ASSESSING THE IMPACT OF DRIVING SIMULATOR EXPERIENCE ON THE REDUCION OF CELL-PHONE DISTRACTION AMONG ADULT DRIVERS

by

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conducted for

NCITEC

June 2016

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ABSTRACT

Use of electronic devices, especially cell phones while driving, is causing havoc on US highways. USDOT reports over 5000 fatalities due to driver inattention; a vast majority of inattention is due to cell phone use. Research shows that one specific use of cell phone "Texting While Driving' causes longer inattention thus more dangerous. Young and adult drivers alike are increasingly using cell phones for various activities while driving. Majority of states and localities in US have enacted rules which putting have some kind of restrictions on Texting While Driving. Besides law enforcement, educational and/or public service efforts are also being made to curb Texting While Driving and other cell phone usage.

This research is address one of the issues in educational efforts. Main objectives of the research were (1) to measure impact of driving simulation experience on attitude of adult drivers towards cell phone usage during driving (2) to measure the differences in change in safety perception of cell use after education based on drivers' and other characteristics. A field experiment was designed to investigate these two objectives. This experiment was conducted in a medium size City the Commonwealth of Virginia. 100 randomly selected adult drivers participated in the study. Experiment was conducted using an in-vehicle driving simulator. During the experiment, simulated driving, drivers were asked to use cell phone as they would normally use while driving their own vehicle.

During simulation, participants saw reduction/changes in the driving performance on the simulator screen while they are engaged in the cell phone related activities. These changes included slowing down, crossing over a lane, jumping red lights, crashing vehicle, etc. Two different survey instruments were administered to drivers, one before and one after their experience in the driving simulator. The drivers were expected to modify her/his perception towards cell phone usage after visualizing impairment/reduction in driving performance caused by the cell phone usages during driving.

About 91% of drivers reported using cell phone for various activities including texting, emailing, searching for directions, etc. Majority of drivers also reported using using cell phone often while driving. 70% of more drivers reported that they follow traffic rules, follow speed limits and are generally consider themselves a safe driver.

After of the simulator experience there was significant improvement in driver's perception of danger of "texting-while-driving". More than 81% driver rated cell phone more dangerous after simulator experience. On an average there was a 0.66 improvement on perception of danger of texting while driving measured on the 5-point Likert scale. Some demographic and other driver characteristics were showed significant relationship to the improvement in perception of danger of texting while driving.

ACKNOWLEDGEMENTS

The authors thank the Hampton University's Presidential Scholars recipients for serving as Transportation Scholars for the duration of this project.

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INTRODUCTION

In modern society, usage of the personal electronic devices is increasing every day including during driving. This increased usage of in-vehicle devices (cell phone, navigation systems, etc.) leads to regular and very risky distraction that could potentially impair the primary task of driving. Furthermore, advanced personal electronic devices in the future are likely to increase driver distraction taking away even more attention from the primary task of driving. Distractions caused by electronic devices are relatively new, hence, not well understood especially among adult drivers. One of the most distracting devices in today's vehicles is the smart cell phone with web-browsing, email, and text messaging capabilities. Studies have shown that cell phone distraction is responsible for high fatalities especially among young drivers in the U.S. It was considered a "teen-driver problem" due to propensity to use of cell-phone based text-messaging by young drivers. However, some recent studies have shown that a large number of adult drivers also use text messaging, emailing, and web-browsing while driving. The cell phone usage is progressive increasing as evident from the published research (Centers of Disease Control and Prevention, 2011, AAA Foundation for Traffic Safety, 2013). Furthermore, adult cell phone distraction has been receiving a lot of media attention due to some very high profile transit accidents associated with distraction (e.g., July 2013 crash of transit train in Santiago de Compostela, Spain). States and localities are enacting laws to ban cell phone use while driving but effectiveness of these laws decline over the time (McCartt, et al., 2010). Effect of variety of education and public service efforts on the cell-phone based adult distraction has not been studied in-depth and has not been understood very well due to recent and evolving nature of the technology of cell phone. This project made an effort to understand the impact of educational program on how adult drivers' perception of danger of texting while driving and related activities could be explained and altered.

LITERATURE REVIEW

As stated earlier cell phone use is increasing while driving and has been studied by many researchers. Braitman, K. & McCartt, A. (2010) conducted a survey of drivers in USA and reported that forty percent of drivers talked on phones at least a few times per week. The percentages were highest for males (49%) and drivers ages 25-29 (66%). The percentage of drivers who reported never talking on phones was higher in states with all-driver bans on handheld phone use (44%). Same research also reported that thirteen percent of drivers reported some texting while driving, and this percentage was highest among drivers ages 18-24 (43%). Adolescent drivers were reported to have very high cell phone use in 2010 (Hafetz, et al., 2010

and Nemme & White, 2010). Furthermore, Lee et al. (2008) reported that young drivers are less likely to suspend cell phone use or texting while involve in difficult driving situation. Trend among young drivers has been reported to have shown major jump from 26% in 2009 (Madden & Lenhart, 2009) to 45% in 2013 (Olsen, Shults & Eaton, 2013). Furthermore, these studies are 4-5 years old and the same participant drivers are now young adults; and probably still using cell phone and texting while driving as before.

There is general consensus that cell phone use while driving reduces drivers' ability to properly control the vehicle and to maneuver the traffic (Young, Ragan & Hammer, 2003). There is also a growing body of literature which shows the danger of texting-while-driving on the roads and highways. Hosking, Young, & Regan (2007) reported that drivers spend 400% more time off the road while texting compared to while not texting. This ultimately leads to poor driving performance and increases chances of crashes. Olson, et al. (2009) reported that risk of accident is 23 times higher for commercial vehicles if driver is texting while driving. It has also been reported that driving impairment during the cell-phone usage and driving under the influence of alcohol are very similar (Strayer, Drews, & Crouch, 2006). A study conducted by Pew Research Center (Madden & Rainie, 2010), found that about 49% of U.S. adults send or read text messages while driving and a whopping 75% talk on the cell phone while driving. A survey of several European countries also shows varying degree of use of texting while driving among adult drivers (Naumann & Dillinger, 2012). However, Cooper, et al. (2011) reported much lower use of cell phone while driving during their observational study in the San Francisco Bay Area, California.

Another area of research, related to distraction and texting, is to understanding the impact of texting on driving performance. A number of studies have examined how texting adversely affects driving performance, with a modest body of experimental research involving driving simulation and on-road studies. The general consensus is that those drivers who look away from the road for prolonged periods of time do not control their vehicles sufficiently (Hosking, Young and Regan, 2009; Owens McLaughlin, & Sudweeks, 2011). Increased reaction time of the drivers who are texting and using cell phone has been reported by Shah, Gokhale & Mehta (2010). Drivers text and drive due to believe that they will not get caught or hurt themselves or others in the process (Drews, et al. 2009). Drivers also have a tendency to overrate their own driving abilities (Walter 2010). Drivers generally think that they are better-than-average drivers and better multitaskers. Driving Dynamics President Arthur Liggio, believed the growth of the issue stemmed from the rapidly increasing adults population of owners and avid users of cell phones (Walter, 2010). Drivers' lack of attention has also been researched using memory recall technique by Strayer, Drews, & Johnston (2003). This method utilized measurement of individuals' recalling of of clearly visible billboards located along the road. They reported that, distraction causes inattention blindness among large majority of drivers.

Texting while driving and other distraction are cause of number of accidents and fatalities in US. In 2011, driver distraction was a contributing factor in about 10% of all driver fatalities and 17% of injuries in the U.S. (NHTSA, 2013). Each day in the United States, over 8 people are killed and 1,161 injured in crashes that are reported to involve a distracted driver (NCSA, 2015). Wilson & Stimpson (2010) used multivariate regression analysis to estimate the relation between state-level distracted driving fatalities and texting volumes. Their results show that after declining from 1999 to 2005, fatalities from distracted driving increased by 28% after 2005, rising from 4,572 fatalities to 5,870 in 2008. These numbers are obviously unacceptable. Number of state and localities (Maheshwari & D'Souza, 2012) has made law/rules against texting while driving, cell phone use, etc. However, these bans are not always successful. McCartt & Geary (2004) studied long term effect on cell phone ban in New York State and reported that effect decline over time. Holbrook (2010) reported that accidents related to distractions have increased instead of decreasing since ban on texting has been placed in number of states. Hahn, Tetlock, and Burnett (2000) collected cell phone subscription records and in-vehicle regulations already present across the US to study effect of regulations. They were looking specifically at the aggressive implementation of regulations in Brooklyn, Ohio, and research concluded that the related fine was minute and resulted in limited effectiveness of the ban on cell phone use.

Therefore, law enforcement alone may not be the solution; it has to be augmented with educational efforts. US Department of Transportation Education has mobilized awareness program through distraction.gov. According to Regan (2006), there is still need of more "public campaigns to raise awareness of risks, especially for hands-free phone use and text messaging; highlight factors that increase vulnerability to risks, especially driver inexperience; promote strategies for minimizing distraction, especially the purchase of the most ergonomic hands-free phone types; and raise awareness of penalties for using hand-held phones." Gostin & Jacobson (2010) concluded in a study of effectiveness of cell phone related laws that effect of law and regulation is limited and must be accompanied with "deactivation technologies installed by car manufacturers" and "vigorous health education and enforcement campaigns to sustain longer-term behavior change." There are number of studies on effectiveness of public service announcements or other educational efforts against texting while driving (like Maheshwari& D'Souza, 2012). Miller (2009) advocates that solution of texting while driving lies in law enforcement partnering with educational efforts. Beside this, numbers of US companies are releasing youtube video, public service announcement (PSA), documentaries to highlight and to educate on danger of texting while driving (like a documentary produced by AT&T, 2010). Billboards trying to educate drivers about danger of texting while driving appear in about 67% of the market in USA (Anonymous, 2010). "Death by Cell Phone" billboard is produced by National Safety Council (2009) which appeared in number of US cities. Educational efforts also

include designing and conducting safety courses. One study in Massachusetts reported 70% reduction in accident involving those who had taken the crash course offered on distraction while driving (Chordas, 2010). Simulator based training has also been conducted. In a simulator training study, drivers show increased the awareness towards hidden dangers while driving (Vlakveld, et al., 2011). Beside these, efforts are also being made to find a technological solution to the problem, like disabling phone functions like texting in moving vehicle (PhoneGuard, 2010). These technologies are also becoming more intelligent in detecting accurately driver vs. passengers, and many other phone activities using variety of software and hardware tools, like TEXIVE (Bo et al. 2013).

