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Texting and driving: Perceptions and video game simulation among college students

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ABSTRACT

Background: Distracted driving due to texting accounts for thousands of preventable vehicle related deaths each year. Despite national campaigns to encourage drivers to wait to text when not driving, and laws making texting and driving illegal, the majority of college students still report texting while driving. **Objective:** The current study was designed to examine the effect that text messaging has on simulated driving performance, as well as the perceptions that university students have regarding texting and distracted driving. The use of text messaging while driving was predicted to greatly increase the number of simulated driving infractions. An overall negative view of texting and driving was expected, and participants in the texting condition were predicted to have a significantly stronger negative perception of texting and driving. **Methods:** Thirty-five college students participated in a video game driving simulation on the X-box 360 gaming console. One group was randomly assigned to text with the experimenter (experimental group) while the other group was not (control). Infractions were recorded. Participants also completed questionnaires about their perceptions of texting and driving. **Results:** Findings revealed that texting while driving negatively impacted simulated driving performance. Participants committed nearly 10 times as many traffic infractions while engaged in a texting conversation compared to participants who drove the simulation without the use of a hand held texting device. **Conclusion:** Our results indicate texting significantly impairs driving ability, and we recommend greater efforts should be made to regulate the use of cellular communication devices while driving a motor vehicle.

KEY WORDS: Distracted driving, driving, texting, simulation, video game

INTRODUCTION

According to the national highway safety and traffic administration, distracted driving includes the use of: Texting, use of a cell phone or smartphone, talking to passengers, grooming, reading, using a navigation system, watching a video or adjusting the radio [1]. Texting and driving cause on average 4.3 s of eye time off the road and increases the chances of a driving accident by 23 times [2]. Distracted driving caused a 28% increase in accident fatalities in the United States from 2005 to 2008 [3]. There is an increase in the use of distracting activities, especially texting while driving, and it is becoming a major safety concern today. It is now commonplace to associate traffic fatalities with the use of text messaging and driving [4]. Wilson and Stimpson concluded that distracted driving due to texting has accounted for thousands of vehicle-related deaths in 2008 [3]. There are three major distractions that occur while engaging in texting and driving: Cognitive, visual, and physical [5]. The current study will examine the effect that text messaging has on simulated driving performance, as well as the perceptions that university students have regarding texting and distracted driving.

Cell phones are now included in almost every aspect of people's daily life. From sending a quick message to a friend, to checking a bank statement, to watching LeBron highlights from last night's basketball game, people revolve around their smartphone. On average, Americans send over 5.5 billion text messages a day [6]. According to a recent anti-texting and driving program, almost every teenager owns a smartphone [5]. This surge of popularity of this form of communication comes with consequences. In 2012, there were 3,328 fatalities due to distracted driving and an estimated 421,000 people injured [1]. Numbers such as these have sparked studies all over the country and all over the world to create campaigns such as AT&T's "it can wait" campaign released in 2012 [6]. Some reports say that over 90% of young people aged 15-20 have or still do text while driving [7]. This is important because this same age group accounts for 6.4% of all drivers on the road but account for over 11% of traffic fatalities [8]. Of all the age groups, it is the young adult population that is affected by texting and driving the most.

There have been several studies on driver's perceptions of texting and driving [7,9]. Driver's perceptions on text messaging are generally negative; people tend to agree that texting and

driving are dangerous [7,9]. Although people generally see texting and driving as dangerous, they also admit to continue to do so anyway [7]. Some researchers suggest this is because of overconfidence that people, especially teenagers, have due to their abundant use of text messaging and their ability to text without looking at their phone [5]. Other factors that can cause a desire or even need to text, while driving in some people is the social pressures of responding in a fast manner [10]. Distracted driving plays a major role in traffic accidents and fatalities, however, many people especially those in the age ranges of 18 years old to mid 20s continue to engage in this dangerous behavior [7,9-11].The current study compares students in two experimental conditions, texting and non-texting, in performance and perceptions of texting and driving.

