.2%) over this period involved an unlicensed or invalidly licensed driver. These crashes resulted in 21,049 deaths.

Most unlicensed and invalidly licensed drivers involved in fatal crashes did not leave the scene of the crash; however, they were much more likely than validly licensed drivers to have left the scene. Among drivers with reasonable opportunity to leave the scene (i.e., excluding those who were incapacitated or killed), drivers with an expired, cancelled, or denied license were 6.4 times as likely to flee, drivers with a suspended or revoked license were 8.3 times as likely to flee, and unlicensed drivers were 9.4 times as likely to flee, compared to validly licensed drivers.

[1] There were an additional 124 fatal crashes in the United States from 2007 through 2009 in which no involved vehicle was coded as having been operated by a driver; these were excluded from the analysis presented here.

Furthermore, it is estimated that more than half of all drivers who left the scene of fatal crashes in 2007 – 2009 were unlicensed or were driving with an invalid license.

Fully half (49.8%) of all unlicensed or invalidly licensed drivers involved in fatal crashes had some amount of alcohol in their system; 42.8% had a BAC of 0.08 or greater. Fatal-crash involved drivers with illegal BAC levels were 2.4 times as likely to have been unlicensed and 3.6 times as likely to have had a suspended or revoked license, compared to drivers with no alcohol in their system. Drivers with positive BACs below the legal limit were also more than twice as likely as drivers with no alcohol to have been unlicensed or to have had a suspended or revoked license.

There may be some synergy between efforts to combat unlicensed driving and efforts to combat hit-and-run crashes and alcohol-related crashes. For example, in the case of drivers who have never obtained a driver's license, measures to promote licensure might reduce hit-and-run crashes by eliminating a potential motivation for leaving the scene, and might reduce the incidence of crashes altogether if interaction with the driver licensing system and the training and examination that it entails would lead to improved driving behavior. This, however, is only speculative. Whether interaction with the licensing system would improve the driving behavior or performance of people who otherwise would be willing to drive without a license is not known.

Effective measures to prevent people without valid driver's licenses from driving would reduce the number of fatal hit-and-run crashes, as well as the number of alcohol-related crashes. Although identification of measures to prevent people who have never interacted with the licensing system from driving are not straightforward, vehicle-based measures have been shown to reduce driving and crash involvement by drivers whose licenses had been suspended or revoked or who have had previous interactions with law enforcement while driving unlicensed. For example, a study by the California Department of Motor Vehicles reported that impounding vehicles driven by unlicensed drivers and drivers whose licenses were suspended or revoked reduced (but did not completely eliminate) the subsequent crashes and driving-while-suspended/revoked/unlicensed convictions of these drivers over a one-year period (16).

Analysis of trends over the past 20 years shows that there has been an increasing trend in the proportion of fatal-crash involved drivers who were unlicensed. A major exception to this trend was motorcyclists: the proportion of fatal-crash involved motorcyclists who were unlicensed decreased steadily across the entire study period, from 7.7% in 1990–1992 to 3.1% in 2007–2009. An additional 13.5% of motorcyclists held a valid license to drive a car but lacked the license endorsement required to drive a motorcycle. This proportion, however, also decreased significantly over the study period.

The proportion of fatal crashes that involved an unlicensed or invalidly licensed driver reported here is slightly lower than in past studies, due to a minor modification in methodology. In past studies (2-4), drivers of unknown license status were grouped with unlicensed drivers and invalidly licensed drivers into an overall category of drivers not known to have possessed a valid license. In this study, the method of multiple imputation was used to allocate drivers of unknown license status to the other categories of license status according to the distribution of license

status among other drivers that were similar with respect to specified characteristics. While multiple imputation cannot be used to determine the license status of individual drivers, and imputation-based proportions can be biased if variables strongly correlated with the imputed variable (license status) are omitted from the imputation model (14), the estimates reported here represent the AAA Foundation's best estimate of the prevalence of unlicensed and invalidly licensed drivers in fatal crashes.

Although the possibility that the imputation could have been biased cannot be ruled out, the maximum amount of bias that could have been introduced through imputation is quite small, because license status was unknown for only 2.6% of all drivers. In the unlikely event that all drivers of unknown license status actually had a valid license at the time of the crash, the overall proportion of drivers who lacked a valid license would have been 11.6%, and the proportion of fatal crashes that involved an unlicensed or invalidly licensed driver would have been 16.6%. In the similarly unlikely event that all drivers of unknown license status were unlicensed or invalidly licensed, the proportion of drivers who lacked a valid license would have been 14.1%, and the proportion of fatal crashes that involved an unlicensed or invalidly licensed driver would have been 20.0%. Using multiple imputation, it is estimated that 12.8% of drivers involved in fatal crashes from 2007 through 2009 lacked a valid license, and 18.2% of all fatal crashes over this period involved at least one driver who lacked a valid license.

A related limitation that is substantial, however, is that the estimates of the license status of drivers who fled the scene of fatal crashes are very imprecise. Driver's license status was unknown for nearly half of all drivers who fled the scene. Furthermore, in addition to license status, age was unknown for 47% of these drivers, sex was unknown for 43%, vehicle type was unknown for 34%, and BAC was unknown for 80%. Thus, in the case of drivers who left the scene of the crash, imputation of license status also required the imputation of these variables as well. This has only a small effect on the precision of license status for all drivers or in relation to other variables (age, sex, vehicle type), because the vast majority of drivers of any given age, sex, or vehicle type did not leave the scene, and their licensing status was known. However, the estimates of licensing status among hit-and-run drivers should be viewed as rough estimates and treated with caution.

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