Driver perception and social norms are also being studied as they directly contribute to the driving habits. Drivers generally rates themselves better than average drivers and that tend to put safety on a lower priority (Maheshwari & D'Souza, 2014; AAA Foundation, 2009). The young driver is not deter from texting due to perceived risk of apprehension or perceived risk of crashing (Walsh et al. 2008). Most drivers do not realize that sending or reading a text takes a driver's eyes off the road for an average of 4.6 seconds. At 55 mph, that's like driving the length of a football field blindfolded (Olson et al. 2009). In a behavioral study conducted by Atchley, Atwood, & Boulton (2011) reported that 92% of drivers at least read text, 81% reply to text and 70% initiate text messages while driving despite considering texting to be very risky. Research concluded that perception is not necessarily a good indicator of behavior. In an earlier study on cell phone call, similar results were reported, i.e., despite association of risk, large majority of people reported using cell phone while driving (Nelson, Atchley, & Little, 2009). This was further supported by the fact that texting while driving activities is considered more socially acceptable thus not deemed as dangerous by the drivers (Atchley, Hadlocka & Laneb, 2012). In nationwide phone survey (Tison, Chaudhary & Cosgrove, 2011) confirmed some of attitude regarding social acceptability of cell phone use while driving as well as drivers' perception of their own driving skill. They reported that most drivers will answer a call while driving and most will continue to drive after answering. About 2 out of 10 drivers (18%) reported that they have sent text messages or e-mails while driving; about half (49%) of those 21 to 24 years old reported doing so. More than half believed that using a cell phone and or sending a text message/e-mail makes no difference on their driving performance, yet as passengers, 90% said they would feel very unsafe if their driver was talking on a handheld cell phone or texting/e-mailing while traveling with them. Another personality test research study (Feldman, et al., 2011) examined whether individuals differ in propensity to text on mindfulness associated with texting-while-driving, i.e., texting is initiated by emotion-regulation motives or attention-regulation motives. Drivers lower in mindfulness reported more frequent texting-while-driving and this relationship appeared to be mediated primarily by emotion-regulation motives.

The literature on texting while driving as presented above has several gaps. Two things are consistently reported that texting and other cell phone used based driving distraction is on the rise across the board; and this distraction is probable cause of multiple accidents. But there relatively few studies on how to effectively curb the increasing use of cell phone while driving. A number of strategies has been tried which include legislative, educational, technological, public service announcement, etc. Efforts have also been made to understand why majority of driver participate in such a risk behavior. There is still a lacuna in literature related to effectiveness of education and awareness campaign on cell phone use, texting-while-driving and other electronics devices related distractions during the driving. There is also a need to understand why driver engage in such behavior. Furthermore, what education and awareness programs can help in modifying of risky behavior? How can impact of such program be measured?

OBJECTIVES

The main objectives of this project were to assess the impact of educational program in changing adult drivers' perception towards cell phone use (texting is a sub-set of overall cell phone usage) while driving, and to understand the differences in change in safety perception of cell use after education based on drivers' characteristics. The details of these objectives are provided below:

- Assessment of use of cell phone by adult drivers in a mid size city in Virginia.

- Assessing effectiveness of driving simulator education on the changes in safety perception of the adult drivers' toward the safety of cell usage while driving.

- Assessment of the effect of demographics factors on changes in safety perceptions of adult drivers after simulation education/experience.
    - Establish relationship between gender, age, race, family size and employment status and the changes in safety perception of the adult drivers' toward the safety of cell usage while driving.

- Assessment of the effect of risk factors factors on changes in safety perceptions of adult drivers after simulation education/experience.
    - Relationship of propensity of risk behavior (risky behavior is operationalize on several risk associated attributes) and the changes in safety perception of the adult drivers' toward the safety of cell usage while driving

- Assessment of the effect of environmental factors on changes in safety perceptions of adult drivers after simulation education/experience.

- Relationship of type of cell phone use (business vs. personal), type of driving, and household driving responsibility and the changes in safety perception of the adult drivers' toward the safety of cell usage while driving

- Assessment of relationship between driving skill and changes in safety perception of the adult drivers' toward the safety of cell usage while driving.

SCOPE

This study is an effort to understand the effectiveness of the educational efforts in reducing the negative impact of distracted driving, especially distraction caused by the use of cell phones. As indicated in previous sections, cell related distraction causes number of accidents and fatalities on US roads. States and localities are making laws but effectiveness of these laws is not as intended. Other efforts including educational means are examined and studied. There is no single answer to this problem, and there is lack of data on type and effectiveness of the educational programs for reducing cell phone based distraction.

This study assessed the changes in perception of safety of cell phone use while driving using a driving simulator. First step in understanding and changing drivers' behavior is to change drivers' and societal perception towards cell phone use while driving. As without changing drivers' perception, behavior can't be modified; however, changing perceptions alone can't guarantee modification in drivers' behavior. This study adds to the literature by understanding the effectiveness of one single simulator based experience in modifying drivers' safety perception of cell usage in driving. However, this study did not research the longevity of the change in perception of drivers after simulator experience.

METHODOLOGY

This research was focused on cell phone distraction among adult drivers. A driver was considered an adult driver if he or she was 25 years or more (i.e. in generally approximately 7-8 years of driving experience). This study conducted a field expeirement using a driving simulator. Schema for the experiment is presented in the Firgure 1. Focus of the study was to undstard impact of simulator experience on changes in drivers' safety perception of use of cell phone while driving.

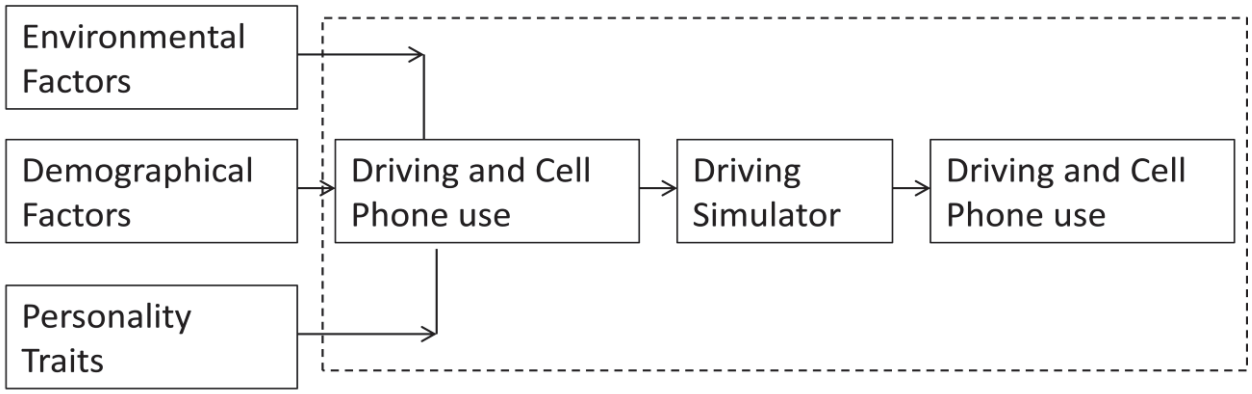

Figure 1. Schema of the Experimental Design

The drivers were randomly selected in the City of Hampton. There was no control group in the study. Justification for no control group is that the data collection between pre and post experiment had very little lapsed time (about 30-40 min). Internal validity causes like history, maturation, instrumentation, etc. were not a factor due to very short time/duration between pre and post data collection; hence absence of the control group is justifiable. Experimental framework is presented in Figure 2.

R O1 X O2 (treatment group only)

Effect: (O2-O1)

Where,

R	-Randomness in selection
O1	-Pre-assessment
X	-Treatment Simulator Experience
O2	-Post-assessment

Figure 2. Experimental Design Framework

Driving Simulator

The experiment used an in-vehicle driving simulator manufactured by DriveSquare, Inc. This is a portable in-vehicle driving simulator. It uses three sensors mounted on the brake pedal, accelerator pedal and front wheels to measure driving functions. Eye goggle shows the driving scenario and drivers' maneuver the vehicle using gas pedal, steering wheel and brake pedals. Figure 3 shows DriverSquare simulator in action. Drivers do need to get familiarize with the simulator and feel comfortable with the simulated environment. As compared to laboratory based computer simulators, this simulator has an advantage of creating multiple driving scenarios while experiencing the feel of driving a real vehicle. The simulator automatically

generates data log for each session which includes number of red light infractions, crossing of yellow lines, severing of vehicle, and number of crashes.

Instrument Design

Based on the literature review and previous study (Maheshwari & D'Souza, 2012), two survey instruments were designed. One instrument was for pre-assessment of the driving behavior and post-experiment instrument was to assess changes in the safety perception after the simulator experience (see Appendix 1). The pre-assessment instrument had 41 questions. These questions were divided into three several major categories demographics, risk behavior attitude, and cell phone use while driving. Risk behavior question battery was taken from standard psychological questionnaire inventory (Goldberg, 1999; Goldberg, et al. , 2006). The International Personality Item Pool and the future of public-domain personality measures. Journal of Research in Personality, 40, 84-96.. Cell phone use questions were selected from the previous research by the authors of this report (Maheshwari & D'Souza, 2012). Post-experiment survey instrument had six questions on safety perception (see Appendix 1). These six questions defined the safety perceptions of drivers. Same questions were asked in the pre-survey instrument. Instruments were pilot tested in a classroom for any errors and confusion in the language. No statistical test of reliability was conducted. For the majority of the questions in the survey instruments, a 5-point Likert scale was used for responses. Questions in the post-test instrument were simply the reassessment of the safety perception questions used in the pre-test instrument.

Figure 3. DriveSquare Simulator (http://www.drivesquare.com)

Data Collection

The data was collected from the adult drivers (25 years or older). Proper IRB approval was obtained from Hampton University before the data collection started. A consent form was designed and presented to each participant (See Appendix 2). The sampling frame for the experiment was adult drivers in the City of Hampton, Virginia visiting certain localities. Data was

collected at three different shopping centers in the City of Hampton. Researchers used the mall intercept method for selection of participants. Data was collected between January 2014 and May 2014. Data collection timings were between 11a.m. - 4 p.m. during working days. No data was collected on weekends and on holidays to avoid crowds in these shopping centers. 25-30 different attempts were made to collect data during that period. Several potential participants refused due to time involved in the data collection. Small reward ($20) was offered for participation to speed up the data collection. There is ample research to show that small reward does not skew the results or introduce any bias in the data (see Singer & Ye, 2013). Total 100 participants were part of the study. Our sample target was also 100; which was largely limited due to reward money restrictions. After a short training session, participants were asked to drive in simulated environ while doing variety of task of cell phone, including texting, emailing, and calling. Figure 4 shows a student worker collecting data in the field.

Participants' phone numbers were collected and matched with the survey number. After field editing, it was realized that many participants (approximately 25) did not fill survey completely. These participants were contacted and asked if they will be willing to complete the questionnaire or they have left the questions unanswered knowingly. Several participants agreed to complete the survey. This editing was carried on August-September, 2014. Overall 93 completed per and post-instruments were obtained. Seven incomplete surveys were removed from the analysis. Raw data from both pre and post-instrument is presented in the Appendix 3.

Figure 4. Data collection by student worker Ms. Philips (left).