The texting group (experimental group) will be compared to the non-texting group (control group) to investigate the types and frequency of infractions that occur while texting and driving on a gaming simulation. The types of infractions that will be recorded are total vehicles hit, walls hit, speeding, and lane violations. Consistent with this study, texting is predicted to significantly impair driving performance. Earlier research has found an increase in delayed reaction time, an increase in crash risk, and increased lane infractions are all due to texting while driving [12-15]. Specifically, the use of text messaging while driving was predicted to greatly increase the number of driving infractions. Participants were predicted to have a negative view on texting and driving, and participants in the texting condition were predicted to have a stronger attitude against texting and driving after their simulated driving experience.

MATERIALS AND METHODS

Methods

Participants

Participants included 35 university students ranging from 18 to 22 years of age (mean [M] = 19). A majority of the participants were underclassman; 15 freshmen, 11 sophomores, four juniors, and five seniors. Of these university students, nine were men, while 26 were women. The ethnicity background included 28 Caucasian, three African-American, and four other. Participants were granted half a credit towards their introduction to psychology class requirement for research participation in this study. All the participants were treated with consideration of the American Psychological Association's ethical treatment guidelines [16].

Materials

The materials included an X-box 360 gaming console linked to a video game steering wheel and pedal displayed on a 46″ flat screen TV. The game played was Midnight Club: Los Angeles and was set up in the first person driving setting. The participants drove the same interstate course in the game, in a free drive mode. An iPhone 5s was provided to participants for texting during the study. Participants carried on a conversation with the experimenter who asked questions from an iPad while sitting in the back of the room. The devices used the wireless iMessage function from Apple, Inc., allowing text messaging conversation between the participant and the experimenter. The experimenter asked the participant a series of questions from the script that include questions such as, what is your favorite color and who is your Hollywood crush? A video camera was used to record each participant driving in the video simulation, and this recording was reviewed at a later time.

A paper survey was given that was developed from Harrison's study of students' prevalence and perceptions of text messaging while driving [7]. It is a two-part survey; the first includes a five-point scale (Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5) consisting of five statements: Q1 = It is unsafe to text while driving. Q2 = It should be illegal to text while driving. Q3 = Texting while driving can be dangerous, but I will do it anyway. Q4 = It is my business if I want to text and drive. Q5 =Texting while driving is not distracting. The second part is a yes or no section consisting of 17 questions. A sample questions are "Regarding texting and driving have you ever received a ticket while driving?" [7]. The last page in the packet was a demographic sheet asking for age, gender, ethnicity, and class rank.

Procedure

The room was set up with the participant seated directly in front of the television with access to the steering wheel and pedal. The participant was instructed on how the game simulator worked as well as what the experiment required. The participant was directed to stay in a single lane and keep their speed under 70 miles/h. Next, the participant was given a 2 min period to try the driving simulator without any distractions to get used to the system. The experimental group was given the iPhone and told to hold a conversation. The experimenter was seated behind the participant, out of view. The screen was video recorded so the violations could be counted at a later time. Violations included going outside of the designated speed, swerving into another lane, and hitting another vehicle or wall. Participants in the texting group were asked to drive the course until all the questions from the experimenter were completed, M = 3 min 46 s. Participants in the non-texting group were asked to drive for 4 min. After the driving simulation, both groups was given the paper survey to fill out. After completion of the survey, participants were given a debriefing statement and then the experiment was concluded.

RESULTS

To compare the control group (non-texting) to the experimental group (texting), a series of independent means *t*-tests were performed using $P < 0.05$ to determine statistical significance. The total number of infractions in the non-texting group (M = 1.65, standard deviation [SD] = 2.4) was significantly less than the participants in the texting group (M = 15.78, SD = 11.8), $t(33) = 4.83$, $P < 0.001$. Infractions were broken down into four categories: Number of vehicles hit, lanes

infractions, the number of walls hit, and speeding. There were significant differences between groups when comparing vehicles hit (non-texting: M = 0.41, SD = 0.71; texting: M = 1.5, SD = 2.1; t(33) = 2.06, $P = 0.02$), number of lane infractions (non-texting: M = 1.0, SD = 1.5; texting: M = 12.44, SD = 8.6; t(33) = 5.38, $P < 0.001$), and walls hit (non-texting: M = 0, SD = 0; texting: M = 1.4, SD = 2.1; t(33) = 2.77, $P < 0.01$). There were no significant differences between groups for speeding infractions (non-texting: M = 0.24, SD = 0.39; texting: M = 0.39, SD = 0.85; t(33) = 0.63, and $P = 0.27$) [Figure 1].

