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Fatal crashes involving young unlicensed drivers in the U.S.

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Abstract

Introduction: Young unlicensed drivers' involvement in fatal crashes is a recurrent problem in the United States. *Methods:* This descriptive study extracted cross-sectional data on fatal crashes from the Fatality Analysis Reporting System from 1998 to 2002. Young unlicensed driver fatal crashes are examined by age, gender, and region. *Results:* There were 2,452 young unlicensed driver fatal crashes representing 10.8% of all young drivers' fatal crashes. By age, 72.5% are over 15 years, males are involved in 74.5%, and southern and western states have a higher percent of young unlicensed driver fatal crashes. *Conclusions:* Subgroups of young people based on their age, gender, and region are over-represented in fatal crashes as unlicensed drivers. Further studies are needed to investigate the context and factors of young unlicensed drivers, essential to tailor interventions. *Impact on industry:* Young unlicensed drivers circumvent the established licensing process and pose a serious threat to themselves and other road users.

Keywords: Unlicensed driving; Young drivers; Fatal crash; Motor vehicles; Driver License

1. Introduction

In the United States, motor vehicles are a primary mode of travel, providing an unprecedented degree of mobility, but also implying varying risk to road users (Arnett, 2002). An estimated 40,000 people die and over 3 million are injured each year in traffic crashes in the United States (NHTSA, 2004). An additional important motor-vehicle risk factor, less recognized in public health settings, is that of unlicensed driving (DeYoung, Peck, & Helander, 1997; Perneger & Smith, 1991). It has been estimated that of all fatal crashes, 20% involve an unlicensed, revoked, or suspended driver (Griffin & DeLaZerda, 2000) and countermeasures are limited (DeYoung, 1999). Crashes involving these unlicensed drivers often are more serious, resulting in higher rates of fatalities and serious injury (Blows, Ameratunga, Ivers, Lo, & Norton, 2005; Watson, 1998). Because of the illegal nature of the problem, rates of detection are low, and prosecutions and convictions seldom occur for unlicensed driving (DeYoung, 1999). Unlicensed drivers are generally unknown to authorities until they crash or commit a traffic violation, which results in a suspected large number of drivers with unknown risks and driving practices. Among them, there is a suspected large amount of unlicensed young people with unknown risks and driving practices.

Yet, knowledge and visibility of risk of young licensed drivers is well documented in the scientific literature (See Injury Prevention, 2002 (8) suppl. II, Journal of Safety Research, 2003, 34). Young people are prepared for driving in most states with a system that includes driver training and graduated driver licensing (Vernick et al., 1999). In the system, young drivers can be trained and managed with license disqualification as a deterrent (Watson, 1998). However, young unlicensed drivers undermine the integrity of the system (Mayhew, Fields, & Simpson, 2000). Young unlicensed drivers provide not only an immediate road traffic danger, but driving experience prior to licensing increases the crash risk upon licensing (Stevenson & Palamara, 2001). What is known about young unlicensed drivers comes from

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self-reported unlicensed driving behavior and fatal crash reports that included licensing status as a variable.

1.1. Self-reports

Two studies from the United States (Ferguson, Leaf, Williams, & Preusser, 1996; Williams, Lund, & Preusser, 1985) and two from New Zealand (Harré, Brandt, & Dawe, 2000; Harré, Field, & Kirkwood, 1996) report a range of young unlicensed driving from a low of 18% for males in New Zealand (including motorbikes) to a high of 58% from one state in a study of seven U.S. states. In general, the studies from the United States report that males and those closer to the age of licensing report more frequent driving. The self-report studies recognize the difficulty in generalizing results beyond the limited areas and times reported.