RESULTS AND DISCUSSION

Data analysis was conducted using Microsoft Excel and SPSS 13.0. All survey data was coded numerically except the comments question variable. A complete codebook is included in the Appendix 4. List of variables is presented in Table 1. Beside raw variables listed in Table 1, three composite variables were also used in the analysis. The composite variables included risk score, usage frequency and safety perception score. The risk score variable was sum of all risk attitude questions, lower the score more risk averse is the participant. The usage frequency variable was sum of responses of self reported usages frequency of reading, replying and initiating text massages while driving. The safety perception score was sum of safety perception of reading, replying, and initiating text messages as well as perception of safety of emailing, internet search and direction search. This is the main dependent variable for this study. The safety perception score was calculated both for pre and post surveys. Effect of the simulator experience is measured as the difference of post and pre-test scores of safety perception variables. Additionally, three categorical variables were also created for analysis. These were age category, risk category and usage frequency category. All additional variables are listed in the Table 2. Age categories are ten-year apart; i.e., 30 or less, 31-40, 41-50 and 50 or more. There was no participant older than 55 in the sample. Risk categories were based on the composite variable RiskScore. Each component (10 total questions) of this variable was measured on a 5-point Likert scale. Based on the RiskScore five different risk categories were created (18 or less; 19-26; 27-34; 35-42; and 43 or more). Similarly, usage frequency category was created based on composite variable UsageFreq. Each component (3 total questions) of this variable was measured on a 5-point Likert scale. Based on the UsageFreq, five different usage

Table 1. Definitions of Raw Variables

Variable#	**Description**	Variable#	**Description**
V1	Gender	V24	Do you Receive Cell Call
V2	Race	V25	Do You Initiate Cell Call
V3	Type of Employment	V26	Is Cell Phone Use Safe
V4	Family Size	V27	Read Text While Driving
V5	Number of Drivers in The Family	V28	How Often You Read Text
V6	Are You Primary Driver	V29	Reply To Text While Driving
V7	Purpose of Cell Use	V30	How Often You Reply to Text While Driving
V8	Importance of Social Med	V31	Initiate Text Message While Driving
V9	Age	V32	How Often You Initiate
V10	Do Crazy Things	V33	Consider Sending Text Safe
V11	Act Wild..	V34	Consider Reading Text Safe
V12	Do Unexpected Things	V35	Use Cell for Emails While Driving
V13	Like to Act On Whim	V36	Consider Email Reading Safe

V14	Do Silly Things.	V37	Use Phone For Internet Search
V15	Unpredictable.	V38	Consider Internet Search Safe
V16	Enjoy Wild Things.	V39	Use For Direction Search
V17	Persuaded to be Adventurous	V40	Consider Direction Search Safe
V18	Seek Adventure	V41	Other Use --Write In
V19	Take Risks	V1P	Is Cell Phone Use Safe: Post-Test
V20	% of Driving on Freeway	V2P	Consider Sending Text Safe: Post-Test
V21	Are You A Safe Driver	V3P	Consider Reading Text Safe: Post-Test
V22	Follow Speed Limit	V4P	Consider Email Reading Safe: Post-Test
V23	Follow Traffic Rules	V5P	Consider Internet Search Safe: Post-Test
		V6P	Consider Direction Search Safe: Post-Test

Categogies were created (5 or less; 6-8; 9-11; 4: 12-13**;** 14 or more). Both RiskCat and UsageFreqCat variables have same 5-point Likert scale. RiskScore categories are 8 points apart on the RiskScore and UsageFreqCat are either 2 or 3 points apart on the UsageFreq score.

Table 2. Definitions of Composite Variables

Variable Name	**Description**
RiskScore	Sum of Risk Behavior Variables (V10 to V19)
UsageFreq	Sum of Cell Phone Usage Variables (V28, V30, V32)
SafetyPerception	Sum of Safety Perception Variables (V26, V33, V34, V36, V38, V40)
SafetyPerception_Post	Sum of Safety Perception Variables (V26, V33, V34, V36, V38, V40)
Effect	SafetyPerception_Post – SafetyPerception
AgeCat	1: 30 Years or less; 2: 31-40 Years; 3: 41-50 Years, 4: 50 Years or more
RiskCat	1: Score 18 or less; 2: Score 19-26; 3: Score 27-34; 4: Score 35-42; 5: Score 43 or More
UsageFreqCat	1: Score 5 or less; 2: Score 6-8; 3: Score 9-11; 4: Score 12-13; 5: Score 14 or More

Cell Phone Usage While Driving

Results indicate that the overall cell phone use among participating adults was very high. 98% of the participants indicated using cell phone while driving this included calling, texting and other activities. 92% used cell phone for texting (reading, replying or initiating), emailing, internet search or direction search. This usage percentage is much higher than the numbers reported in previous studies (like Centers of Disease Control and Prevention, 2013). Participants were also very confident drivers. They had a very high opinon of their own driving skills. 94% considered themselves as safe drivers, 82% follow the posted speed limits most of the time and 91% follow traffic rules most of the time. Higher opinion of the their own driving skills and driving citizenship (following rules and speed limits) may be contributing to such high level of cell phone usage among participants. Table 3 presents the summary of cell phone use responses.

Table 3. Cell Phone While Driving Use Among Participants

Use of Cell Phone	Positive Resp	Percentage of Positive Resp
Are you a safe driver?	86	94%
Do you follow posted speed limit?	76	82%
Do you follow traffic rules?	85	91%
Do receive cell calls while driving?	80	86%
Do initiate cell calls while driving?	64	69%
Do read text while driving	65	70%
Do reply to text while driving	59	63%
Do initiate text message while driving?	48	52%
Do use cell for emails while driving?	21	23%
Do use phone for internet search while driving?	19	29%
Do use for direction search while driving?	30	32%
Use cell phone for texting, emailing, internet searching or direction searching	85	91%

Importance of social media was also measured among participants. Average social media importance was 2.75 (see Figure 5) which indicated that participant in this sample did not give importance to social media. This was measured to determine if social media's importance is a factor in increased used of cell phone especially for email, and internet use while driving. Importance of social media was tested for its relationship with texting, email, internet search, and direction search. Chi-square tests were performed which showed that importance of social media was independent of any type of cell phone usage (see Table 4).

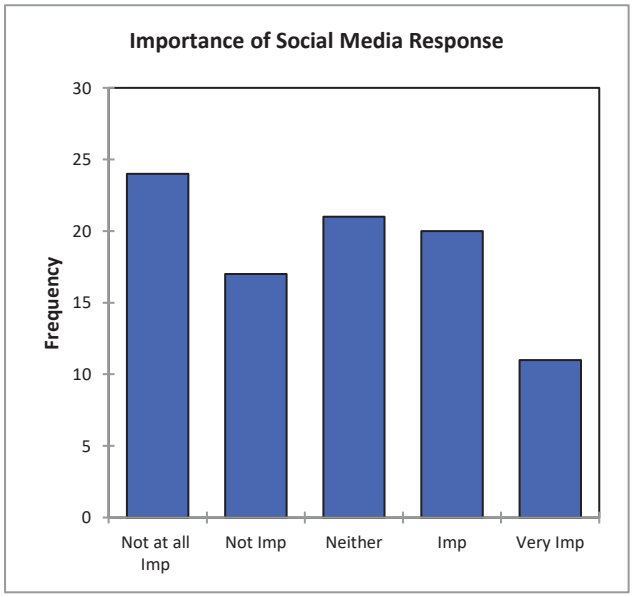

Figure 5. Distribution of Importance of Social Media

Table 4. Relationship of Importance of Social Media and Cell Phone Usage in Driving

Variable	Chi-Sq Statistic	p-value
Do read text while driving	0.43	0.98
Do reply to text while driving	0.37	0.985
Do initiate text message while driving?	0.12	0.998
Do use cell for emails while driving?	0.45	0.98
Do use phone for internet search while driving?	0.99	0.91
Do use for direction search while driving?	0.98	0.91

Overall Effect of Simulator Experience

Effect of the simulation education on the safety perception of participants was defined as the difference of SafetyPerception scores: pre and post-test. These scores were calculated by adding six safety perception variables. The SafetyPerception scores and effect are presented in the Table 5.

Table 5. SafetyPerception Scores and Effect Variables

#	Safety Perception	SafetyPerception_Post	Effect	#	Safety Perception	SafetyPerception_Post	Effect	#	Safety Perception	SafetyPerception_Post	Effect
1	14	6	-8	33	14	8	-6	67	11	6	-5
2	12	12	0	34	18	6	-12	69	9	8	-1
3	9	6	-3	35	6	8	2	70	9	6	-3
4	14	6	-8	36	12	6	-6	71	12	6	-6
5	11	9	-2	37	10	6	-4	72	13	9	-4
6	9	6	-3	38	13	12	-1	73	15	8	-7
7	12	14	2	39	12	12	0	74	12	9	-3
8	15	15	0	40	11	6	-5	75	9	12	3
9	20	12	-8	41	9	8	-1	76	11	6	-5
10	10	12	2	43	15	12	-3	77	6	8	2
12	21	8	-13	44	22	18	-4	78	7	6	-1
13	15	11	-4	45	9	12	3	79	11	12	1
14	22	11	-11	46	8	9	1	80	9	20	11
15	14	6	-8	47	12	8	-4	81	10	6	-4
16	29	26	-3	48	12	7	-5	82	7	10	3
17	10	12	2	49	21	12	-9	83	7	8	1
18	18	8	-10	50	19	6	-13	84	11	8	-3
19	18	6	-12	51	25	6	-19	85	12	11	-1
20	9	6	-3	53	18	12	-6	86	14	6	-8

21	19	12	-7	54	13	6	-7	87	12	6	-6
22	13	6	-7	55	19	6	-13	88	25	14	-11
23	12	12	0	56	25	14	-11	89	14	9	-5
24	10	13	3	57	8	14	6	90	24	6	-18
25	14	18	4	58	11	6	-5	92	6	6	0
26	12	11	-1	59	16	8	-8	93	19	12	-7
27	14	12	-2	60	14	12	-2	94	12	9	-3
28	14	12	-2	62	11	12	1	95	12	6	-6
29	12	6	-6	63	8	21	13	96	13	12	-1
30	10	9	-1	64	13	13	0	98	18	11	-7
31	18	6	-12	65	12	7	-5	99	16	6	-10
32	11	9	-2	66	17	6	-11	100	14	9	-5

Average SafetyPerception was 13.48 over six factors or an average of 2.25 for each factor before the simulator experience. This indicated that participants considered cell phone use to be unsafe to neutral. Standard deviation of perception per factor was about 1.93. The average SafetyPerception_Post was 9.55 over six factors or an average of 1.59 for each factor. That is after the experience in the simulator, participants' opinion shifted for cell phone use while driving to very unsafe to unsafe from unsafe to neutral. Furthermore, standard deviation per safety perception factor has also reduced to 1.57. This indicates variability in the perception has also reduced, showing greater consensus on perception of safety. The average Effect was -3.94 over all six factors. To assess the significance, a paired t-test was conducted for Effect. The p-value was less than 0.001, indicating high statistical significance. Thus, simulation experience has an immediate impact in improving participating drivers' safety perception. More than 80% of participants had either same or improved safety perception after simulator experience. It is largely due to the fact that drivers realize hidden effects of cell phone based distraction once information is visually presented to them in the simulator.

Effect of frequency of use of cell phone while driving was tested on the the change in safety perception after the simulator experience. For that, a categorical variable of three different frequencies (reading, replying and initiating text messages) "UsageFreqCat" was created as explained the previous section (see Table 2). The values of the UsageFreCat are listed in the Table 6. A one-way anova test showed that UsageFreqCat and Effect are independent of each other (p-value 0.792). That is, the frequency of use had no impact of on the change in the safety perception.

Table 6. UsageFreqCat Variable Distribution

#	Usage Freq Score	UsageFreq Cat	#	Usage Freq Score	UsageFreq Cat	#	Usage Freq Score	UsageFreq Cat
1	6	2	33	12	4	67	8	2
2	11	3	34	10	3	69	13	4
3	4	1	35	3	1	70	8	2
4	13	4	36	6	2	71	3	1
5	5	1	37	15	5	72	14	5
6	13	4	38	7	2	73	10	3
7	13	4	39	13	4	74	12	4
8	12	4	40	5	1	75	14	5
9	4	1	41	4	1	76	15	5
10	12	4	43	7	2	77	3	1
12	12	4	44	10	3	78	13	4
13	6	2	45	7	2	79	7	2
14	5	1	46	5	1	80	3	1
15	13	4	47	12	4	81	7	2
16	7	2	48	4	1	82	8	2
17	9	3	49	15	5	83	8	2
18	10	3	50	7	2	84	8	2
19	3	1	51	3	1	85	9	3
20	3	1	53	9	3	86	12	4
21	7	2	54	14	5	87	7	2
22	10	3	55	9	3	88	8	2
23	10	3	56	3	1	89	15	5
24	6	2	57	8	2	90	6	2
25	7	2	58	6	2	92	15	5
26	3	1	59	12	4	93	9	3
27	5	1	60	15	5	94	6	2
28	9	3	62	3	1	95	15	5
29	6	2	63	12	4	96	6	2
30	4	1	64	9	3	98	9	3
31	9	3	65	3	1	99	15	5
32	9	3	66	6	2	100	14	5

Demographic Factors and Simulator Experience

As stated earlier, the one of objectives was to establish the relationship between demographic variables and Effect of safety perception after simulator experience. Six demographic variables, age, gender, race, employment type, family size and number of drivers, were included in this study. Descriptive statistics are presented below in Table 7.