Distracted driving perceptions were analyzed next. In response to the statement "it is unsafe to text while driving" the mean response for the non-texting group was not significantly different (M = 4.41, SD = 0.62) than the texting group (M = 4.56, SD = 0.51), t(33) = 0.75, $P = 0.23$. For most cases, the vehicle simulation had no significant effect on the questionnaire responses except for the question "texting and driving is not distracting," which was marginally significant. For this statement, the non-texting group scored lower (M = 4.29, SD = 0.99) than the texting group (M = 4.67, SD = 0.59), t(33) = 1.36, and $P = 0.09$. Perception results are shown in Figure 2.

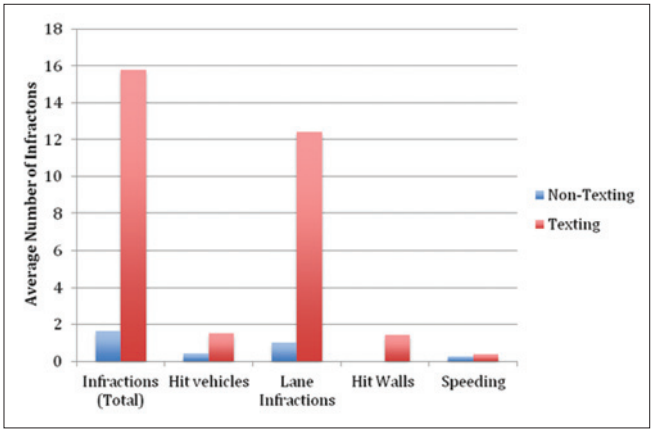

Figure 1: The mean number of driving simulation traffic infractions in the texting versus non-texting groups. All texting versus non-texting group comparisons were statistically significant, $P < 0.001$, except for the speeding category ($P = 0.21$)

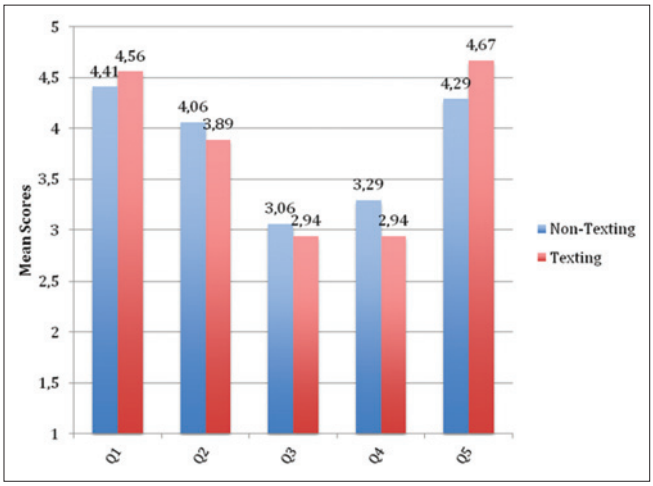

Figure 2: Participant perceptions of texting and driving in the texting versus non-texting groups. No statistically significant differences were found between groups except for the question "texting and driving is not distracting" ($P < 0.02$). Strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5. Q1 = It is unsafe to text while driving. Q2 = It should be illegal to text while driving. Q3 = Texting while driving can be dangerous, but I will do it anyway. Q4 = It is my business if I want to text and drive. Q5 = Texting while driving is not distracting

The participants reported driving a mean of 5.7 days/week with over 62% reporting that they drive every day. The participants were asked if they text and drive and 85.7% answered "yes" that they do text and drive. Descriptive data was calculated on the survey. About 57% of participants said that they have drifted into another lane because of texting, and 45% said that they have eaten food, texted and driven all at the same time. When asked if they have "texted with a passenger riding in your vehicle" 83% said that they have. In regards to knowing someone who has been in an accident over 68% of participants answered "yes" that they have known someone. A summary of results in provided in Table 1.

DISCUSSION

Evidence suggests that engaging in a texting conversation while driving is very dangerous and impairs driving performance despite the overwhelming evidence. Over 85% of participants in the current study reported that they text while driving. When asked about their beliefs that it is unsafe to text and drive the average participant perception was "yes" it is an unsafe activity. This pool of participants may have an overconfidence regarding texting and driving, by reporting a neutral view on the statement "texting and driving are dangerous, but I do it anyway." This study supports the need for further action to be taken to increase the awareness that the decision to text and drive does affect others around you.

