Use of a Driving Simulator to Assess Health Belief Model Variables for Distracted Driving Prevention

Department of Health Sciences | College of Health and Behavioral Studies | James Madison University
Theresa M. Enyeart Smith, Ph.D., CHES®
Maria Theresa Wessel, Ed.D., CHES®

Introduction

Many who have had phones since their preteen years consider them a crucial part of their daily lives; however, they can be deadly distractions. In 2015, 15% of motor vehicle injury crashes and 10% of fatal crashes were distraction related (National Highway Traffic Safety Administration [NHTSA], 2017). To break it down even further, approximately nine people are killed and over 1,000 injured in the United States every day due to distracted driving (NHTSA, 2017). Approximately 14% of all fatal distraction-affected crashes in 2015 were related to cell-phone use while driving (NHTSA, 2017). However, the National Safety Council, when accounting for unreported cell phone use, estimates at least one in four car crashes involves cell phone use (National Safety Council, 2013). A 2016 survey showed that drivers reported participating in distracted driving events, even though they were aware that the activities were distracting and increased the likelihood of crashing (State Farm Mutual Automobile Insurance Company, 2016). For example, 29% of drivers reported searching the web while driving, even though 96% found it distracting and 77% thought it increased the likelihood of a crash (State Farm Mutual Automobile Insurance Company, 2016). Among all drivers who reported cell phone use while driving, the age group with the highest likelihood (33%) to continue the habit was 20-29 year olds (NHTSA, 2017). The top two reasons distracted drivers reported using their cell phone for talking while driving was because "It is an efficient use of my time" (49%) and "I want to stay in touch with my family" (36%) (State Farm Mutual Automobile Insurance Company, 2016).

The trend of using online driving simulators is becoming popularized within various hospitals, community events, public schools, and accredited universities in attempt to make their communities a safer place to live and drive in. The issue is so important that the research aspect is gaining the interest of multiple corporations. AT&T is in the midst of a texting and driving simulator project, titled "It Can Wait," in which an online driving simulator is available countrywide (Panta 2017). The company released in 2017 that the anti-texting campaign has inspired more than 15 million people in making pledges not to drive and use their phone simultaneously (Panta 2017). AT&T also noted that 90% of those surveyed voiced that they are more aware of the dangers of distracted driving (Panta 2017).

The purpose of this study was to identify attitudes related to distracted driving behaviors, particularly texting and driving, before and after the completion of an online distracted driving simulation using the One Simple Decision Simulator.

Methods

Prior to implementation of the study, the procedures and survey were pilot tested. The pilot test included an additional four-item written survey used to edit the final survey and implementation. Study participants completed a 14-item online "One Simple Decision" pre-test using Qualtrics. The pre-test included questions on demographics, driving behaviors, and knowledge and attitudes related to distracted driving. Participants then performed the "One Simple Decision" distracted driving simulation for approximately ten minutes. Immediately following the simulation, the participants completed the "One Simple Decision" online post-test using Qualtrics. The post-test included eight questions to measure knowledge, attitudes, and behaviors related to distracted driving. The participants' responses were recorded using Qualtrics and later assessed using the SPSS statistical analysis program.

Data Analysis

Using SPSS (V. 24), descriptive statistics were determined including means, modes, and medians; chi-square analyses were used to determine relationships, if any, between demographic variables and risk behavior results.

Results

Results indicated that a total of 90 students participated in the study, having completed the pre-test, simulation, and post-test. Many participants reported driving daily (84%) with a small minority reporting they never use their phones while driving (6%). Considering most participants reported having used their phones while driving (94%), a majority (62%) said texting on the phone while driving was "very distracting". Texting while driving was the most frequently identified distraction among those listed in the survey.

Age:
- 60% were 21 years of age
- 32% were 20 years of age
- 8% were 22 years of age

