Journal of Safety Research 48 (2014) 37–42

Contents lists available at ScienceDirect

Journal of Safety Research

journal homepage: www.elsevier.com/locate/jsr

Characteristics of teens-with-teens fatal crashes in the United States, 2005–2010

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ARTICLE INFO

Article history:
Received 7 January 2013
Received in revised form 18 November 2013
Accepted 19 November 2013
Available online 7 December 2013

Keywords:
Teenagers
Teenage driving
Passengers
Passenger restrictions
Graduated driver licensing

ABSTRACT

Background: More than 40% of fatal crashes of 16- and 17-year-old drivers occur when transporting teenagers. Characteristics of this predominant crash type and prevention possibilities are described, based on data from fatal crashes in the United States during 2005–2010. *Results:* Fifty-seven percent of 16- and 17-year old drivers in fatal crashes had at least one passenger. Most commonly, all passengers were ages 13–19 (42% of all drivers and 73% of those with passengers). Of fatal crashinvolved drivers with teenage passengers and no passengers of other ages, 56% had one passenger, 24% had two, and 20% had three or more. Most frequently, passengers were the same sex and within one year of the driver. Risk factors involving speeding, alcohol use, late-night driving, lack of a valid license, seat belt non-use, and crash responsibility were more prevalent with teenage passengers than when driving alone, and the prevalence of these factors increased with the number of teenage passengers. Many risk factors were most prevalent with passengers ages 20–29, although few crashes had this occupant configuration. Risk factors were least prevalent with a passenger 30 or older. *Discussion:* Fatal crashes of 16- and 17-year-old drivers with teen passengers are a common crash scenario, despite passenger restrictions in 42 states and the District of Columbia during some or all of the study period. The proportion of these fatal crashes decreased slightly from 46% in 1995 (pre-GDL) to 43% in 2010 and showed no signs of decreasing during the six-year study period (range 41% to 43%). *Practical applications:* Existing passenger restrictions are relatively weak and could be strengthened. Fatal crashes involving teen passengers, especially multiple passengers, are more likely to involve alcohol, late-night driving, driver error, and invalid licensure, so stepped-up enforcement of existing laws involving these behaviors might reduce the prevalence of such crashes.

1. Introduction

Teenage drivers are involved in more crashes per mile driven than drivers of any other age group; drivers ages 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. [Data files], 2012; National Household Travel Survey, 2009). Although 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, including their passengers, drivers and passengers in other vehicles, and pedestrians (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, Baker, Braver, & Li, 2000; Doherty, Andrey, & MacGregor, 1998; Preusser, Ferguson, & Williams, 1998; Rice, Peek-Asa, & Kraus, 2004; Tefft, Williams, & Grabowski, 2013). 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 & Institute of Medicine, 1999, 2006). The need for social acceptance, risk taking tendencies, undeveloped self-regulation capabilities, and driving inexperience can combine to create a "perfect storm" when teenagers travel together (Allen & Brown, 2008). The types of distraction and risk-inducing activities that occur in the vehicles of teenagers have been documented in crash reports, surveys, focus groups, and on-road studies of vehicles leaving high schools (e.g., Williams, Preusser, & Ferguson, 1998; Heck & Carlos, 2008; National Highway Traffic Safety Administration, 2006; Simons-Morton, Lerner, & Singer, 2005). Although there are many examples from these studies of risky behavior and distractions that take place when teens transport other teens, naturalistic studies of driving behavior recorded by in-vehicle instrumentation have begun to reveal some of the complexities in the interactions that occur. A recent study that used in-vehicle cameras to monitor a sample of teens for their first 6 months of licensed driving found that although passengers did not often actively urge the driver

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http://dx.doi.org/10.1016/j.jsr.2013.11.001

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), implying that it was the mere presence of the passengers that affected the driver's behavior. In another study in which a different sample of newly-licensed 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 prevalent when teen passengers were present than when the driver was alone; however, risky driving was much more prevalent among teen drivers with relatively more risky friends (Simons-Morton et al., 2011).

The primary approach to reducing crashes involving teens with passengers has been passenger restrictions, enacted as part of graduated driver licensing (GDL) systems. As of early 2012, 45 states and the District of Columbia had passenger restrictions in force during the initial stage of licensed independent driving. The restrictions vary substantially in terms of the number of passengers allowed, ages of passengers prohibited, and the length of time that the restrictions are in effect (Insurance Institute for Highway Safety, 2012a, 2012b). Studies that have investigated the effect of passenger restrictions have consistently reported that they have been effective in reducing the crash involvement of young drivers carrying passengers (Cooper, Atkins, & Gillen, 2005; Chaudhary, Williams, & Nissen, 2007; McCartt, Teoh, Fields, Braitman, & Hellinga, 2010; Masten, Foss, & Marshall, 2013; Fell, Todd, & Voas, 2011).

Despite the widespread introduction of passenger restrictions and their success in reducing crashes, teens transporting passengers, especially other teens, remain a major problem (Ferguson, Teoh, & McCartt, 2007). For 16- and 17-year-olds, it has been reported that more than 40% of their fatal crashes occur when they are transporting teens and no non-teens are in the vehicle (Williams, Ali, & Shults, 2010). The elevated crash risk when teens travel together has been well established. We do not, however, know the current features of crashes in which teen drivers have passengers. The objectives of the present study were to provide a comprehensive national picture of fatal crashes that involve teen drivers transporting passengers, documenting 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 examining the characteristics of these crashes in relation to specific combinations of passengers. These descriptive analyses may provide information as to how to extend the effects of passenger restrictions, or how to target these crashes in other ways.

2. Methods

2.1. 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.

2.2. 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.

The statistical significance of the relationship between each risk factor and passenger configuration was assessed using logistic regression of passenger configuration (represented by an array of binary indicator variables for each combination of passengers) on the risk factor (e.g., speeding vs. not speeding). In cases where the risk factor was related to passenger configuration ($P < .05$ based on likelihood ratio χ^2 statistic for the overall model), the statistical significance of each passenger configuration was assessed relative to the reference category of no passengers using χ^2 tests.

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 were imputed by NHTSA (Rubin, Schafer, & Subramanian, 1998). In this study, classification of driver alcohol use was based on both known and imputed BAC values.

The FARS data do not contain assignment of fault. For the purpose of this 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. Improper actions and errors considered indicative of responsibility for the crash included the following, which are coded in FARS as driver-related contributing factors: 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; driving on the wrong side of the road; driver inexperience; lack of familiarity with the roadway; stopping in the roadway; and over-correcting.

Data from the state of Virginia were excluded due to apparent under-reporting of the presence of passengers who were not injured, because under-reporting of passengers from the data would bias results related to the presence, number, and characteristics of passengers. Rice and Anderson (2009) examined FARS data from years 1996 to 2005 and found that data from several states appeared to omit 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 teenage drivers) 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.

3. Results

There were 9,578 drivers age 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 teenage 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 2006 in 2005