Table 7. Descriptive Statistics of Demographic Variables

Variable	Category	Frequency	Percentage
Gender	Male	66	70.97%
	Female	27	29.03%
Race	African Am.	69	74.19%
	White	15	16.13%
	Hispanic	8	8.60%
	Other	1	1.08%
Type of emp	Hourly	32	34.41%
	Professional	30	32.26%
	Student	6	6.45%
	Unemployed	21	22.58%
	Others	4	4.30%
Family Size	1	47	50.54%
	2	23	24.73%
	3	14	15.05%
	4	6	6.45%
	5+	3	3.23%
# of Drivers in the Household	1	45	48.39%
	2	40	43.01%
	3+	8	8.60%
AgeCat	20s	51	54.84%
	30s	29	31.18%
	40s	10	10.75%
	50s	3	3.23%

Impact of all of these six variables was tested on Effect. One-way anova was used to test every factor independently. Test results are summarized in Table 8. AgeCat was significant with a p-value of 0.021. Participants in 40s and 50s (40s and 50s were combined as 50s had only 3 participants) showed the highest average increase in safety perception about -1.11 which means on average safety perception got better by more than one point on a 5-point Likert scale. This

was followed by the participants in 20s (-0.73) and least impact was among 30s group with average change of -0.33. It was unclear why participants in 30s showed statistically less gain (p-value .008) than other groups. Employment type was also significant with p-value of 0.093. Unemployed group (other was removed from the analysis due to lack of data) was statistically significantly (p-value of approx. 0.01) different than employed participant (professionally or hourly). Employed participants showed on an average -4.32 chnages in the safety perception where as unemployed average change was -1.67. No other demographic factor was significant.

Table 8. One-way ANOVA results of Demographic Variable Vs. Effect

Variable	**p-value**
Gender	0.30762
Race	0.57109
Employment Type	0.09297*
Family Size	0.44352
Number of Drivers in Household	0.53215
AgeCat	0.02127*

Risk Factors and Simulator Experience

Ten different attributes were included in the survey to create a risky behavior profile. A composite variable RiskScore and a categorical variable RiskCat were also calculated. RiskScore and RiskCat are included in Table 9. And descriptive statistics of each of the risk attributed is included in Table 10. Figure 6 shows the distribution RiskCat. RiskCat were defined as 1: RiskScore 18 or less; 2: RiskScore 19-26; 3: RiskScore 27-34; 4: RiskScore 35-42; 5: RiskScore 43 or more.

Table 9. RiskScore and RiskCat

#	**Risk Score**	**Risk Cat**	#	**Risk Score**	**Risk Cat**	#	**Risk Score**	**Risk Cat**	#	**Risk Score**	**Risk Cat**
1	16	1	25	24	2	49	16	1	75	28	3
2	30	3	26	13	1	50	18	1	76	25	2
3	28	3	27	38	4	51	27	3	77	10	1
4	28	3	28	35	4	53	18	1	78	36	4
5	35	4	29	39	4	54	28	3	79	23	2
6	35	4	30	39	4	55	16	1	80	31	3
7	21	2	31	34	3	56	41	4	81	31	3
8	15	1	32	31	3	57	21	2	82	17	1
9	14	1	33	10	1	58	23	2	83	33	3

10	14	1	34	13	1	59	32	3	84	32	3
12	34	3	35	20	2	60	10	1	85	10	1
13	38	4	36	43	5	62	10	1	86	33	3
14	39	4	37	13	1	63	31	3	87	34	3
15	40	4	38	29	3	64	30	3	88	24	2
16	38	4	39	38	4	65	21	2	89	10	1
17	25	2	40	43	5	66	30	3	90	10	1
18	50	5	41	49	5	67	32	3	92	16	1
19	39	4	43	33	3	69	34	3	93	10	1
20	10	1	44	22	2	70	30	3	94	10	1
21	37	4	45	38	4	71	34	3	95	10	1
22	39	4	46	36	4	72	10	1	96	10	1
23	38	4	47	24	2	73	26	2	98	36	4
24	35	4	48	36	4	74	10	1	99	12	1
									100	10	1

Table 10. Descriptive Statistics of Risk Attribute and RiskScore

Risk Variable	Mean	SD
Do Crazy Things	2.46	1.32
Act Wild	2.45	1.32
Do Unexpected Things	2.67	1.39
Like to Act On Whim	2.49	1.32
Do Silly Things.	2.14	1.17
Unpredictable.	2.57	1.28
Enjoy Wild Things.	2.44	1.31
Persuaded to be Adventurous	2.72	1.45
Seek Adventure	3.18	1.42
Take Risks	3.18	1.41
RiskScore	26.31	11.00

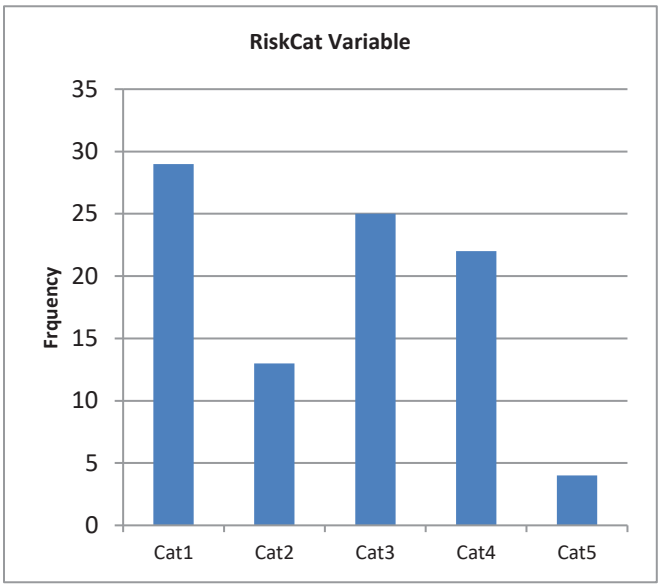

Figure 6. RiskCat Distribution

Average RiskScore was 2.63. It is indicating that participants rated themselves as generally risk averse. 72% of participants had a RiskScore below 34 (low to neutral score). It is possible that self admission or assessment of risky behavior is not clearly understood by the participants, hence, majority of them indicating to have low risk personality attributes. On individual risk attributes, all factors except two "Seek Adventure" and "Take Risk" had average score below 3 indicating risk-averse personalities. Variability of the risk factors was also not very high as standard deviations of these factors were measured between1.17 to 1.45; this is indicating very homogeneous group.

To assess the impact of these risk attributes or the composite variable of RiskCat on the Effect, one-way anova tests were performed (see Table 11). "Do Crazy Things" was the only significant attribute related to the Effect. Post-anova analysis of this factor showed two distinct groups. The participants with responses in the middle for this factor (2 or 3) made one group with an average improvement of -1.91 and the participants with responses on either extremes (1, 4, or 5) made another group with an average improvement of -5.10. This indicates either the least risk takers or the most risk takers on this attribute had the largest impact on safety perception after simulator experience. None of the other nine risk attributes or the RiskCat showed any statistically significant impact on Effect. That is, improvement in the safety perception could not be attributed to majority of the risk attributes considered. However, strong relationship with one of the attribute show that if larger number of the risk behavior attributes are tested, it is possible to delineate personality and behavior attributes of adult drivers whose safety perception can be significantly improved with educational efforts.

Table 11. One-way ANOVA results of Risk Attributes Vs. Effect

Risk Variable	p-value
Do Crazy Things	0.056*
Act Wild	0.309
Do Unexpected Things	0.383
Like to Act On Whim	0.102
Do Silly Things.	0.234
Unpredictable.	0.282
Enjoy Wild Things	0.148
Persuaded to be Adventurous	0.779
Seek Adventure	0.799
Take Risks	0.181
RiskScore	0.443

Environmental Factors and Simulator Experience

Environmental factors were variables which may affect driving behavior but are not part of the individuals' personality attributes. Three different environmental factors were included in the survey. These were uses of cell phone due to employment needs, household driving responsibilities, and percentage of freeway driving. Relationship between these variables and cell phone use is self explanatory. Frequency distributions of these variables are presented in Figures 7-9.

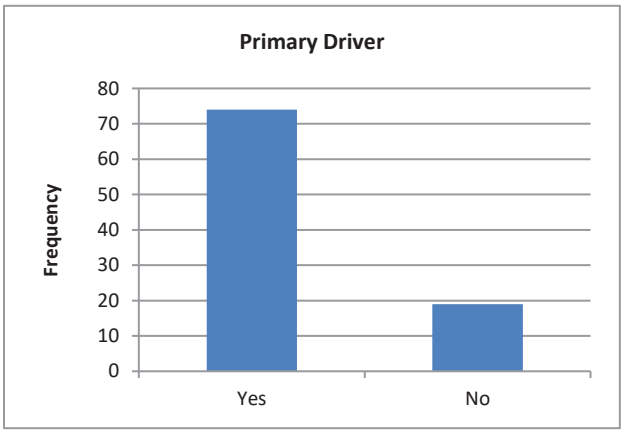

Figure 7. Distribution of Primary Drivers' in Household

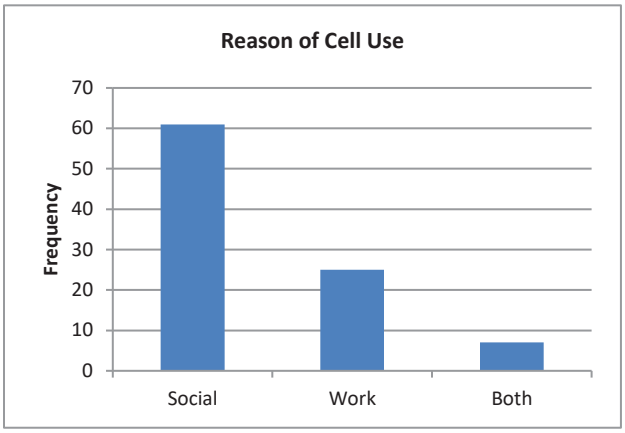

Figure 8. Distribution of Reason of Cell Phone Use

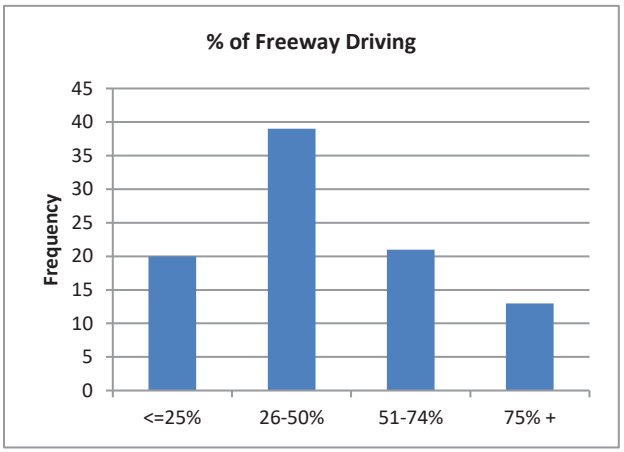

Figure 9. Distribution of Freeway Driving

One-way anova was utilized to test significance of the environmental variables. A summary of results is provided in Table 12. Two factors are significant: primary driver and percentage of freeway driving. Participants who are primary drivers in the household probably have more driving as well as household responsibilities. It is possible that is the reason of using more cell phone while driving; hence these participants reported much higher improvement in the safety perception score (-4.41) compared with non-primary drivers (-2.11) after the simulator experience. Participants with lower percentage of freeway driving showed significantly more improvement and improvement gets lower as percentage of freeway driving increases. Drivers with less than 25% of freeway driving reported an average improvement of -5.20 safety perception score, 26%-50% group average scores change was -4.56 and 50%-75% has an average improvement of -3.86. Last group was not included in the analysis due to low frequency. It is obvious that non-freeway driving requires more attention due to traffic lights, pedestrians, turning, etc. thus visualization of these situations in simulator had larger impact on

drivers who encounter these situations more while driving. Furthermore, simulator scenario used were focused on the city driving could have a confounding effect on the outcome.