Gender:
- 91% participant were female
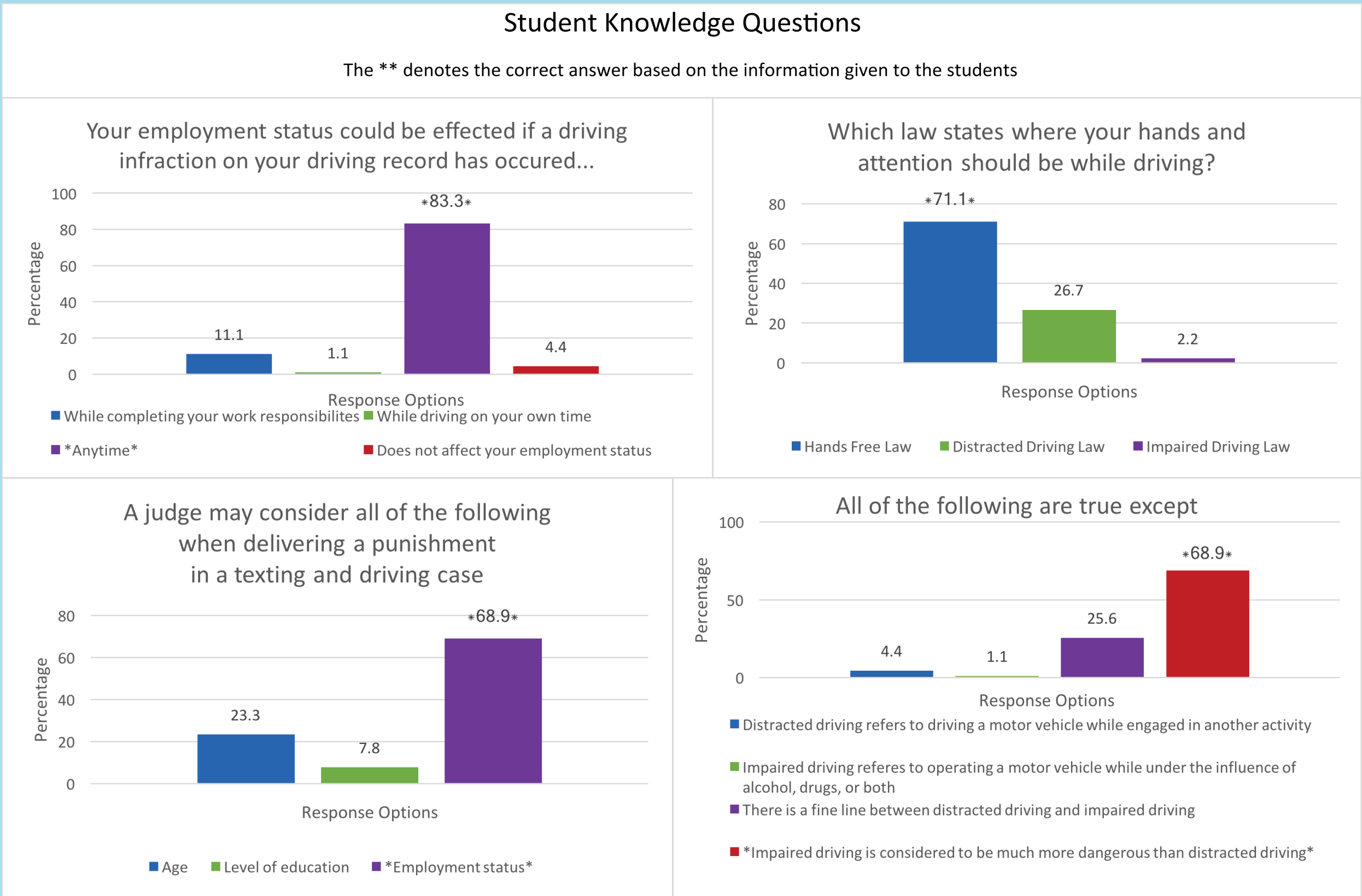