1.2. Young unlicensed driving fatalities

Several studies from the United States provide evidence of fatal crash involvement of young unlicensed drivers. For instance, nationally, unlicensed drivers under 15 years were involved in 378 fatal crashes resulting in 436 deaths over a 5-year period (Frisch, Johnston, Melhorn, Hill, & Boyce, 2003). A study in 33 states of 15- and 16-year-old drivers found that 57% of the 15 year olds and 10% of 16 year olds were unlicensed or held an invalid license at the time of the fatal crash (Williams, Preusser, Ferguson, & Ulmer, 1997). Another study across the United States found 9% of 16 year olds were unlicensed at the time of the crash (Williams, Preusser, Ulmer, & Weinstein, 1995). Further, a study conducted over a 7-year period of all unlicensed drivers under age 20 reported 4,947 fatal crashes, representing 12.1% of all fatal crashes in the United States (Scopatz, Hatch, DeLucia, & Tays, 2003).

Apart from the United States, two studies from Australia provide further evidence. A study of unlicensed and underage drivers less than 16 years in New South Wales, Australia reported injury and crash rates on 526 motor-vehicle crashes (33.7% fatal) with increasing rates with age over a 5-year period (Lam, 2003). Over a 3-year period in Australia, 11–24-year-old unlicensed drivers were involved in 126 fatal crashes, representing 12% of all fatal crashes (Federal Office of Road Safety [FORS], 1997).

Against this background, the purpose of this study is to build upon previous research and assess the scope and practices associated with the young unlicensed drivers' involvement in fatal crashes. The study questions include: (a) what is the young unlicensed drivers involvement in fatal crashes, (b) how are fatal crashes distributed by age and gender, (c) what attributes of fatal crashes are associated with age and gender, and (d) how are young unlicensed driver fatal crashes distributed by region.

2. Method

This is a cross sectional descriptive study that focuses on fatal motor-vehicle crashes where at least one young unlicensed driver was involved. Five years (1998–2002) of data were extracted from the Fatality Analysis Reporting System (FARS), National Highway Traffic Safety Administration (NHTSA, 1998–2002). In FARS, data are collected on over 185 coded data elements organized into linkable crash, vehicle, and person files. For a crash to be included in FARS, a motor vehicle must be travelling on a trafficway customarily open to the public, and result in the death of at least one person within 30 days of the incident.

2.1. Case selection

For purposes of this study, a young licensed or unlicensed driver is under the age of 19 years. A young unlicensed driver is the operator of a motor vehicle who has never been licensed. Drivers with learner's permits, provisional licenses, and those who have had their driving privileges suspended or revoked are excluded. All fatal crashes involving a four-wheel motorized passenger vehicle are included. Farm machinery, off-road recreational vehicles, and other three or fewer wheeled vehicles were excluded, leaving the focus on passenger vehicles. Thereafter, all fatal crashes within the 50 U.S. states and the District of Columbia, where at least one of the drivers in the crash was less than 19 years and unlicensed to drive a motor vehicle, are included. Licensing age requirements vary from state to state, where some states allow driving at 14 years, and one state not until age 17. Generally, age 16 years is when most states allow young people to enter the licensing process (Insurance Institute for Highway Safety [IIHS], 2005) and for purposes of this study will be referred to as age eligible. A total of 2,457 young unlicensed drivers were involved in 2,452 fatal crashes as cases. Differences in drivers and crashes are due to one crash involving two young unlicensed drivers and two crashes involving three young unlicensed drivers. One death in 2003 was due to a crash event in 2002 and included in the 2002 crash total.

2.2. Selection of variables

For the purpose of answering the study questions, 12 variables were retained from FARS and sorted by unlicensed driver as the independent variable. Variables were selected based on their utility for developing a foundation for understanding the demographics and attributes of young unlicensed drivers' involvement in fatal crashes in response to the study questions. The researchers' interests are primarily in the young unlicensed driver in the fatal crash and not specific crash circumstances. Numerous variables were considered for inclusion and variables that were excluded were not a contributor to the young unlicensed driver fatal crash (e.g., occupational–related crashes), were not collected consistently over the study period or inconclusive (e.g., race), missing extensive data (e.g., alcohol test), and not critical to young drivers fatal outcomes (Williams & Ferguson, 2002). Some variables are condensed for interpretation and are described. Variables include age (age 13 years and younger

