Journal of Safety Research xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Safety Research

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

# Examining teen driver crashes and the prevalence of distraction: Recent trends, 2007–2015

Cher Carney, [a,*] Karisa K. Harland, [b] Daniel V. McGehee [a,b]

[a] National Advanced Driving Simulator, The University of Iowa, 2401 Oakdale Blvd, Iowa City, IA 52242, United States
[b] Department of Emergency Medicine, The University of Iowa, 200 Hawkins Dr., 1008 RCP, Iowa City, IA 52242, United States

ARTICLE INFO

*Article history:*
Received 27 February 2017
Received in revised form 1 June 2017
Accepted 5 December 2017
Available online xxxx

*Keywords:*
Teen drivers
Distraction
Cell phone
Texting
Rear-end crashes

ABSTRACT

*Introduction:* Teen drivers crash at a much higher rate than adult drivers, with distractions found as a factor in nearly six out of 10 moderate-to-severe teen crashes. As the driving environment continues to rapidly evolve, it is important to examine the effect these changes may be having on our youngest and most vulnerable drivers. *Method:* The purpose of this study was to identify types of vehicle crashes teens are most frequently involved in, as well as the distracting activities being engaged in leading up to these crashes, with a focus on identifying changes or trends over time. We examined 2,229 naturalistic driving videos involving drivers ages 16–19. These videos captured crashes occurring between 2007 and 2015. The data of interest for this study included crash type, behaviors drivers engaged in leading up to the collision, total duration of time the driver's eyes were off the forward roadway, and duration of the longest glance away from forward. *Results:* Rear-end crashes increased significantly (annual % change = 3.23 [2.40–4.05]), corresponding with national data trends. Among cell phone related crashes, a significant shift occurred, from talking/listening to operating/looking (annual % change = 4.22 [1.15–7.29]). Among rear-end crashes, there was an increase in the time drivers' eyes were off the road ($\beta = 0.1527$, $P = 0.0004$) and durations of longest glances away ($\beta = 0.1020$, $P = 0.0014$). *Conclusions:* Findings suggest that shifts in the way cell phones are being used, from talking/listening to operating/looking, may be a cause of the increasing number of rear-end crashes for teen drivers. *Practical applications:* Understanding the role that cell phone use plays in teen driver crashes is extremely important. Knowing how and when teens are engaging in this behavior is the only way effective technologies can be developed for mitigating these crashes.

© 2017 National Safety Council and Elsevier Ltd. All rights reserved.

## 1. Introduction

The number one cause of teen deaths is driving or riding in a car. In 2014, 1,717 young drivers died in motor-vehicle crashes, with an additional estimated 170,000 injured (NHTSA, 2015a). Inexperience (Greenberg et al., 2003; McKnight & McKnight, 2003; Patten, Kircher, Östlund, Nilsson, & Svenson, 2006), overconfidence (Brown & Groeger, 1988; Finn & Bragg, 1986), social pressure (Allen & Brown, 2008; Farrow, 1987; Simons-Morton, Lerner, & Singer, 2005), a tendency to underestimate risk (Albert & Steinberg, 2011; Evans & Wasielewski, 1983; Horrey, Lesch, & Garabet, 2008), and engaging more often in risky behaviors (McEvoy, Stevenson, & Woodward, 2006; Sayer, Devonshire, & Flannagan, 2005) are just some of the factors influencing teen drivers.

Proportionally more than any other age group, teens involved in fatal crashes are reported to have been distracted at the time of the crash (NHTSA, 2016), with distractions found as a factor in nearly six out of 10 moderate-to-severe crashes (Beanland, Fitzharris, Young, & Lenné, 2013). In the context of driving, a distraction has been defined as the diversion of attention from activities critical for safe driving toward a competing activity (Regan, Hallett, & Gordon, 2011). Distractions vary widely, with the most prevalent behaviors including attending to passengers, cell phone use, and attending to something inside the vehicle (Carney, McGehee, Harland, Weiss, & Raby, 2015). Those identified as particularly dangerous for young drivers—peer passengers and technology, most notably cell phones—have been the focus of recent research.