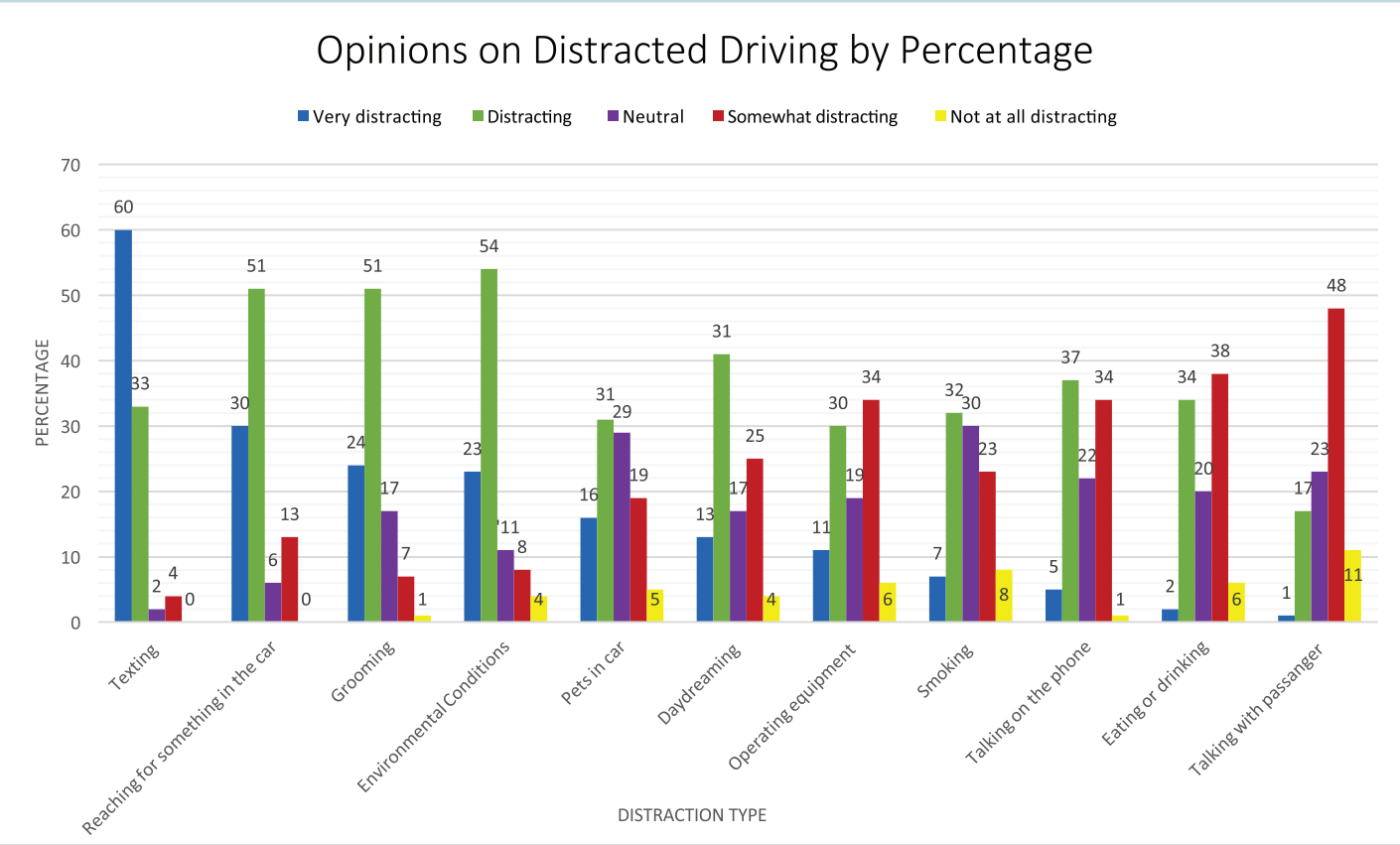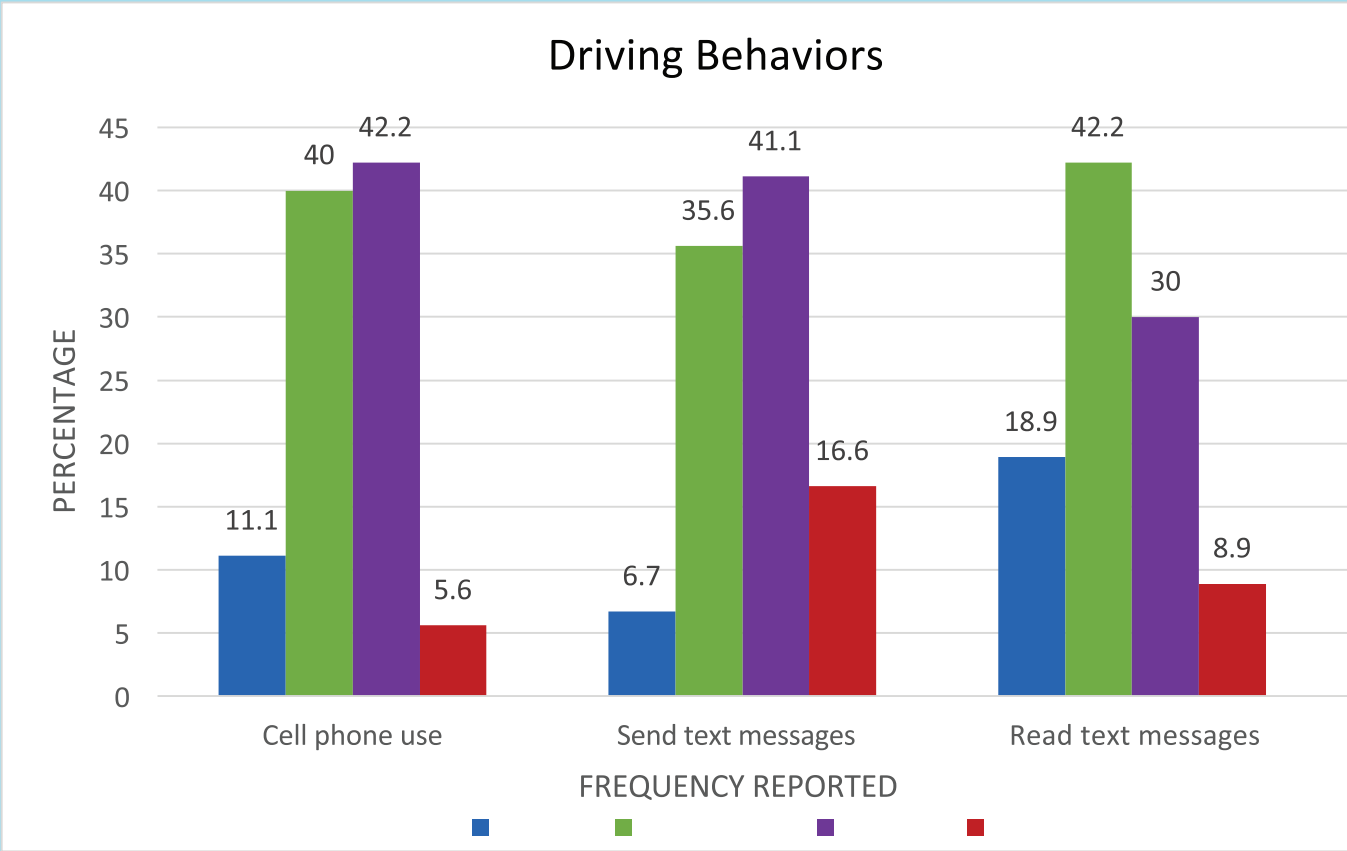- 9% participants were male