Table 1
Frequency and percent of young unlicensed driver (YUD) fatal crashes, FARS, 1998–2002

Year	YUD crashes (n)	Percent	YUD fatalities (n)	Percent	All fatalities in YUD crashes (n)	Percent	Vehicles involved in YUD crashes (n)	Percent	People involved in YUD crashes (n)	Percent
1998	457	18.6	195	18.0	533	18.2	663	18.8	1,597	19.4
1999	460	18.8	181	16.7	534	18.3	656	18.6	1,560	18.9
2000	486	19.8	220	20.3	585	20.0	695	19.7	1,616	19.7
2001	493	20.1	225	20.8	597	20.5	728	20.6	1,634	20.0
2002	556	22.7	256	23.7	670	23.0	788	22.3	1,805	22.0
Missing			5	0.5						
Total	2,452	100	1,082	100	2,919	100	3,530	100	8,212	100

are grouped) and gender of young unlicensed driver; state/region of residence of young unlicensed driver; year that crash occurred; day of week; hour of crash (divided into twelve 2 hour dyads); month of crash; speed limit zone that crash occurred (aggregated into four different miles per hour speed groups); number of vehicles in crash (crashes with four to six vehicles are combined); number of occupants in young unlicensed driver vehicle at the time of the crash (crashes with six or more occupants are combined); violations charged to young unlicensed driver; restraint use by young unlicensed driver (improper use is safety belt used improperly and shoulder or lap belt use only); injury severity to young unlicensed driver; owner of the vehicle driven by the young unlicensed driver; object crash involved in a hit and run event; and driver contributing factors divided into six categories.

2.3. Data treatment

FARS data were aggregated from 1998–2002 and frequencies, percentages, and Pearson chi-square tests were analyzed in SPSS (1999). The number and percentage of deaths to young unlicensed drivers, deaths to all persons involved in a young unlicensed driver crash, total crashes involving at least one young unlicensed driver, and total vehicles and people of all ages involved in a fatal crash involving a young unlicensed driver are considered by year for the 5 year period, 1998–2002.

Pearson chi-square tests with an alpha level of 0.05 were conducted to determine significance by age and gender for the variables. Additionally, multiple variables and interpretation of the Pearson chi-square tests data for age, severity of young unlicensed driver injury (including fatality), day of week, and number of vehicles were plotted. Driver contributing factors are assigned by the reporting law enforcement officer on the crash scene with the option to assign zero to four driver contributing factors for each young unlicensed driver in the crash. Because of the variability in assigning factors to each crash, Pearson chi-square tests are not used. The driver contributing factors is addressed by percent assigned to the 10 most frequently mentioned factors by age and gender. Percentage of young unlicensed driver fatal crashes were compared to all young driver fatal crashes under the age of 19 years by the four primary U.S. census regions. Thirteen crashes lacked state designation and could not be assigned a region.

2.4. Institutional Review Board

The Institutional Review Board of Marshfield Clinic Research Foundation granted ethical approval on June 16, 2004.

3. Results

3.1. Young unlicensed drivers' involvement in fatal crashes

A total of 2,452 young unlicensed driving fatal crashes occurred over the 5-year study period. These crashes involved 8,212 people, 3,530 motor vehicles, 1,082 young unlicensed driver fatalities, and 2,919 total fatalities (Table 1). A young unlicensed driver died in 44.1% of the crashes. Young unlicensed drivers involvement in fatal crashes escalates over the study period as evidenced by the absolute number of deaths, people, vehicles, and crashes from year to year.