For teens, in particular, the cell phone has become the primary mode of communication: in 2015, 92% of teens age 15–17 owned a cell phone, with 76% of those owning a smartphone (Lenhart et al., 2015). With the evolution of cell phones to smartphones, this technology has evolved from talking into texting and engagement in social media. In a 2015 survey, nearly 70% of drivers ages 16 to 18 reported they had talked on a cell phone, 42% had read a text or e-mail, and 32% had typed/texted while driving in the past 30 days (AAA, 2016).

However, determining what activities teens are engaging in before a crash occurs is not an easy task. Previous research has largely relied on survey and crash data to attempt to obtain this type of information.

* Corresponding author.
*E-mail addresses:* cher-carney@uiowa.edu (C. Carney), kari-harland@uiowa.edu (K.K. Harland), daniel-mcgehee@uiowa.edu (D.V. McGehee).

https://doi.org/10.1016/j.jsr.2017.12.014
0022-4375/© 2017 National Safety Council and Elsevier Ltd. All rights reserved.



UNCORRECTED PROOF

ARTICLE IN PRESS



While surveys can inquire about drivers' attitudes toward and frequency of engaging in certain distracting activities, there are issues associated with the reliability and validity of these self-reported data. Additionally, though crash data can be found in the large national databases, these rely on police reports in which distraction is notably underreported for a variety of reasons, including: (a) reliance on driver to self-report, (b) information being unavailable, and (c) variability in reporting across jurisdictions. Naturalistic data provides researchers with an unbiased view inside the vehicle during the critical seconds leading up to a crash and micro-level analyses to be conducted, providing invaluable data that would not otherwise be available.

The objective of this study was to use naturalistic crash data to examine the types of crashes teens are most frequently involved in, with a focus on analyzing whether the distractions or competing activities leading up to those crashes have changed over time. In addition, we investigated if eye glance behavior, including total eyes off road time and duration of the longest glance off road, have changed over time by crash type and potential distractions. The current analysis expands on a previous naturalistic teen driving study (Carney et al., 2015) and broadens knowledge of teen driver distractions from an earlier publication that focused on rear-end crashes (Carney, Harland, & McGehee, 2016).

## 2. Methods

### 2.1. Study sample

Nearly 15,000 drivers ages 16 to 19 were enrolled in a teen driving program between 2007 and 2015. The participants were licensed drivers in Arizona, Colorado, Illinois, Iowa, Minnesota, Missouri, Nevada, and Wisconsin. The program provided teens and their families with weekly web-based feedback regarding the young driver's performance and promoted safe driving behaviors through the use of the Lytx DriveCam system. This system, mounted on the inner windshield of a vehicle, recorded video, audio, and accelerometer data when a crash or other high g-force event (e.g., hard braking, acceleration, or impact) was detected. The system afforded a view of the inside of the cab and driver of the vehicle, as well as a view out the front. Each 12-second video provided data from the 8 s before to 4 s after the event.

Between August 2007 and April 2015, 8,228 videos of teen driver crashes had been collected by Lytx. These crashes were de-identified and released by the families and made available for review in order to further the understanding of contributing factors associated with young driver crashes (Carney et al., 2015). A single teen could have multiple crash videos within the data but, due to the anonymous nature of the videos, we were unable to control for multiple measurements (videos) on the same teen. Based on a review of the data, crashes in which the vehicle sustained forces less than 1 g were excluded to eliminate minor dings and curb strikes from the analysis. Additional videos were excluded for other reasons, as presented in Fig. 1. A total of 2,229 crashes met the inclusion criteria and were analyzed: 1,034 vehicle-to-vehicle (V2V) and 1,195 single-vehicle (SV) crashes.