Class:
- 83% were juniors
- 17% were seniors

Driving Frequency:
- 84.4% drove daily
- 6.7% 2-3 times a week
- 2.2% once a week
- 2.2% 2-3 times a month
- 2.2% once a month
- 2.2% never

Texting and Driving Environments
- Neighborhood
  - 77% text and drive in a neighborhood
- Heavy traffic
  - 59% text and drive in heavy traffic
- Major city roads
  - 53% text and drive on major city roads
- Country roads
  - 70% text and drive on country roads
- Highways/ interstates
  - 49% text and drive on highways/ interstates
- Stopped at a traffic light
  - 94% text and drive when stopped at a traffic light
- Stopped at a stop sign
  - 76% text and drive when stopped at a stop sign

Driving Behaviors

Opinions on Distracted Driving by Percentage

Student Knowledge Questions

The ** denotes the correct answer based on the information given to the students

Your employment status could be effected if a driving infraction on your driving record has occured...

Which law states where your hands and attention should be while driving?

A judge may consider all of the following when delivering a punishment in a texting and driving case

All of the following are true except

Health Belief Model Constructs

Results indicate students continue to drive distracted in spite of acknowledging the risk. Health Belief Model constructs verify high perception of susceptibility and perceived severity to negative consequences of distracted driving, high perception of benefits to not texting while driving to reduce negative consequences, and low perceptions of self-efficacy to safely text and drive. All attitudes and beliefs are favorable for prevention of texting and driving. However, a majority perceived texting while driving was a hard habit to change. Unfortunately, an accident was the most frequently listed cue to action for changing behavior considering it is a serious negative consequence, which could have been prevented in the first place. Additional cues to action for prevention include having friends and/or family members promoting not texting while driving, receiving a fine if caught, media accident reports and coverage using public service announcements, being stopped by law enforcement officers, or losing one's license due to texting while driving.