3.2. Age and gender distribution of young unlicensed drivers

The youngest unlicensed driver involved in a fatal crash defines the lower age limit of 8 years (Table 2). In all age

Table 2
Percent of young unlicensed driver (YUD) involved in fatal crashes by age and gender, FARS, 1998–2002

Age	Males			Females			Total	
	N	Male YUD crashes (%)	YUD crashes (%)	N	Female YUD crashes (%)	All YUD (%)	N	YUD crashes by age (%)
8–13 years	73	4.0	3.0	44	7.0	1.8	117	4.8
14 years	136	7.4	5.5	67	10.7	2.7	203	8.3
15 years	243	13.3	9.9	112	17.9	4.6	355	14.5
16 years	370	20.2	15.1	145	23.2	5.9	515	21.0
17 years	519	28.4	21.2	128	20.5	5.2	647	26.3
18 years	486	26.7	19.8	129	20.7	5.3	615	25.1
Total	1,827	100.0	74.5	625	100.0	25.5	2,452	100.0

groups there are more males involved in fatal crashes and, overall, three out of four young unlicensed drivers are males (74.5%). Three out of four (72.5%) of all young unlicensed drivers are 16 years of age or older. The percentage of females under age 17 years (58.8%) is higher than the percent of young males under 17 years (33.5%). In contrast, 17- and 18-year-old males represent 54.7% of the male crashes and 17- and 18-year-old females (41.2%) of the female crashes.

3.3. Crash attributes of young unlicensed drivers involved in a fatal crash

As shown in Table 3, more than half of the young unlicensed driver fatal crashes occurred from Friday to Sunday (53.4%) and nearly three out of five crashes (58.8%) occurred between the hours of 1800 and 0559. The highest percentage of crashes peaked in the months of June, July, and August. Further, a majority of crashes occurred in posted speed limit

Table 3
Young unlicensed driver (YUD) selected fatal crash variables, FARS, 1998–2002

Day of the week of crash	N	Percent	**Number of vehicles in crash**	N	Percent
Monday	291	11.9	1	1,547	63.1
Tuesday	307	12.5	2	768	31.3
Wednesday	234	9.5	3	100	4.1
Thursday	294	12.0	4+	33	1.3
Friday	352	14.3	Missing	4	0.2
Saturday	477	19.5	**Total**	2,452	100.0
Sunday	480	19.6			
Missing	17	0.7	**Occupants in YUD vehicle**		
Total	2,452	100	1	657	26.9
			2	830	33.8
Hour of crash			3	469	19.1
0:00–2:59	422	17.2	4	290	11.8
3:00–5:59	273	11.1	5	129	5.3
6:00–8:59	176	7.2	6+	77	3.1
9:00–11:59	166	6.8	**Total**	2,452	100
12:00–14:59	271	11.0			
15:00–17:59	366	15.0	**Violation charge to YUD**		
18:00–20:59	349	14.2	None	1,717	70
21:00–23:59	398	16.2	Reckless/careless/hit-and-run type	363	14.8
Missing	31	1.3	Impairment	45	1.8
Total	2,452	100	Speed-related	45	1.8
			Traffic sign and signals	12	0.4
Month of crash			Turning, yielding, signaling	29	1.1
January	150	6.1	Wrong side passing and following	4	0.2
February	141	5.8	Lane usage	10	0.3
March	186	7.5	License and registration violations	108	4.3
April	207	8.4	Other/unknown	129	5.3
May	220	9.0	**Total**	2,452	100
June	238	9.7			
July	264	10.8	**Restraint use by YUD**		
August	247	10.1	None	1,322	53.9
September	211	8.6	Improper	46	1.9
October	215	8.8	Yes	769	31.4
November	194	7.9	Unknown/missing	315	12.8
December	179	7.3	**Total**	2,452	100
Total	2,452	100			
			Hit and run event		
Speed limit zone crash occurred			No	2,307	94.2
0–35	159	6.5	Motor vehicle in transport	62	2.5
36–54	209	8.5	Pedestrian or non-motorist	60	2.4
55+	2,084	85.0	Parked/other/missing	23	0.9
Total	2,452	100	**Total**	2,452	100
YUD injury severity			**Owner of vehicle driven by YUD**		
No injury	298	12.2	Registered owner	209	8.5
Possible	180	7.3	Non-registered owner	1,830	74.6
Non-incapacitating injury	403	16.4	Business/government/rental	96	3.9
Incapacitating injury	466	19.0	Stolen	154	6.3
Fatal	1,088	44.4	Not registered	145	5.9
Unknown	17	0.7	Unknown	18	0.8
Total	2,452	100	**Total**	2,452	100