Table 12: One-way ANOVA results of Risk Attributes Vs. Effect

Risk Variable	p-value
Primary Driver	0.098*
Reason Purpose of Use of Cell	0.401
Percentage of Freeway Driving	0.049*

Driving Skills, Driving "Citizenship" and Simulator Experience

Research instruments were designed to gather information on participants self assessment of their own driving skills and driving citizenship. As reported in previous section in Table 3, 94% drivers considered themselves safe drivers and 82% to 91% had good driving "citizenship." Driving citizenship defined as drivers following traffic rules and posted speed limits. Assessment of these characteristics relationship with improvement in safety perception was carried out using t-test. Results are shown in the Table 13. "Follow Speed Limit" group had a significant difference between those who reported they follow the speed limit compared to those don't follow the limits. Safety perception improvement in among driver who reported not following the speed limits was -5.70 compared -3.45 for the group which follow the speed limits. It should be noted that sample size difference was very large in between positive response compared to negative response drivers. This could potentially skew the results.

Table 13: One-tail t-Test Driving Skills and Citizenship Vs. Effect

Risk Variable	p-value
Safe Driver	0.117
Follow Speed Limits	0.049*
Follow Driving Rules	0.110

CONCLUSIONS

It is clear from the results that drivers' perception of safety of using cell phones was significantly altered after one simulator experience. More 80% of the drivers' safety perception of using cell phone driving either remained same or or improved. Furthermore, improvement was highly significant. Major results are summarized below:

- 80% drivers reported same or improved safety perception after simulator experience. (74% reported improvement.)
- SafetyPerceptionScore changed from 13.34 to 9.12. That is, drivers considered cell

phone use to Unsafe to Neutral prior to the experiment and considered cell phone use to Very unsafe to Unsafe after the experiment.

- Overall improvement (improvement was measured as Effect, which was difference of pre and post Safety Perception Scores) was statistically significant with a p-value less than 0.001%.
- Safety perception improved based on every demographic, environmental and personality risk factors considered in the experiment. However, not factors show statistically significant improvements.
- Drivers' age had significant relationship with overall improvement of safety perception. However, improvement was shown either by younger drivers (20s) or older drivers (40s or 50s), drivers in 30s showed very little change.
- Employment status was also has an impact. Unemployed drivers showed least improvement.
- Frequency of cell phone use had no direct influence on the Effect variable.
- Importance of social media to the drivers' also did not show any relationship with the Effect variable.
- One personality risk attribute "Do Crazy Things" was significantly related to the Effect variable.
- Overall Personality Risk Score has shown no direct relationship to the Effect variable.
- "Percentage of Freeway Driving" was significantly related to Effect. Lower the percentage of the freeway driving more improvement was reported by the drivers.
- Similarly, drivers who reported to be primary drivers in the household showed higher improvement compared to drivers who reported not to be primary drivers.
- 94% drivers considered themselves as safe drivers.
- Driving "citizenship" was measured by the two factors: 'Follow the Speed Limit' and 'Follow the Traffic Rules'. Large majority (82%) of the participants reported to be following traffic rules and speed limits.
- Those who reported to 'Follow the Speed Limits' also showed statistically significant improvement in the safety perception.

It is also important to mention limitations of the study. Hence external validity of experiment must be made carefully. It is small study, thus, have limited external validity. Major limitations are listed below:

- Sampling frame was a very limited. A small Virginia city is not fully representative of drivers in the region or state.
- Small sample size, 93 data points with 40 variables is rather small sample. A larger more inclusive sample may provide results that can be easily generalized.
- Pre-post data was collected within a very short time. That is, experiment did not collect

the data on longevity of the effect of the treatment applied on the participants.

- More research is needed where change in drivers' safety perception can be related to the change in the attitude and actual behavior.
- Expanded list of personality risk factors needs to be tested for change in the perception.
- Effect of multiple and variety of treatments like PSA, billboards, and other educational efforts needs to be studied. A combination of different effort may have synergetic effect of the drivers' behavior.

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APPENDIXES

Appendix 1

Pre and Post Survey Instruments

Class Climate	Driving Study	SCANTRON

School of Business — Sharad Maheshwari

Department of Management — Driving Study

HAMPTON UNIVERSITY

Mark as shown: ☐ ☒ ☐ ☐ ☐ Please use a ball-point pen or a thin felt tip. This form will be processed automatically.

Correction: ☐ ■ ☐ ☒ ☐ Please follow the examples shown on the left hand side to help optimize the reading results.

1. Demographics

1.1 Gender ☐ Male ☐ Female

1.2 Race/Ethnicity ☐ African-American/ Black ☐ Caucasian/White ☐ Asian ☐ Hispanic ☐ Other

1.3 Type of work ☐ Hourly worker ☐ Professional ☐ Student only ☐ Unemployed ☐ Other

1.4 Family size ☐ One/Single ☐ Two ☐ Three ☐ Four ☐ Five or more

1.5 How many drivers in your household? ☐ One ☐ Two ☐ Three or more

1.6 Are you the primary driver? ☐ Yes ☐ No

1.7 Do you use your communication device primarily for: ☐ Social ☐ Business

1.8 How important is it for you to respond to social media you receive? Not important ☐ ☐ ☐ ☐ ☐ Very important

1.9 What is your age?

2. Sensation

The below phrases describe people's behaviors. Please use the rating scale below to describe how accurately each statement described you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. Please read each statement carefully, and then fill in the box that corresponds to the description on the scale.

		Very Inaccurate	Moderately Inaccurate	Neither	Moderately Accurate	Very Accurate
2.1	Do crazy things.	☐	☐	☐	☐	☐
2.2	Act wild and crazy.	☐	☐	☐	☐	☐
2.3	Do unexpected things.	☐	☐	☐	☐	☐
2.4	Like to act on a whim.	☐	☐	☐	☐	☐
2.5	Am easily talked into doing silly things.	☐	☐	☐	☐	☐
2.6	Am unpredictable, people never know what I am going to say.	☐	☐	☐	☐	☐
2.7	Enjoy wild flights of fantasy.	☐	☐	☐	☐	☐
2.8	Have persuaded others to do something really adventurous or crazy.	☐	☐	☐	☐	☐
2.9	Seek adventure.	☐	☐	☐	☐	☐
2.10	Take risks.	☐	☐	☐	☐	☐

3. Your driving.

Please respond to the following questions as accurately as possible.

3.1	What approximate percentage of your regular driving is on freeways?	☐ Less than 25%	☐ 25% to 50%	☐ 51% to 75%
		☐ More than 75%		
3.2	Do you consider your self a safe driver?	☐ Yes	☐ No	
3.3	Do you follow speed limits most of the time while driving?	☐ Yes	☐ No	
3.4	Do you generally follow traffic rules other than the speed limit?	☐ Yes	☐ No	
3.5	Do you ever RECEIVE cell phone calls while driving?	☐ Yes	☐ No	
3.6	Do you INITIATE cell phone calls while you are driving?	☐ Yes	☐ No	
3.7	Do you feel using your cell phone while driving is safe?	☐ Very unsafe	☐ Unsafe	☐ Neither
		☐ Safe	☐ Very Safe	
3.8	Do you ever READ a text message while driving?	☐ Yes	☐ No	
3.9	How often do you READ a text message while driving?	☐ Very often	☐ Often	☐ Sometimes
		☐ Seldom	☐ Never	
3.10	Do you REPLY to a text message while driving?	☐ Yes	☐ No	
3.11	How often do you REPLY to a text message while driving?	☐ Very often	☐ Often	☐ Sometimes
		☐ Seldom	☐ Never	
3.12	Do you INITIATE a text message while driving?	☐ Yes	☐ No	
3.13	How often do you INITIATE a text message?	☐ Very often	☐ Often	☐ Sometimes
		☐ Seldom	☐ Never	
3.14	Do you consider SENDING a text message safe while driving?	☐ Very unsafe	☐ Unsafe	☐ Neither
		☐ Safe	☐ Very safe	
3.15	Do you consider READING a text message safe while driving?	☐ Very unsafe	☐ Unsafe	☐ Neither
		☐ Safe	☐ Very safe	
3.16	Do you use a cell phone for READING email while driving?	☐ Yes	☐ No	
3.17	Do you consider READING email safe while driving?	☐ Very unsafe	☐ Unsafe	☐ Neither
		☐ Safe	☐ Very safe	
3.18	Do you use a cell phone for Internet search while driving?	☐ Yes	☐ No	
3.19	Do you consider conducting Internet searches safe while driving?	☐ Very unsafe	☐ Unsafe	☐ Neither
		☐ Safe	☐ Very safe	
3.20	Do you use a cell phone for direction SEARCHING while driving?	☐ Yes	☐ No	

3.21

3.21 Do you consider conducting direction SEARCHING safe while driving? ☐ Very unsafe ☐ Unsafe ☐ Neither ☐ Safe ☐ Very safe

3.22 Do you use your cell phone for any other purpose while driving (other than phone calls)? Please specify.

Class Climate	Driving Study	SCANTRON

School of Business — Sharad Maheshwari

Department of Management — Driving Study Posttest

HAMPTON UNIVERSITY

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1. Your driving.

Please respond to the following questions as accurately as possible.

1.10	Do you feel using your cell phone while driving is safe?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very Safe	☐ Neither
1.11	Do you consider SENDING a text message safe while driving?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very safe	☐ Neither
1.12	Do you consider READING a text message safe while driving?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very safe	☐ Neither
1.13	Do you consider READING email safe while driving?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very safe	☐ Neither
1.14	Do you consider conducting Internet searches safe while driving?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very safe	☐ Neither
1.15	Do you consider conducting direction SEARCHING safe while driving?	☐ Very unsafe ☐ Safe	☐ Unsafe ☐ Very safe	☐ Neither

Appendix 2
IRB Application and
IRB Consent Form

Protocol for a Research Project Submitted for Review to the HAMPTON UNIVERSITY Institutional Review Board

All research involving human subjects must be reviewed by the Hampton University IRB. Submit the IRB Proposal following the guidelines of this proposal submission form. Please label the sections as indicated below. A proposal that does not follow these guidelines or is incomplete will be returned. Submit one hard copy of the full thesis or project/grant proposal and one hard copy of the following: IRB Approval Form with approval signatures, IRB Application Form and Informed Consent Form and an electronic copy of the completed IRB Application Form and Informed Consent Form to:

Dr. James Forbes, Chair, Hampton University IRB, Department of Biological Sciences, 101 DuPont Hall
757-727-5419
James.forbes@hamptonu.edu

Applications are reviewed monthly. Submit IRB applications no later than one month in advance of a scheduled IRB meeting. Please check with the IRB Chair for the schedule of IRB meetings. You are strongly advised to contact Dr. Forbes before submission of IRB documents to determine what level of review will be required..