Health Belief Model Constructs and Attitudes about Distracted Driving

Perceived Susceptibility

Perceived Severity

Perceived Benefits

Perceived Barriers

Self-Efficacy

Cues to Action
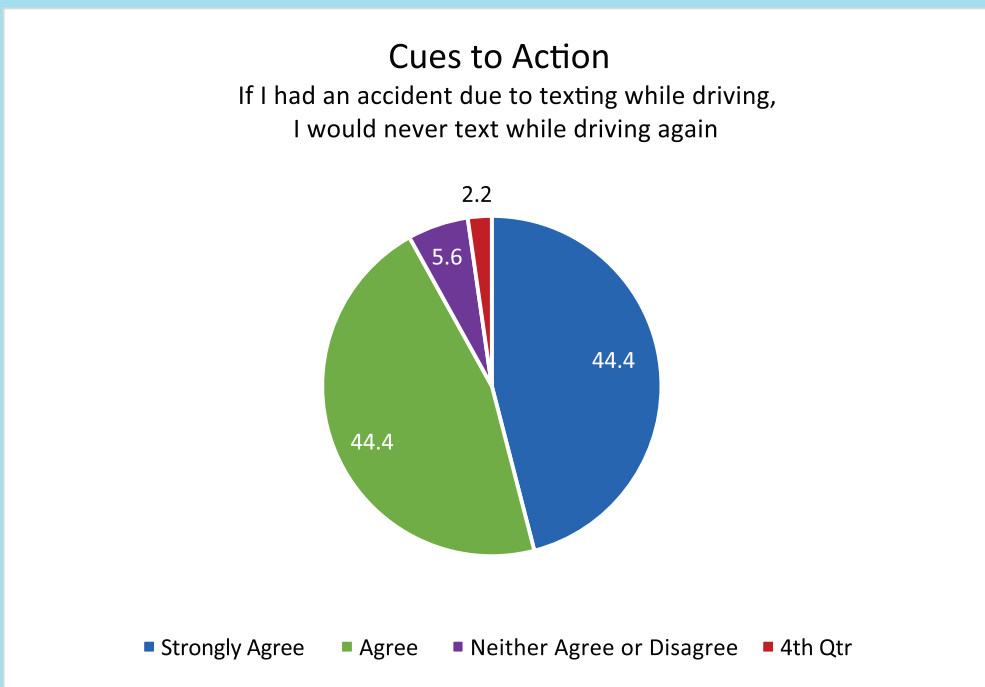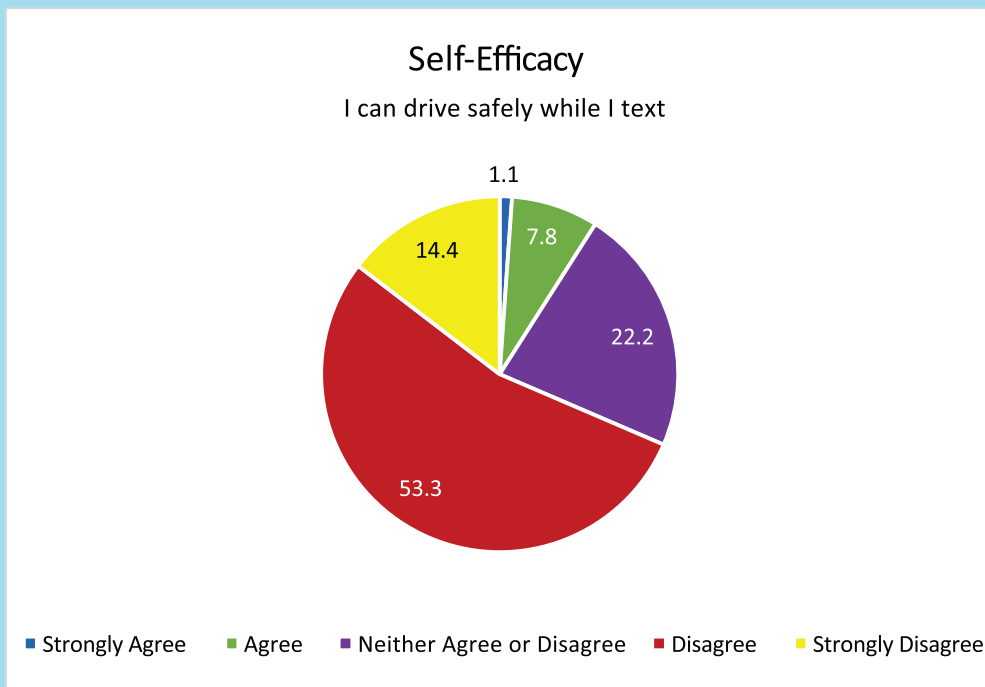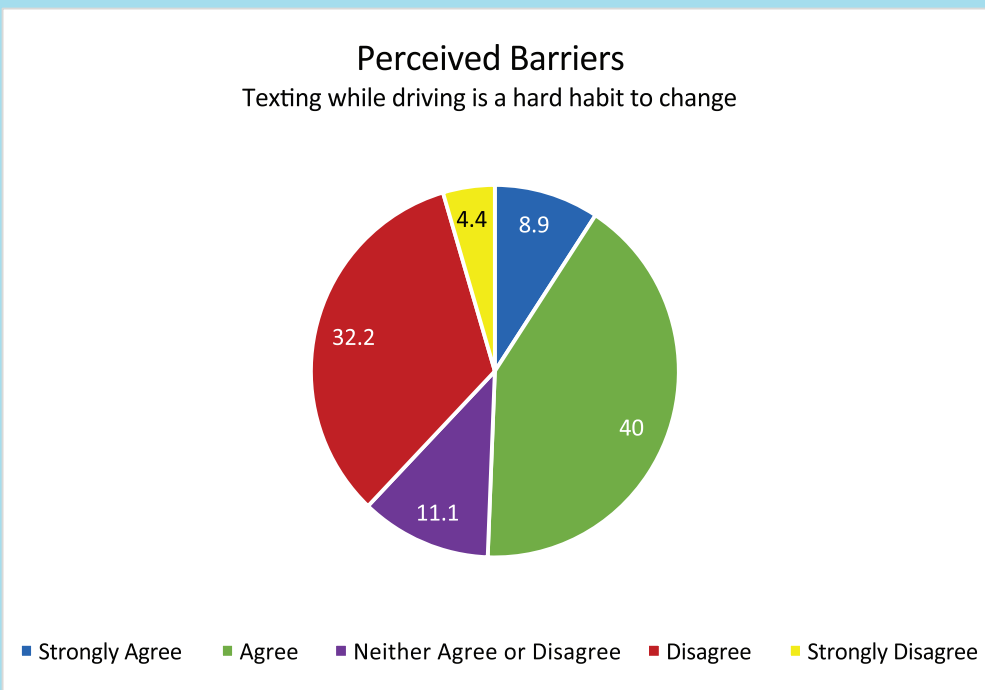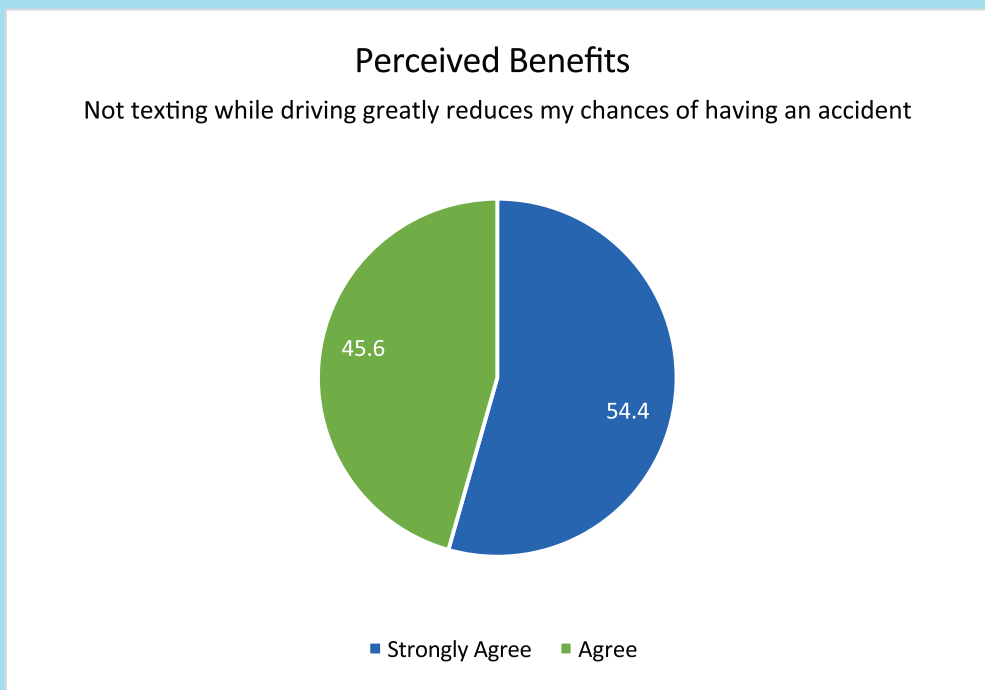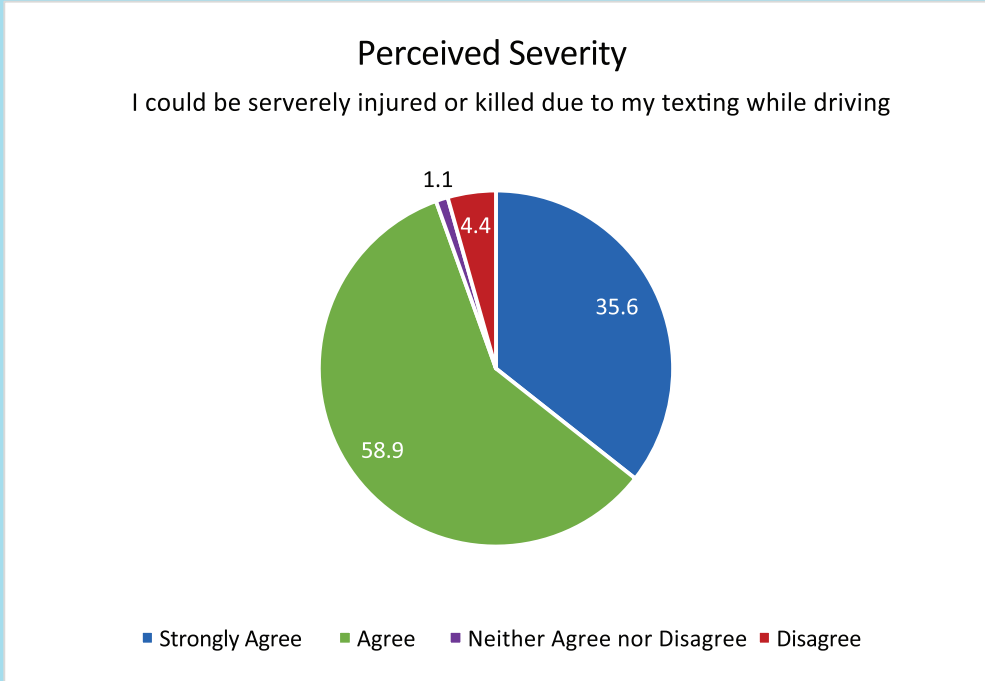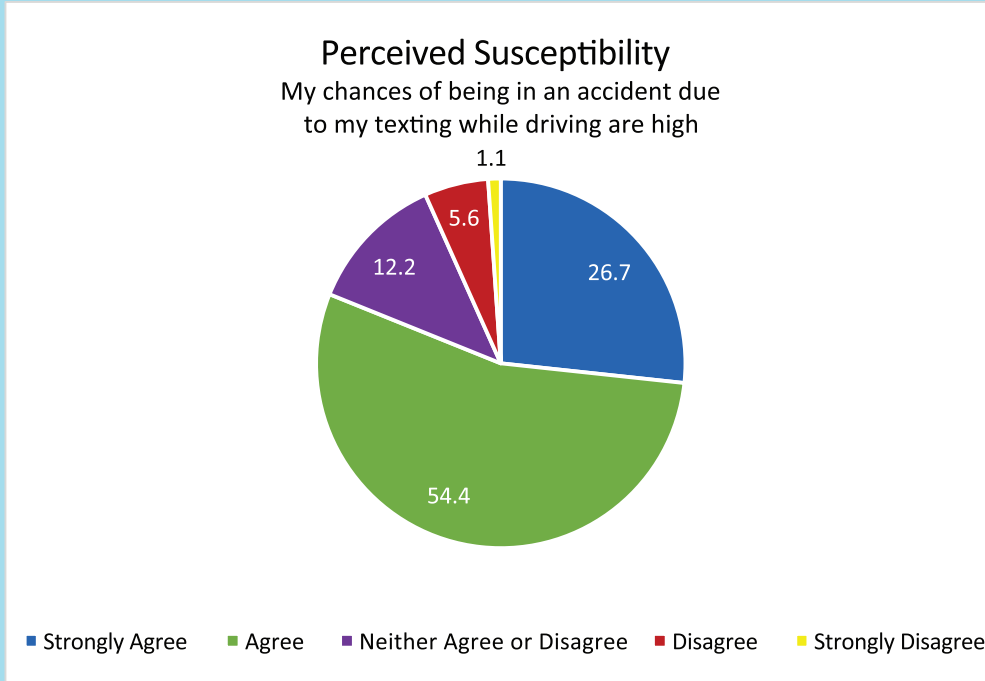
Prevention