Table 4
Frequency of driver contributing factors of young unlicensed drivers in fatal crashes, FARS, 1998–2002

	N
Physical/mental condition	
Drowsy, sleepy, asleep, fatigued	68
Drugs-medication	11
Inattentive (talking, eating)	250
All others	8
Total	337
Miscellaneous factors	
Running off the road	582
Failing to dim lights or no lights	12
Operating without required equipment	65
Improper or erratic lane change	27
Passing where prohibited	14
Passing with insufficient distance	28
Erratic, reckless, careless or negligence	283
Police pursuit	127
Failure to yield right of way	198
Failure to obey traffic signs/devices/officers/safety zone	223
Speed and speed for conditions	1,197
Making improper turn	121
Driving on wrong side of road	54
Operator inexperience	241
Overcorrecting	211
All others	68
Total	3,400
Vision obscured	
Total	27
Avoiding, swerving, or sliding due to	
Slippery or loose surface	11
Live animals on road	11
All others	23
Total	45
Other miscellaneous	
Hit and run vehicle	114
Manslaughter, homicide or other assault	194
Other non-moving traffic violation	266
Possible distractions (inside vehicle)	
Total	6
Unknown total	52

zones of 55 miles per hour and greater (85.0%). Almost two out of three crashes are single-vehicle crashes (63.1%). Most vehicles in the fatal crash have two or more occupants (73.1%). In 70% of the crashes the young unlicensed driver was not issued a violation charge. When issued a primary citation, it was most likely in the category for reckless/careless/hit-and-run type offenses (14.8%) or a non-moving offense like a license or registration violation type (4.4%). In over half (53.9%) of the fatal crashes, the young unlicensed driver was not wearing a safety restraint. Nearly 9 out of 10 (87.0%) of the young unlicensed drivers sustained an injury, about half (44.1%) sustained a fatal injury. The vehicle driven by the young unlicensed driver was not registered to that driver in 74.6% of the instances, and in 6.3% of the cases the vehicle was listed as stolen. Hit-and-run fatal crashes represent 5.8% of the fatal crashes, including hitting another motor vehicle in transport ($n=62$) or a pedestrian or non-motorist ($n=60$).

3.4. Driver contributing factor

Table 4 shows that the physical and mental conditions category has 337 driver contributing factors assigned with inattentive being the most frequent. Miscellaneous factors category has 3,400 total factors with speed, speed for conditions, and running off the road the most frequent. Vision obscured as a contributing factor was cited 27 times with no dominant factor. The category avoiding, swerving, or sliding had 45 factors with slippery or loose surface or live animals on the road as the most frequent. The other miscellaneous category included 574 total factors with other non-moving traffic violation and manslaughter, homicide, or other assault most frequent. There were 52 total mentions for the unknown category.

3.5. Age specific crash attributes

There are seven variables that are significantly influenced by age (Table 5). Examining age of the young unlicensed drivers by day of week, statistically significant differences ($p=.011$) are attributed to increased involvement of 17 year olds in crashes on Monday–Wednesday, decreased involvement of 16 year olds in crashes on Sunday, and decreased involvement of 18 year olds on Wednesday. Additional age differences that are significant include increased involvement of speeds over 55 miles per hour ($p=.004$) for those under 14 years compared to those 14 years and above. Restraint use by age was significant ($p=.001$) with those less than 15 years less likely to be properly restrained than those 15 years and above. Injury severity ($p=.050$) differed where younger drivers are more likely to have injuries of unknown severity and unknown injury. Vehicle ownership by age was significant ($p=.003$) with 14–16 year olds more likely to be in a stolen vehicle at the time of the crash than other ages. Examining the number of vehicles in a crash by age showed significant differences ($p=.000$) with young unlicensed drivers less than 17 years more likely involved in a single vehicle crash, 17 year olds in two and three vehicle crashes, and 18 year olds in crashes with four or more vehicle crashes.