Approvals granted by another Federally approved IRB may be accepted. Copies of approvals and an abstract of the study must be filed with the Hampton University IRB for review for all proposals approved by an external IRB.

Project Title:

Principal Investigator: Sharad Maheshwari
Department: Dept of Business Admin
School: School of Business

Address: BU 121 B
Telephone: 5605
e-mail: sharad.maheshwari@gmail.com

Faculty Advisor (if applicable):
Address:
Telephone:
e-mail:

Is this project a continuation of a previously approved project? ___Yes _X_No
Project period: Aug 2013-Dec 2014
Funding Source: US Dept of Transportation via Univ of Mississippi

In a brief abstract, please provide the following information using the headings given.

Introduction: Include rationale; statement of purpose, aims or objectives; research questions or hypotheses as appropriate. Citations from the literature should be included in support of your proposal.

Methods:

Study Design: Give brief overview of the design. Cite references pertaining to the proposed research methods as needed. If there is an intervention, include a section clearly describing the intervention involved. Are there any alternatives to the proposed (i.e. "experimental") procedure? If so, what are they?

Survey instrument to be administered on the selected group of adults.

Setting: Describe location where study will be conducted, including how you plan to gain access to subjects in the setting and procedures for obtaining permission for the study. Attach any supportive documentation (i.e. letter of agreement from host agency).

City of Hampton

Participants: Include criteria to be used in selecting participants, including any inclusion or exclusion criteria (e.g. age, gender, ethnicity). Give anticipated number of subjects. Discuss criteria related to health status, if relevant. Provide any other additional information that may help to determine potential risk to participants.

Randomly selected adults at various locations in the city

Instruments: Describe measures, instruments or tools to be used. **Attach copies of all data collection instruments. Attach verification of author's permission to utilize copyrighted material.**

Instrument is attached.

Procedures: Describe how participants will be recruited and selected. **Attach any advertisements, flyers, consent forms and verbal or written information given to potential subjects.**

What will the participants be asked to do in the study?

1. ***Answer questions on the instrument.***
2. ***Take sit and experience Driving Simulator and try to use cell phone.***
3. ***Fill out the post experiment survey.***

How will you obtain informed consent from participants and parents (if applicable)?

A consent will be giving before the survey.

Discuss any inducements, such as money or gifts, used for participation. If payments are given, discuss

the amount and method of disbursement.

$15 payment will be made to the participants at the conclusion of the study.

Are any aspects of the study kept secret from the participants? __No__ ~~Yes~~ (Please describe)

Is any deception used in the study?__No__ ~~Yes~~ (Please describe)

Are participants misled about any aspect of the study?__ *No*__ ~~Yes~~ (Please describe)

Will participants be recorded on video or audio taped? __ *No*__ ~~Yes~~
Will participants be recorded without their knowledge? __ *No*__ ~~Yes~~
Risk/Benefit: Discuss the potential risks of the study. This may include possible physical injury, complications or side effects, emotional distress or violation of privacy.

There is no physical, or emotional risk. Voluntary discussion of the aspect of the driving habits

Where potential risks exist, what will you do to protect participants from these hazards? Discuss how risk will be minimized or consequences handled.

N/A

How will you protect the confidentiality of your participants? (Check one.)
__Identifying names or numbers will not be collected. (Data are anonymous.)
__Codes will be used on data; the list linking codes to personal identifiers will be kept secure. (Data are confidential.)
__Other. Please describe:

Will participants be debriefed? __No__ ***Yes*** (Attach a copy of your Debriefing Statement.)

See consent form

What benefits can reasonably be expected from the study? Discuss direct benefits to the individual, if any, as well as to a particular community or society at large.

Study the effect on adult drivers' driving behavior related to 'texting while driving' after simulator experience.
What is the potential impact of the study for the subject, the institution and the field?

It is part of the Dept of Trans grant activity.

Remember to attach copies of data collection instruments, information letters, advertisements, and consent forms. Attach letters of permission from agencies involved in the research.

Signature of Principal Investigator: _____
Date:_____

Send these materials to:

Hampton University Institutional Review Board
Dr. James Forbes
Department of Biological Sciences
Room 101 Du Pont Hall
Hampton University
Hampton, VA 23668

If you have questions, please contact Chair of the IRB:
Dr. James Forbes
Telephone: (757)727-5419-e-mail: james.forbes@hamptonu.edu

HAMPTON UNIVERSITY

HAMPTON, VIRGINIA 23668

CONSENT FORM

TEXTING WHILE DRIVING AMONG ADULTS

I, _____, consent to participate in driving simulator research conducted by the ESITAC research team. The main purpose of this study is to gather information from young drivers' attitude change towards Texting While Driving after a driving simulator experience. The goal of this study is to find what educational and public services programs can be developed which can reduce the tendency among young drivers to reduce use of certain type of electronic communication while operating an automobile.

The driving simulator will be parked in the various parking lots. **Participation and answering of questions are voluntary**. There is no obligation on any participant to provide information unwillingly. You have right to withdraw from the process any time without any explanation or loss. This process will involve approximately 100-200 participants.

All data collected will be used strictly for the purpose stated above and will be completely confidential. The "Texting While Driving" research team will provide copy of the consent form if you desire so. You can obtain a copy of the final project report from Dr. Sharad Maheshwari (see address below) at the conclusion of the project on Dec, 2014.

You can contact faculty advisor to the project, Dr. Sharad Maheshwari (see address below) or the chair of institutional research board (IRB) of Hampton University (see address Below) for any concerns related to this study. This form is valid only if approved and signed by the IRB chair.

Participant signature_____ Date _____

PI: Dr. Sharad Maheshwari
School of Business
Hampton University
Hampton, VA 23668
757-727-5605

IRB Chair: Dr. James Forbes, Chair
Hampton University IRB
Du Pont Hall Room # 101
Hampton, VA 23668
757-727-5419

Approved [Yes( ) No ( )]

_____ Date_____

Dr. James E. Forbes
Chairperson, HU IRB

Appendix 3

Raw Data from Survey Instrument
Pre and Post Test

Pre-Test Raw Data

#	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13
1	1	1	2	1	1	1	3	4	25	1	1	2	1
2	1	1	1	1	1	1	3	5	25	2	2	2	2
3	1	1	2	1	1	1	1	5	27	2	3	5	2
4	1	1	1	3	1	1	1	3	27	3	4	3	3
5	1	1	1	1	2	1	1	2	26	4	4	4	5
6	1	1	4	2	1	1	1	2	27	4	2	5	4
7	1	1	4	1	2	1	1	3	29	3	1	1	2
8	1	1	2	1	1	1	3	3	26	1	2	3	2
9	1	1	1	1	1	1	1	3	26	1	1	1	1
10	1	1	1	1	2	1	1	2	26	1	1	1	1
12	1	1	5	5	2	1	1	1	28	4	4	3	3
13	1	1	4	1	2	1	1	4	29	4	5	5	2
14	1	1	1	2	1	1	1	5	27	4	5	5	3
15	1	1	2	3	2	2	1	1	26	4	5	4	3
16	1	2	1	1	1	1	3	4	25	4	4	4	4
17	1	1	3	2	1	2	2	1	26	3	3	3	3
18	1	1	2	2	2	2	1	1	27	5	5	5	5
19	1	1	2	1	1	1	1	4	25	4	3	4	4
20	1	1	1	1	1	1	1	1	27	1	1	1	1
21	1	4	2	2	2	1	1	3	29	4	4	4	4
22	1	4	2	3	2	1	1	2	26	5	5	5	5
23	1	1	1	1	1	1	2	2	27	4	4	1	4
24	1	4	4	1	1	1	1	4	28	4	4	3	2
25	1	1	4	1	1	1	2	4	28	2	3	2	2
26	1	1	2	1	1	1	2	5	27	1	1	1	1
27	1	1	2	1	1	1	2	3	27	3	3	3	3
28	1	1	4	3	3	1	3	4	29	4	4	3	3
29	1	1	1	1	2	2	1	2	27	4	4	4	5
30	1	1	4	1	2	2	1	5	25	4	4	4	4
31	1	1	3	3	2	1	1	3	27	4	3	3	3
32	1	1	2	1	1	1	2	4	28	2	2	3	4
33	1	2	2	1	1	1	1	2	26	1	1	1	1
34	1	1	1	2	2	1	2	1	29	1	1	1	1
35	1	1	5	5	3	2	1	2	29	2	2	2	2
36	1	1	1	1	1	1	3	5	28	5	4	5	3
37	1	1	1	1	1	1	1	2	25	2	1	1	1
38	1	1	1	4	2	1	2	1	27	3	2	4	2
39	2	1	1	1	1	1	1	2	29	2	2	5	5
40	2	1	2	2	2	1	2	4	27	5	5	4	4
41	2	4	2	3	2	2	1	5	26	4	5	5	5

#	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13
40	2	1	2	2	2	1	2	4	27	5	5	4	4
41	2	4	2	3	2	2	1	5	26	4	5	5	5
43	2	1	4	2	2	2	1	3	29	3	2	4	4
44	2	1	4	4	1	2	1	4	26	2	2	2	2
45	2	1	1	1	3	2	1	4	27	4	4	3	4
46	2	1	1	1	3	2	1	2	27	3	3	4	2
47	2	4	1	3	2	1	1	2	29	2	2	3	2
48	2	2	3	1	1	1	1	2	25	2	4	4	3
49	2	1	3	1	1	1	1	3	28	1	2	1	2
50	2	2	1	4	2	1	1	1	26	1	1	1	1
51	2	1	3	1	1	1	1	3	26	1	1	1	4
53	2	2	2	2	2	1	1	4	29	1	1	1	1
54	2	1	1	1	1	1	1	1	25	2	2	3	2
55	1	1	2	4	1	1	1	2	31	1	1	1	1
56	1	1	2	2	2	1	2	5	32	5	4	4	5
57	1	1	4	1	1	1	1	2	30	1	1	2	2
58	1	1	1	2	2	1	1	4	34	1	2	3	2
59	1	1	2	1	2	1	1	3	31	4	2	4	2
60	1	2	1	3	2	1	2	1	39	1	1	1	1
62	1	2	2	3	2	1	1	1	37	1	1	1	1
63	1	1	4	2	2	1	2	1	33	3	3	3	2
64	1	1	2	1	1	1	2	3	31	3	3	3	3
65	1	1	4	2	1	1	1	1	34	2	1	2	2
66	1	4	4	1	1	1	1	3	33	3	3	3	3
67	1	1	4	1	2	2	1	2	32	3	3	4	2
69	1	1	4	2	2	1	2	3	30	3	3	3	4
70	1	1	4	1	3	2	1	4	31	2	2	3	4
71	1	1	1	3	3	2	1	4	33	4	4	4	3
72	1	5	1	3	2	2	1	1	34	1	1	1	1
73	1	1	4	4	3	1	2	4	31	3	2	3	2
74	1	4	4	4	3	1	2	1	33	1	1	1	1
75	1	1	3	1	1	2	1	4	32	1	1	4	2
76	1	1	1	2	1	1	1	3	30	1	1	2	3
77	1	1	2	3	2	1	2	4	30	1	1	1	1
78	2	1	1	1	2	1	1	1	31	3	4	4	4
79	2	1	2	2	2	1	1	5	32	3	4	1	1
80	2	1	1	2	2	2	1	3	31	2	2	3	4
81	2	1	2	1	2	1	2	3	38	3	3	2	2
82	2	1	4	1	1	1	1	5	32	1	2	1	1
83	2	1	2	2	1	1	2	2	34	3	3	4	4