Use of Simulators

Studies show that when people are placed on a simulator course, simple faults such as swerving, inconsistent speeds, or slower reaction times appear, indicating the driver is not paying attention and is at a higher risk for causing or being involved in an accident (Horrey, Lesch, & Garabet, 2008). Driving while distracted places all people on the road in a dangerous situation. Texting, playing games, e-mailing and trying to look up a number can distract people from the road and increase the risk for a potential accident. Distracted driving continues to be a serious health hazard, and the National Transportation Safety Board has supported a nationwide ban on the use of portable electronic devices (PEDs) by all drivers (National Transportation Safety Board, 2011). However, no state has a complete ban on cell phone use (including hands-free options) while driving (Insurance Institute for Highway Safety, Highway Loss Data Institute, 2016).

Simulation Feedback / Impact of the Simulation

Simulation Feedback

Impact of the Simulation
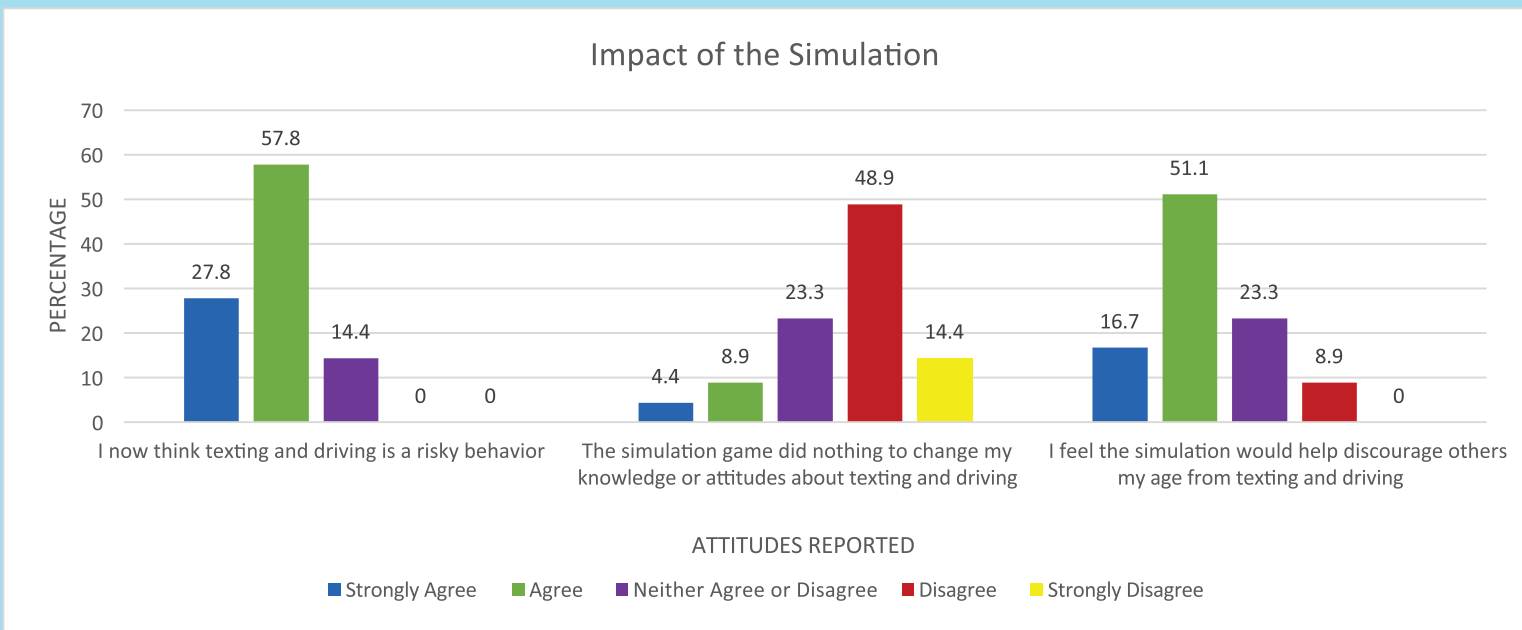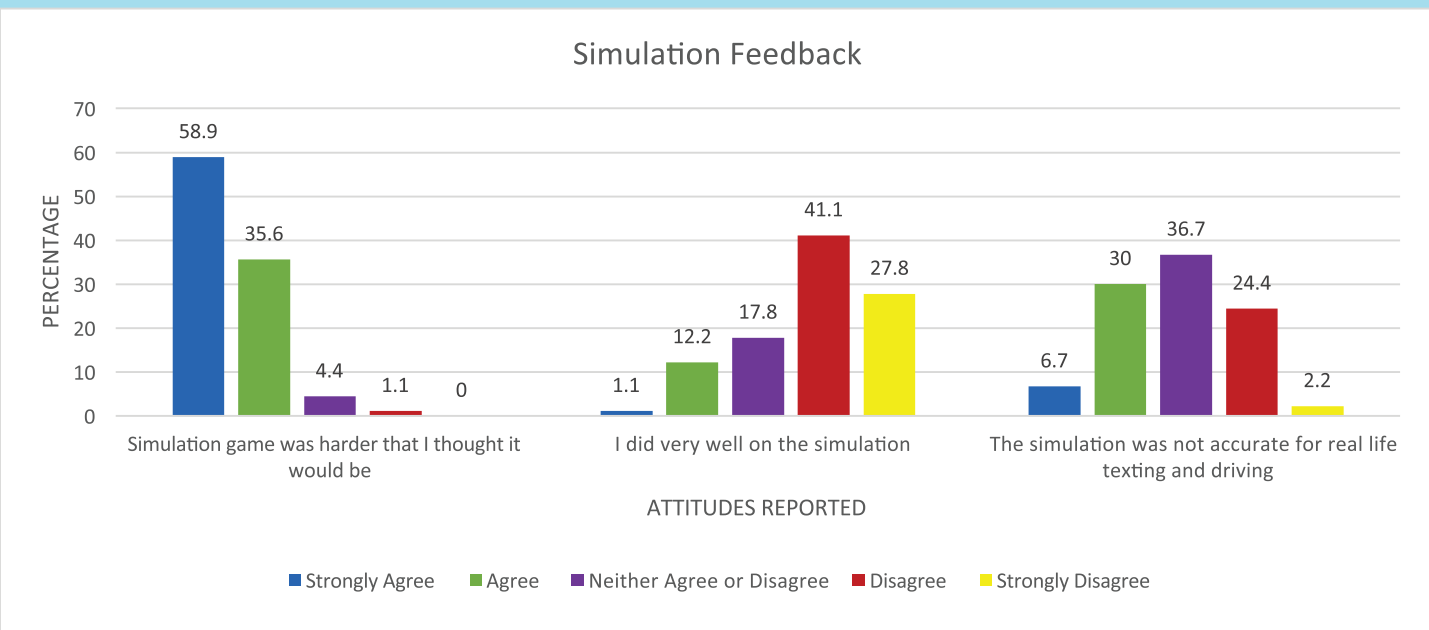
Use of Cell Phone Applications