Table 5
Resulting p–values of variables for Pearson chi-square test scores, FARS, 1998–2002

	Age	Gender
Day of week	0.011*	0.051
Month	0.480	0.378
Hour	0.574	0.000*
Speed zone	0.004*	0.067
Violations	0.444	0.340
Restraint use	0.001*	0.001*
Injury severity	0.050*	0.020*
Vehicle owner	0.003*	0.000*
Number of vehicles	0.000*	0.254
Occupants	0.387	0.000*
Hit and run	0.008*	0.003*

* alpha level of $p<0.05$.

Also, hit-and-run crashes by age are significantly different ($p=.008$) with 18 year olds more likely to hit a pedestrian/non-motorist or a parked vehicle than other ages.

3.6. Gender specific crash attributes

Also in Table 5, six variables are significantly influenced by gender. Hour that the crash occurred by gender differed significantly ($p=.000$) where male drivers are more likely to crash between the hours of 0000–0259 and females more likely to crash between the hours of 1500–1559 and 1900–1959. For restraint use ($p=.001$), males are significantly less likely to be properly restrained than females. Injury severity was significantly different by gender ($p=.020$) with young unlicensed driver females more likely to have a possible or non-incapacitating injury and less likely to be a fatality compared to males. Vehicle ownership by gender showed significant differences ($p=.00$) for males who are more likely to be in a stolen vehicle than females. The number of occupants of a vehicle showed significant differences ($p=.000$), with males more likely to be alone in the vehicle and females more likely to have at least one passenger. For young unlicensed drivers in a hit-and-run crash, females are significantly more likely ($p=.003$) to hit a pedestrian and less likely to hit another motor vehicle moving or parked car than males.

3.7. Driver contributing factors to young unlicensed driver fatal crashes

Speed and speed for conditions was mentioned as the most frequent driver contributor factor in 49% of all crashes with 53% of crashes for males and 37% of crashes for females (Table 6). Speed was also a factor in 50% of the fatal crashes of young unlicensed drivers 13 years and under, 60% for 14 year olds, and 40% for 18 year olds. In 24% of the crashes, running off the road was a contributing factor with similar percentages by gender and younger unlicensed drivers are more likely to have running off the road with similarities by gender. In all crashes, operator inexperience was mentioned in 10% of all crashes and for those less than 14 years it was attributed to 32% of the crashes. Males are more likely to have failure to obey traffic signs/devices/officer and manslaughter/homicide/or other assault as a contributing factor. Females are more likely to have inattentive, operator experience, failure to yield right-of-way, and overcorrecting as contributing factors. By age, those under 15 years are likely to have non-moving traffic violation and those above 15 are less likely to have operator inexperience mentioned as a contributing factor.

Table 6
Percent of selected driver contributing factors assigned to young unlicensed driver (YUD) by age and gender, FARS, 1998–2002

Gender/age	All	Male	Female	<13	14	15	16	17	18
Speed and speed conditions	49	53	37	50	60	55	53	46	40
Running off road	24	23	24	25	29	24	24	23	22
Erratic, reckless, careless or negligence	12	12	11	13	13	15	14	9	10
Other non-moving traffic violations	11	10	13	4	7	12	11	14	9
Inattentive	10	9	14	14	13	12	10	9	9
Operator inexperience	10	3	16	32	21	19	11	4	2
Failure to obey traffic signs, devices, officer	9	10	7	5	6	7	10	9	11
Failure to yield right of way	8	7	11	3	9	6	8	9	9
Overcorrecting	9	7	13	19	9	10	9	8	6
Manslaughter, homicide, other assault	8	9	6	4	5	5	6	10	10
Total quantity	2,452	1,827	625	117	203	355	515	647	615

Table 7
Number and percent of young unlicensed driver (YUD) fatal crashes and percent of young driver fatal crashes involving an unlicensed driver by U.S. Census Bureau Region, FARS, 1998–2002