#	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13
84	2	4	1	2	1	1	1	3	35	3	3	4	4
85	2	2	2	3	2	1	2	3	32	1	1	1	1
86	1	1	4	1	1	1	2	3	42	3	3	4	3
87	1	1	4	1	2	1	2	4	40	4	2	3	4
88	1	1	1	1	1	1	1	1	40	2	3	2	2
89	1	2	1	2	1	1	1	1	47	1	1	1	1
90	1	2	2	2	2	1	2	1	41	1	1	1	1
92	2	2	2	1	1	1	2	1	49	1	2	2	1
93	2	1	2	5	1	1	1	1	42	1	1	1	1
94	2	2	2	3	2	1	1	1	49	1	1	1	1
95	2	2	2	2	2	2	2	5	40	1	1	1	1
96	2	1	1	1	1	1	1	4	48	1	1	1	1
98	1	2	5	1	1	1	3	3	51	4	3	4	4
99	1	1	1	1	1	1	1	1	54	1	1	1	1
100	1	2	5	2	2	2	1	1	53	1	1	1	1

#	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26
1	1	1	1	2	2	4	2	1	1	1	1	1	4
2	2	4	4	4	4	4	3	1	1	1	1	2	2
3	3	2	4	2	1	4	2	1	2	1	1	1	2
4	2	2	3	2	3	3	1	1	1	1	2	1	2
5	1	2	4	4	4	3	4	1	1	1	1	1	2
6	1	3	4	4	4	4	2	1	2	1	1	1	2
7	1	2	4	3	1	3	3	1	1	1	2	2	5
8	1	1	1	1	1	2	2	1	1	1	1	2	2
9	1	1	1	1	3	3	1	1	1	1	1	1	4
10	1	1	1	1	3	3	3	1	1	1	1	2	1
12	2	5	4	1	4	4	2	1	2	2	1	2	4
13	3	5	1	5	4	4	2	1	1	1	1	2	3
14	4	3	4	4	3	4	2	1	1	1	1	2	4
15	3	4	4	4	4	5	4	2	2	1	1	1	2
16	1	3	4	4	5	5	1	2	1	2	1	1	5
17	3	3	3	2	1	1	1	1	1	1	1	2	2
18	5	5	5	5	5	5	1	2	2	1	1	2	5
19	4	4	4	4	4	4	2	1	1	1	1	1	4
20	1	1	1	1	1	1	3	1	1	1	1	1	4
21	2	3	4	3	4	5	2	1	2	1	1	1	1
22	4	2	3	3	4	3	2	1	1	1	1	2	3
23	3	3	5	4	5	5	2	1	2	1	1	2	2
24	3	4	3	4	4	4	4	1	1	1	1	1	2
25	4	2	1	3	2	3	2	1	1	2	1	1	2
26	1	1	1	1	1	4	4	1	1	1	1	1	2
27	3	3	5	5	5	5	1	1	1	2	2	2	1
28	4	4	2	4	4	3	2	1	1	1	1	1	3
29	4	4	2	4	4	4	3	1	1	1	1	1	3
30	3	3	4	4	5	4	2	1	1	1	1	1	2
31	3	3	3	4	4	4	1	1	1	1	1	1	3
32	3	3	2	4	4	4	4	1	1	1	1	1	2
33	1	1	1	1	1	1	1	1	2	1	1	1	3
34	1	1	1	1	4	1	1	1	1	1	1	1	3
35	2	2	2	2	2	2	4	1	1	1	1	1	1
36	2	4	5	5	5	5	2	1	1	1	1	1	2
37	1	3	1	1	1	1	3	1	1	1	2	1	1
38	1	3	3	4	4	3	2	1	2	1	2	1	2
39	1	5	3	5	5	5	1	1	1	1	1	1	2
40	3	4	5	5	5	3	3	1	1	1	1	1	2
41	5	5	5	5	5	5	2	1	1	2	2	1	4

#	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26
43	2	3	2	5	4	4	2	1	1	1	1	1	3
44	4	3	3	1	2	1	1	1	2	1	1	1	5
45	4	4	3	5	4	3	2	1	1	1	1	1	2
46	4	4	3	4	4	5	1	1	1	1	1	2	1
47	2	2	3	2	3	3	2	1	1	1	1	1	2
48	2	3	4	4	5	5	3	2	2	1	1	1	2
49	1	1	1	1	3	3	1	1	1	1	1	2	2
50	1	1	1	1	5	5	3	1	1	1	1	2	3
51	1	4	1	4	5	5	2	2	1	1	1	1	5
53	1	1	1	1	5	5	1	1	1	1	1	1	3
54	2	3	2	2	5	5	2	1	1	1	1	1	3
55	1	1	1	1	4	4	2	1	1	1	1	1	4
56	3	4	4	5	3	4	3	1	2	1	1	1	4
57	1	3	3	1	4	3	3	1	1	1	1	2	1
58	3	4	3	2	2	1	1	1	2	1	2	1	1
59	1	4	3	4	4	4	2	1	1	1	1	2	2
60	1	1	1	1	1	1	3	1	2	1	1	1	3
62	1	1	1	1	1	1	3	1	1	1	1	1	1
63	3	2	3	4	3	5	4	1	1	1	1	1	1
64	3	3	3	3	3	3	2	2	1	2	2	2	1
65	1	1	1	3	3	5	4	1	1	1	1	1	2
66	3	3	3	3	3	3	1	1	1	2	1	1	3
67	3	3	2	4	4	4	2	1	1	1	1	1	3
69	3	4	3	3	4	4	3	1	1	1	1	1	2
70	3	4	3	2	3	4	3	1	1	1	1	1	2
71	4	2	2	3	4	4	2	1	1	1	1	1	3
72	1	1	1	1	1	1	3	1	2	1	1	1	2
73	1	3	2	2	4	4	1	1	1	1	1	1	3
74	1	1	1	1	1	1	2	1	1	1	1	1	2
75	3	4	1	4	4	4	1	1	1	1	2	2	2
76	2	2	3	3	4	4	3	1	1	1	1	1	1
77	1	1	1	1	1	1	2	1	1	1	1	1	1
78	1	4	3	4	5	4	2	1	1	1	1	2	1
79	3	2	1	1	4	3	1	2	2	1	1	1	1
80	3	3	3	4	4	3	4	1	1	1	1	1	1
81	4	3	3	4	4	3	3	1	1	1	1	1	2
82	1	1	1	2	4	3	2	1	1	2	2	1	2
83	3	3	2	4	4	3	4	1	1	1	1	1	1
84	2	3	2	3	4	4	4	1	1	1	1	2	2
85	1	1	1	1	1	1	2	1	1	1	1	2	1

#	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26
86	2	3	4	3	4	4	1	1	1	1	1	2	2
87	3	4	3	4	4	3	2	1	1	1	1	2	2
88	2	3	4	2	2	2	2	1	2	1	2	2	4
89	1	1	1	1	1	1	3	1	1	1	1	1	3
90	1	1	1	1	1	1	3	1	1	1	1	1	4
92	2	1	2	2	2	1	2	1	1	1	2	2	1
93	1	1	1	1	1	1	2	1	1	1	1	1	3
94	1	1	1	1	1	1	3	1	1	1	1	1	2
92	2	1	2	2	2	1	2	1	1	1	2	2	1
93	1	1	1	1	1	1	2	1	1	1	1	1	3
94	1	1	1	1	1	1	3	1	1	1	1	1	2
95	1	1	1	1	1	1	2	1	1	1	1	2	2
96	1	1	1	1	1	1	2	1	1	1	1	1	5
98	3	4	3	3	4	4	4	1	1	1	1	1	3
99	1	1	1	1	2	2	2	1	1	1	1	2	3
100	1	1	1	1	1	1	4	1	1	1	1	2	3

#	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39
1	1	2	1	2	1	2	2	2	1	2	1	2	1
2	1	3	2	4	2	4	2	2	2	2	1	2	1
3	1	2	1	1	1	1	1	1	1	1	1	1	1
4	2	5	2	5	2	3	4	2	2	2	2	2	2
5	1	2	1	1	1	2	2	2	1	2	2	1	2
6	2	4	2	4	2	5	1	1	2	2	2	1	1
7	2	4	2	4	2	5	2	1	2	2	2	1	2
8	1	4	1	4	2	4	2	3	2	3	2	3	2
9	1	2	1	1	1	1	5	4	1	4	1	2	1
10	1	4	2	4	2	4	3	1	2	1	2	1	1
12	1	4	1	4	2	4	5	4	1	2	1	2	1
13	2	2	1	2	2	2	2	4	2	2	1	2	1
14	2	1	1	1	2	3	4	4	2	4	2	5	2
15	2	4	1	5	2	4	4	4	2	2	1	1	1
16	1	2	2	4	2	1	5	4	2	5	1	5	2
17	2	3	1	3	2	3	1	1	1	1	1	1	1
18	1	4	1	1	2	5	1	1	2	4	2	5	1
19	1	1	1	1	1	1	1	1	1	4	1	4	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	3	1	3	1	1	4	4	2	2	1	4	1
22	1	3	2	3	2	4	2	2	2	2	2	2	2
23	2	4	1	4	1	2	2	2	2	2	2	2	1
24	1	2	1	2	1	2	2	3	2	1	2	1	2
25	1	1	2	3	2	3	2	4	2	2	1	2	1
26	1	1	1	1	1	1	2	2	2	2	2	2	1
27	1	1	2	2	1	2	2	2	1	3	2	3	2
28	1	4	1	3	1	2	3	3	2	1	2	2	2
29	1	2	1	2	1	2	2	2	2	1	2	2	2
30	1	1	1	1	1	2	2	3	1	1	1	1	1
31	1	3	1	3	1	3	3	3	2	3	2	3	1
32	1	3	1	3	1	3	2	2	1	1	2	1	1
33	1	2	2	5	2	5	2	2	2	2	2	2	1
34	1	3	1	3	1	4	3	3	1	3	1	3	1
35	1	1	1	1	1	1	1	1	1	1	1	1	1
36	1	2	1	2	1	2	2	3	1	2	1	2	1
37	2	5	2	5	1	5	1	1	2	2	2	2	2
38	2	3	2	2	2	2	3	2	2	2	2	2	2
39	1	4	1	4	2	5	2	2	2	1	2	1	1
40	1	2	1	2	1	1	1	2	1	2	1	2	1