There was a significant difference in traffic violations between the non-texting group verses the texting group on the driving simulation. The number of infractions in the texting group was almost 10 times the number of infractions of the non-texting group. The most common infraction committed by both groups was lane crossings. Participants in the texting group were three times more likely to hit another vehicle in the simulation than those in the non-texting group. The only calculated variable that was not significant was speeding. Participants were just as

Table 1: Participants indicating they have engaged in these texting behaviors

Question	Percentage
Text and drive	85.7
Ran a stop sign because of texting	11.4
Drifted into another lane because of texting	57.1
Eaten, texted and drove all at the same time	45.7
Texted with a passenger in the car	82.9
Driven recklessly while texting	20.0
Driven more than 10 mph over the speed limit while texting	48.6
Gotten into argument via texting	62.9
Known someone who has been in an accident due to texting	68.6

likely to speed if they were in the non-texting group as if they were in the texting group.

Most of the participants had a negative view of texting and driving and in four of the five questions on perceptions of texting and driving, there were no significant differences between the texting and non-texting groups. The second prediction that participants in the texting condition would have significantly stronger negative perceptions of texting while driving compared to the non-texting group, was partially supported. When prompted with the statement "texting and driving is unsafe," there was no statistically significant difference between the groups, as well as their beliefs that texting and driving should be illegal. However, for the question "texting while driving is not distracting," there was a marginally significant difference in how the texting group responded compared to the non-texting group. Participants in the texting group felt stronger towards the idea that texting and driving are distracting, as shown in Figure 2.

An interesting finding in the current study was that although many participants engage in this driving behavior, very few had faced any serious consequence due to texting and driving (injury, tickets, or car accidents). In fact, only 3% of participants had received a ticket or gotten into an accident with no one reporting that they have ever been injured due to texting and driving. However, when asked about knowing someone who was in an accident due to being distracted by texting, over 2/3^{rds} (68%) of participants reported "yes" that they know someone who was in an accident. This evidence could show why the participants reported in the manner that they did. Although they see that texting while driving is dangerous from their experiences with people they know, they have yet to experience a consequence of texting while driving.

Among the recorded traffic violations (lane crossings, vehicles hit, walls hit, and speeding) in the driving simulation, the greatest numbers of infractions committed were lane violations in both the texting and non-texting group. This data supports lane drifting as being the top traffic violation reported in the survey. Nearly half the participants (48.6%) reported that they have driven 10 miles over the speed limit while texting, but the number falls to 8.6% when participants were asked the same question but at 20 miles over the speed limit. Another interesting discovery is that just shy of half of the current study participants (45.7%) reported that they have eaten food, texted, and driven all at the same time.

The results of the self-report portion of the study could be affected by outside social pressure to maintain a positive image. Most participants agreed that texting and driving are a risky behavior and that could have impacted their answers on the survey. Furthermore, the sample pool used was limited to college students, most being in their first or second year. Convenience sampling was used, and the populations of high school age and older adults were not included in this experiment. Another limitation the study faced was the lack of male participation; only 25% of the participants were men. A few questions could have been added to the survey to better define results such as, "Have you ever driven with a child in the car?" This would help the statistical analysis for question number 11 that asked "Have you ever used texting while you were driving with a child or children in the vehicle?" Furthermore, a scale of the frequency of texting and driving should have been included to show the high volume users of texting compared to low volume users of texting. Other factors that influenced the driving simulation were that peripheral vision and other senses, such as touch and hearing were altered. In addition, not being able to use the cell phone you are familiar with can affect the results of driving infractions.

The implications of this study suggest there is evidence that texting significantly impairs driving ability. This evidence adds to the research already compiled, and new legislation and awareness can be made to prevent the use of texting and driving. It also opens up innovative pathways to help society create safe hands-free solutions for text messaging while driving. The evidence suggest that many people perceive that texting and driving is dangerous, however, this knowledge does not affect their behavior in refraining from texting while driving. With this information, a push should be made to market texting and driving as a legitimate safety concern for modern Americans.

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