U.S. Census region	YUD fatal crashes (n)	YUD fatal crashes (%)	YUD fatal crashes to all young driver fatal crashes (%)
Northeast	155	6.4	6.4
Midwest	411	16.8	7.2
South	1,217	49.9	12.0
West	656	26.9	15.3
Total	2,452	100.0	10.8

3.8. Region specific percentage of young unlicensed driver fatal crashes

Table 7 shows that nearly half of young unlicensed driver fatal crashes occurred in the southern region of the United States (49.9%). The western region has the highest percentage of young unlicensed to young licensed fatal crashes. Overall, 10.8% of all fatal crashes of drivers under 19 years involved an unlicensed young driver.

4. Discussion

4.1. Statement of principal findings

This study provides evidence of young unlicensed drivers' continuing involvement and contribution to fatal crashes. Age and gender fatal crash attributes and geographic patterns distinguish young unlicensed drivers and degree of risk taking when driving. This study and others (FORS, 1997; Griffin & DeLaZerda, 2000) consistently report that over 1 in 10 fatal crashes of young drivers involves a young unlicensed driver. The cohort of young unlicensed drivers involved in fatal crashes possibly corresponds to an even larger group of young people who drive unlicensed.

4.2. Gender distribution of fatal crashes

Males are represented in young unlicensed driver fatalities with a 3:1 male/female ratio that can be attributed to early promotion, increased exposure, and risk-taking. Males are exposed to driving with early formulation and strong encouragement to drive before young females (Arnett, 2002; Farrow & Brissing, 1990; Harré et al., 1996). Self-reported studies of young unlicensed driving in the United States previously described found that females and males report similar exposure for infrequent and occasional driving (e.g., never to once or more a week in the past month). However, males report more frequent driving (e.g., three or more times per week in the past month) than females, which could contribute to the increase in males in young unlicensed driver fatal crash studies cited earlier. Crash data from FARS serves as the best available proxy measure of exposure based on fatal crash involvement and cannot specifically determine on-road gender driving exposure.

In addition to the increased promotion and exposure, males tend to practice specific and frequent high risk driving practices that contribute to fatal crashes (Beck, Hartos, & Simons–Morton, 2002; DeJoy, 1992). In this study, high risk driving practices of males (e.g., speeding, lack of restraint use, and night driving) were significantly different compared to females and reflected in increased severity of injury outcomes. Other studies of young male licensed (CDC, 1996; Rice, Peek–Asa, & Kraus, 2003) and unlicensed drivers (Harré et al., 1996; Lam, 2003; Williams et al., 1997, 1985) showed similarities in the type and frequency of male high-risk behaviors that contributed to fatal crashes. This consistency among young male drivers demonstrates a propensity for high risk driving behaviors that is likely indicative of a select group of risk-taking young male drivers involved in fatal crashes, rather than a licensing status issue (Griffin & DeLaZerda, 2000).

Females also practice some high risk driving in addition to driving unlicensed. Significant female risk-taking in unlicensed driving fatal crashes are noted for carrying passengers, an acknowledged risk factor for all young drivers (Chen, Braver, Baker, & Li, 2001). Associated with passengers is also the increased likelihood of inattentiveness being assigned as a contributing factor to female young unlicensed drivers over males involved in fatal crashes. Despite early driving promotion of young males, the percentage of younger female unlicensed drivers involved in fatal crashes through age 16 is higher than their male counterparts. This is also portrayed in the contributing factors for females that related to driving inexperience (overcorrecting and failure to yield right of way), typical of younger vehicle drivers in this study and others (Lam, 2003).

4.3. Age specific crash attributes

Age is important in determining involvement of young drivers in fatal crashes (Liu, Mooney, Meyer, & Shorter, 1998). For young unlicensed drivers, as age advances, so does the absolute number of involvement in fatal crashes. The crash rates of young unlicensed drivers doubled from age 14 years to 15 years in the only study that examined rates (Lam, 2003). Young unlicensed drivers who are older and age eligible to be licensed (>15 years) represent a majority of the crashes of unlicensed drivers. Not only were the age eligible drivers a majority of the fatal crashes, but their crash experience compared to younger unlicensed drivers more likely involved in multiple vehicle crashes, possibly reflective of increasing traffic experience and driving exposure. Age ineligible younger drivers' (<16 years) fatal crashes were more frequently associated with operator inexperience, such as single vehicle crashes, inappropriate speed, and running off the road. Specific age patterns do appear that influence age specific access to motor vehicles of unlicensed drivers and high risk driving practices that will need to be better understood.