Considering that cell phone use is a common behavior among many people, the incorporation of applications used on portable devices to incentivize safe driving practices or even block the use of a portable device have been implemented by many companies and organizations. These applications are designed to keep the driver's attention on the road and off the phone (Department of Motor Vehicles [DMV], 2017). Many applications exist to assist with keeping drivers safe, such as sending parent notifications, blocking text messages, blocking calls, tracking miles driven in a safe manner, incentivizing safe driving patterns, and the sharing of one's location (DMV, 2017). Below is a summary of some of the more common applications used by the public along with the benefits they provide to the driver, the passenger(s), and others:

- Apple iOS 11 Update (https://www.apple.com/ios/ios-11/)
  - Setting options include: Do Not Disturb and Do Not Disturb While Driving
  - Automatically detects driving based on motion and will block notifications from entering the driver's phone
  - The phone can connect to Bluetooth in the car and the setting will be activated OR
  - The driver can opt to manually activate the setting of choice
  - Another feature the update has is an Autoreply while you are driving, which texts those who texted you saying, "I'm driving with Do Not Disturb While Driving turned on. I'll see your message when I get where I'm going."
- Lifesaver (https://lifesaver-app.com/)
  - Blocks the ability for a driver to use the phone while driving through GPS monitoring
  - Features a "driver portal" where parents can set up rewards for children when they demonstrate safe driving behavior
  - Sends parents notifications, blocks texts, blocks calls, tracks safe miles driven, and rewards safe driving
- AT&T Drive Mode (https://www.att.com/gen/press-room?pid=23185)
  - Blocks calls and text messages
  - Can be set to automatically block the phone when you are driving over 15 MPH
  - Notifies parents when teen driver deactivated or changed settings on the application
- TrueMotion Family (https://gotruemotion.com/)
  - Provides a resource to encourage and monitor safe driving habits, ultimately reducing claims and process costs related to distracted driving
  - Each time a person is driving, the application rates the overall drive and pinpoints moments where driving may have been distracted
  - Compares driving scores and shows family members' location on the road in real time, as well as providing a trip history
  - Sends parents notifications, tracks safe miles driven, and shares location
  - Provides the free application, Mojo
    - Mojo (https://gotruemotion.com/app/)
      - Receive overall Mojo score based on how often one swipes, types, and talks on phone
      - For each minute a person drives without engaging in these behaviors, he/she earns one point. When the driver reaches 300 points, he/she can spin a prize wheel for a chance to win a $5 gift card to Amazon, Starbucks, or Dunkin' Donuts
      - The cell phone owner can invite and compete with friends to see who is the safest driver

In-Vehicle Information Systems

Recent research from the American Automobile Association (AAA) indicates that the purpose of the hands-free In-Vehicle Information Systems (IVIS) is to improve the safety of making phone calls or adjusting entertainment system settings. However, all of the systems increase the amount of distraction that a driver will be exposed to, therefore increasing the chances of being involved in an accident (AAA Foundation for Traffic Safety, 2017). The study showed that drivers using IVIS tended to have slower reaction times and increased levels of distraction (AAA Foundation for Traffic Safety, 2017). Therefore, use of voice activated systems will not completely eliminate distracted driving.

Conclusion

Simulations are deemed a beneficial technique for enhancing learning that are applicable to various disciplines (Lateef 2010). In the case of this study, the simulation was used to uncover the difficulty of maintaining safe driving practices when cell phone use was involved. Simulation-based learning can be a way in which students can expand their knowledge, skills, and attitudes on specific subject matters (Lateef 2010). One outstanding benefit of simulation usage is the ability to replace and intensify real experiences with instructive and lowrisk measures within a controlled environment (Lateef 2010). Simulators allow participants to experience and grasp safety-critical knowledge that would be inappropriate and ethically challenging to practice on the road (de Winter et al 2012). Another positive trait of simulation use is the controllability and standardization (de Winter et al 2012). Participants in different physical locations can be engaged in the simulation under standardized procedures, which can be measured accurately and efficiently through feedback received from the controlled system (deWinter et al 2012). Simulators may be a powerful tool to add to the arsenal of strategies designed to prevent distracted driving, which is a prevalent, unsafe behavior leading to unnecessary deaths.

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