#	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39
41	1	2	1	1	1	1	1	1	2	1	1	1	1
43	1	3	2	2	1	2	2	2	2	5	2	2	1
44	1	5	2	1	2	4	3	4	2	2	2	4	2
45	1	2	1	3	1	2	2	2	2	1	1	1	1
46	2	1	1	1	1	3	2	2	2	1	1	1	1
47	1	4	1	4	1	4	2	2	2	2	2	2	2
48	1	1	1	1	1	2	2	2	2	2	1	2	1
49	2	5	2	5	2	5	2	2	2	5	2	5	2
50	1	1	1	1	2	5	3	3	2	3	1	3	1
51	1	1	1	1	1	1	4	4	1	4	1	4	1
53	1	3	1	3	1	3	3	3	2	3	1	3	1
54	1	4	2	5	2	5	2	2	2	2	2	2	2
55	1	4	1	4	1	1	3	4	1	4	1	2	1
56	2	1	1	1	1	1	4	5	1	4	1	4	1
57	2	4	2	2	2	2	1	1	2	1	2	1	1
58	1	1	2	1	2	4	1	4	1	2	2	1	1
59	2	3	2	4	2	5	3	2	2	2	2	3	1
60	2	5	2	5	2	5	2	2	1	3	1	2	2
62	2	1	1	1	1	1	2	2	1	2	1	2	1
63	2	4	1	5	1	3	2	2	2	1	2	1	2
64	1	4	1	4	1	1	1	2	2	2	2	2	1
65	1	1	1	1	1	1	2	2	2	2	2	2	2
66	1	1	1	3	2	2	3	2	2	3	2	3	2
67	1	2	2	3	2	3	2	2	1	2	2	1	2
69	2	5	2	5	1	3	2	2	2	1	1	1	1
70	1	3	1	3	1	2	2	2	1	1	1	1	1
71	1	1	1	1	1	1	2	2	2	2	1	1	1
72	1	4	2	5	2	5	2	2	2	2	2	2	2
73	1	3	1	3	1	4	2	2	2	2	1	3	1
74	1	2	2	5	2	5	2	2	2	2	2	2	2
75	2	5	1	4	2	5	1	1	2	1	2	2	2
76	2	5	2	5	2	5	1	5	2	1	2	1	1
77	1	1	1	1	1	1	1	1	1	1	1	1	1
78	2	4	1	4	2	5	1	1	2	1	2	1	1
79	1	4	1	2	1	1	2	1	1	1	2	2	1
80	1	1	2	1	1	1	2	3	2	1	1	1	1
81	1	2	1	1	1	4	2	2	2	1	2	1	2
82	1	2	2	2	2	4	1	1	2	1	2	1	2
83	1	3	1	2	1	3	1	2	2	1	2	1	1

#	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39
84	1	3	1	2	1	3	3	3	2	1	2	1	1
85	1	3	2	4	2	2	2	2	1	2	2	2	1
86	2	4	1	4	2	4	2	2	2	2	1	2	2
87	1	2	1	1	2	4	2	1	1	2	2	1	1
88	1	1	2	2	1	5	5	2	1	5	2	4	2
89	2	5	2	5	2	5	2	2	2	2	2	2	2
90	1	2	1	2	1	2	4	4	1	4	2	4	2
92	2	5	2	5	2	5	1	1	2	1	2	1	2
93	1	2	1	2	2	5	3	3	1	3	2	3	1
94	1	2	1	2	2	2	2	2	2	2	2	2	1
95	2	5	2	5	2	5	2	2	2	2	2	2	2
96	2	1	1	4	1	1	1	4	1	1	2	1	1
98	1	3	1	3	2	3	3	3	1	3	2	3	2
99	2	5	2	5	2	5	2	2	2	3	2	3	2
100	1	4	2	5	2	5	2	2	2	2	2	2	2

#	V40	V41
1	2	
2	2	music, to listen to
3	3	Facebook/Social Media
4	2	
5	2	
6	2	
7	1	no
8	2	no
9	1	text, music
10	3	n/a
12	4	no
13	2	I use my phone for music, maps, entertainment
14	1	music
15	1	no
16	5	no
17	4	nothing other than navigation
18	2	
19	4	
20	1	texting
21	4	
22	2	GPS, music
23	2	no
24	1	no
25	2	no
26	2	
27	3	
28	2	
29	2	n/a
30	1	
31	3	
32	3	n/a
33	3	gps, texting
34	3	gps, texting
35	1	
36	1	
37	3	
38	2	
39	4	music
40	2	
41	1	no

#	V40	V41
43	1	no
44	4	
45	1	
46	1	
47	2	
48	2	
49	5	none
50	4	
51	4	
53	3	
54	2	
55	2	
56	4	social media
57	3	n/a
58	2	
59	4	
60	2	
62	2	navigation
63	1	
64	5	
65	2	
66	3	
67	1	no
69	1	
70	1	n/a
71	2	
72	3	
73	3	
74	2	n/a
75	2	emergencies
76	2	
77	1	no
78	2	no
79	4	no
80	1	
81	2	
82	1	
83	1	
84	1	

#	V40	V41
85	3	Pandora
86	4	yes. Search apps and games
87	4	
88	5	
89	3	
90	4	no
92	1	no
93	4	
94	2	
95	1	
96	2	
98	3	
99	3	no
100	3	n/a

Post-Test Raw Data

#	V1P	V2P	V3P	V4P	V5P	V6P
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	2	2	1	1	2	1
6	1	1	1	1	1	1
7	1	1	1	1	1	1
8	2	2	2	2	2	2
9	1	1	1	1	1	1
10	1	1	1	1	1	1
12	2	4	2	1	1	4
13	1	1	1	1	1	1
14	3	2	2	2	2	3
15	4	2	2	2	1	4
16	2	2	2	2	2	2
17	2	2	2	2	2	2
18	2	1	1	2	1	1
19	2	2	2	2	1	2
20	1	2	4	1	1	2
21	1	1	1	1	1	1
22	5	5	2	4	5	5
23	1	1	1	1	1	1
24	1	1	1	1	1	1
25	2	2	1	1	1	1
26	4	2	2	2	2	2
27	2	2	2	2	2	2
28	2	3	2	2	3	2
29	1	1	1	1	1	1
30	2	2	2	2	2	2
31	1	2	1	2	1	1
32	2	2	1	1	1	1
33	1	1	1	1	1	1
34	2	2	2	2	2	2
35	2	2	3	1	2	2
36	2	2	3	1	2	2
37	1	1	1	1	1	1
38	2	1	2	2	2	3

#	V1P	V2P	V3P	V4P	V5P	V6P
39	2	1	2	2	2	3
40	1	1	1	1	1	1
41	2	2	2	2	2	2
43	3	2	2	2	2	2
44	3	3	1	4	4	5
45	2	4	2	4	5	1
46	4	3	3	4	3	4
47	3	3	3	3	3	3
48	1	1	1	2	2	4
49	1	1	1	1	1	1
50	1	1	1	2	2	3
51	2	2	3	2	2	1
53	3	2	3	3	1	1
54	1	1	2	1	1	1
55	2	2	2	1	1	1
56	2	2	2	2	2	2
57	2	2	2	2	2	2
58	1	1	1	1	1	1
59	1	1	1	1	1	1
60	1	2	2	1	1	1
62	1	1	1	1	1	1
63	2	1	1	2	1	1
64	2	2	2	1	1	1
65	1	1	1	1	1	1
66	1	2	2	1	1	1
67	2	2	2	1	1	1
69	2	2	2	2	2	1
70	1	1	1	1	1	1
71	2	2	1	1	1	1
72	1	1	2	1	1	1
73	2	2	2	2	2	1
74	1	1	1	1	1	1
75	1	1	1	1	1	1
76	2	2	2	1	1	1
77	2	2	2	1	1	1
78	1	1	1	1	1	1
79	2	2	1	1	1	1
80	1	1	1	1	1	1
81	2	2	2	1	1	1
82	2	2	2	2	2	2

#	V1P	V2P	V3P	V4P	V5P	V6P
83	1	1	1	1	1	1
84	2	1	2	1	1	1
85	1	2	2	1	1	1
86	1	1	1	1	1	1
87	2	2	2	1	1	1
88	1	1	1	1	1	1
89	2	2	2	1	1	1
90	2	2	2	2	2	2
92	1	1	1	1	1	1
93	1	1	1	1	1	1
94	2	2	2	2	2	2
95	1	1	1	1	1	1
96	2	2	2	2	2	2
98	2	2	2	2	2	2
99	1	1	1	1	1	1
100	2	1	2	1	1	1

Appendix 4
Variables' Code Book

Code Book Pre-Test

Variable#	Q #	Description	Details				
V1	Q1.1	Gender	Male	Female			
		Code	1	2			
V2	Q1.2	Race	African-Am	White	Asian	Hispanic	Other
		Code	1	2	3	4	5
V3	Q1.3	Work	Hourly	Professional	Student	Unemployed	Other
		Code	1	2	3	4	5
V4	Q1.4	Family	Single	Two	Three	Four	Five +
		Code	1	2	3	4	5
V5	Q1.5	Drivers	One	Two	Three	Four	Five +
		Code	1	2	3	4	5
V6	Q1.6	Primary Driver	Yes	No			
		Code	1	2			
V7	Q1.7	Cell Use	Social	Business	Both		
		Code	1	2	3		
V8	Q1.8	Imp of Social Med	Not Imp				Very Imp
		Code	1	2	3	4	5
V9	Q1.9	Age	Actual Number				
		Code	Actual Number				
V10	Q2.1	Do crazy..	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V11	Q2.2	Act wild.	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V12	Q2.3	Do Unexpected Thing.	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V13	Q2.4	Like to act on whim	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V14	Q2.5	do silly things.	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V15	Q2.6	unpredictable..	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V16	Q2.7	enjoy wild things..	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V17	Q2.8	persuaded to be adventurous	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V18	Q2.9	Seek adventure	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5
V19	Q2.10	Take Risks	Very Inacc.	Mod. Inacc.	Neither	Mod. Acc.	Very Acc
		Code	1	2	3	4	5

Variable#	Q #	Description	Details				
V20	Q3.1	% of driving on freeway	<25%	25%-50%	51%-75%	75%+	
		1	1	2	3	4	
V21	Q3.2	Safe driver	Yes	No			
			1	2			
V22	Q3.3	follow speed limit	Yes	No			
		Code	1	2			
V23	Q3.4	follow traffic rules	Yes	No			
		Code	1	2			
V24	Q3.5	receive cell call	Yes	No			
		Code	1	2			
V25	Q3.6	initiate cell call	Yes	No			
		Code	1	2			
V26	Q3.7	cell phone is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V27	Q3.8	read text while driving	Yes	No			
		Code	1	2			
V28	Q3.9	how often you read	very often	often	sometimes	seldom	never
		Code	1	2	3	4	5
V29	Q3.10	reply to text while driving	Yes	No			
		Code	1	2			
V30	Q3.11	how often you reply	very often	often	sometimes	seldom	never
		Code	1	2	3	4	5
V31	Q3.12	initiate text message while dr.	Yes	No			
		Code	1	2			
V32	Q3.13	how often you initiate	very often	often	sometimes	seldom	never
		Code	1	2	3	4	5
V33	Q3.14	sending text is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V34	Q3.15	reading is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V35	Q3.16	use cell for emails while dr.	Yes	No			
		Code	1	2			
V36	Q3.17	email reading is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5

Variable#	Q #	Description	Details				
V37	Q3.18	use phone for internet search	Yes	No			
		Code	1	2			
V38	Q3.19	internet search is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V39	Q3.20	use for direction search	Yes	No			
		Code	1	2			
V40	Q3.21	direction search is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V41	Q3.22	other use --write in					
		None--entered as it is					

Code Book Post-Test

Variable#	Q #	Description	Details				
V1P	Q1.1	cell phone is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V2P	Q1.2	sending text is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V3P	Q1.3	reading is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V4P	Q1.4	email reading is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V5p	Q1.5	internet search is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5
V6P	Q1.6	direction search is safe	very unsafe	unsafe	neither	safe	very safe
		Code	1	2	3	4	5