### 2.2. Crash coding

The six seconds preceding each usable crash were coded for analysis, as this timeframe had the most potential to be contributory and allowed for comparison with previous naturalistic studies (i.e., the 100-car study; Klauer, Dingus, Neale, Sudweeks, & Ramsey, 2006). The coding methodology focused on identifying the factors present in crashes as has been described in detail in previous publications (Carney et al.,

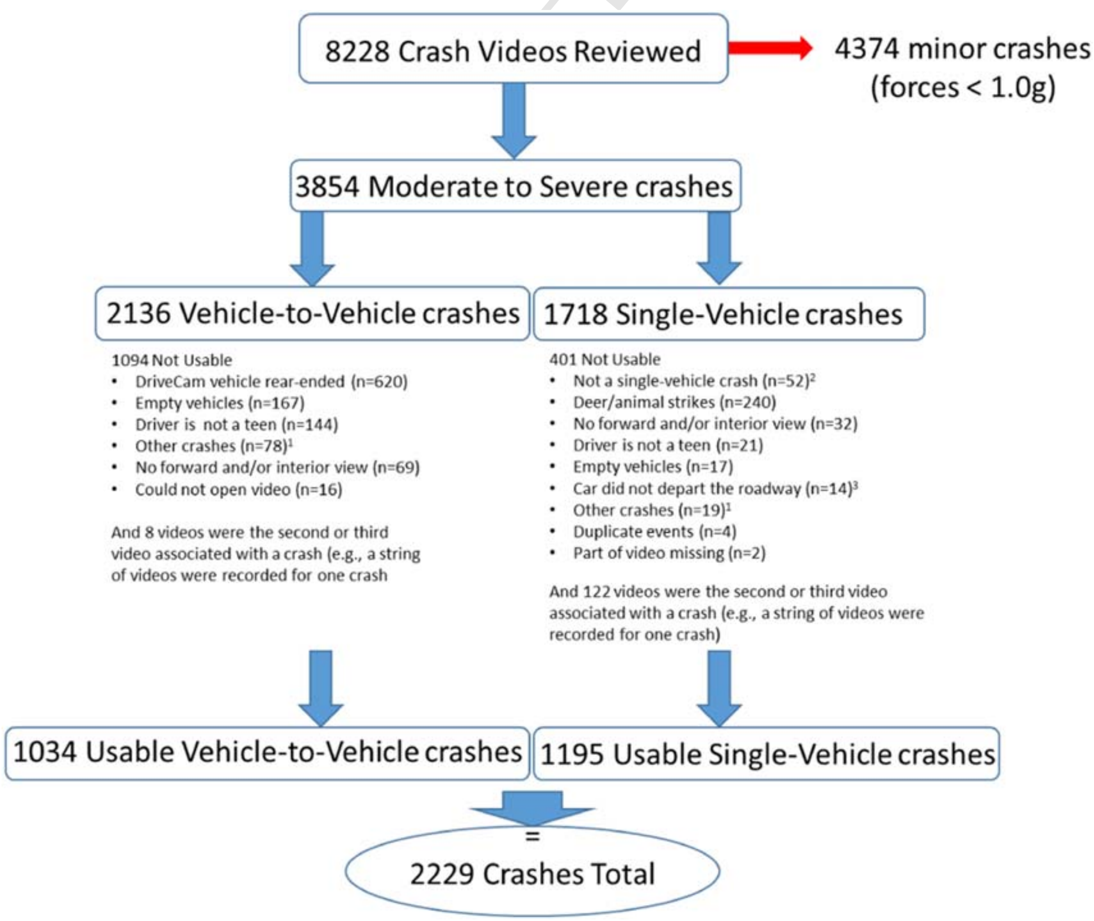


Fig. 1. Breakdown of video review process.

Please cite this article as: Carney, C., et al., Examining teen driver crashes and the prevalence of distraction: Recent trends, 2007–2015, *Journal of Safety Research* (2017), https://doi.org/10.1016/j.jsr.2017.12.014

Download English Version:

https://daneshyari.com/en/article/6973634

Download Persian Version:

https://daneshyari.com/article/6973634

Daneshyari.com