4.4. Influences

The complexities and distribution associated with young unlicensed driving can only be partially understood by age and gender. The social context including aggregated individual characteristics, psychosocial factors, and institutional arrangements may account for some of the differences. Studies of young licensed drivers provide some insight into the influence of social context and may contribute to understanding young unlicensed driving. Aggregated individual characteristics include age and gender specific factors (Beck et al., 2002), peers (Laflamme, Engström, & Huisman, 2004), family (Ferguson, Williams, Chapline, Reinfurt, & De Leonardis, 2001; Watson, 1998), and employment and educational commitments (Murray, 1998; Watson, 1998). Psychosocial factors include socioeconomic status (Hasselberg & Laflamme, 2003), distances between services and population density (Frisch et al., 2003), and urban and rural differences (Clark & Cushing, 1999; Waller, Baker, & Szocka, 1989). Institutional arrangements include availability of public transportation (Watson, 1998), law enforcement practices (Frisch et al., 2003; Harré et al., 1996), and licensing policies that limit access to licensing (Ferguson et al., 1996). These factors that contribute to the social context of young licensed drivers will need to be explored toward understanding potential contributions to young unlicensed drivers.

4.5. Barriers to licensing

The vast difference in fatal crash involvement of age eligible unlicensed drivers raises questions about barriers to licensing. Barriers to obtaining and driving with a valid license are not well understood. Previous studies have alluded to social disadvantage and fear of failure (Harré et al., 1996); immigrant status and country of origin (Stiles & Grieshop, 1999); inadequate enforcement and consequences (Harré et al., 1996); and additional qualifying

requirements, such as graduated drivers licensing (Dee, Grabowski, & Morrisey, 2005; Williams et al., 1997) as impediments. Specific to younger drivers, 13% of youths interviewed at testing for a learner's permit who did not obtain a full license in the subsequent 12 months differed significantly from licensed youths as coming from disadvantaged social, economic, and educational backgrounds and were more likely to be a racial minority (Simons–Morton, Hartos, Leaf, & Preusser, 2006). Recognizing and understanding the barriers to receiving training and licensing are paramount.

4.6. Limitations

The descriptive nature of this study provides insight into the distribution of driving practices and demographics of young unlicensed drivers involved only in fatal crashes. FARS is limited to reporting only fatal crash events occurring on public roads and the accuracy and completeness of circumstantial information collected by the reporting law enforcement at the crash scene. Assignment of circumstantial information by age, gender, and licensing status by reporting law enforcement may have a tendency to view young unlicensed drivers as more likely in error for the crash, overestimating their involvement (Williams & Shabanova, 2003). FARS cannot determine driving exposure of unlicensed driving important in ascertaining risk factors and developing benchmarks to measure future countermeasures. Variations in social context could not be considered with the register-based data and should be in future research.

5. Summary

Fatal crash data from this study validates the recurrent driving presence and practices on public roads of young unlicensed drivers through their involvement in fatal crashes. Young unlicensed driving involvement and practices in fatal crashes are similar to young licensed drivers and not normally distributed by age and gender. With the primary focus in the United States to prepare young drivers with driver's training and graduated drivers licensing, these initiatives bypass a potentially large group of disadvantaged unlicensed young people. States should examine licensing qualifying practices that may restrict vulnerable youths. Subsequently, caregivers as well as law enforcement must be vigilant in their efforts to restrict use of motor vehicles. The findings from this study are preliminary and additional quantitative and qualitative studies will be needed to better understand the individual age and gender motivations and social context of young unlicensed driving.

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