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Texting While Driving: A Test of Self-Control Theory

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ABSTRACT

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The consequences of texting and driving have never been more pertinent concerns than they are presently. As reports of injuries and death increase and are paralleled by direct and indirect emotional and financial costs, it is important to uncover why, even in the face of such escalations, individuals choose to engage in this behavior. This study examines texting while driving behavior in the context of self-control theory and postulates that low self-control is a significant predictor of the conduct.

An online questionnaire was distributed via email to all enrolled students at Old Dominion University, located in Norfolk Virginia, during the summer of 2014. Data were collected which tapped into student's texting while driving behaviors, measured their respective levels of self-control, and ascertained demographical information. Results of the analysis indicated that self-control was a not significant predictor of texting while driving behavior when controlling for other factors. Suggestions for future research and limitations of this study are discussed.

In loving memory to my father, William Glen Gray

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CHAPTER 1

INTRODUCTION

United States Marine John Breen died on March 15, 2009. His mother wrote that "[i]t wasn't war that took JB [John Breen] from us. It wasn't a bullet or a bomb. It was a text message sent on a little 2" x 4" box that ended his life on a beautiful Sunday Afternoon" (Brown 2009:para 2). John suffered a fatal skull fracture after losing control of and crashing his vehicle while he was texting a friend.

Two-year old Calli Ann Murray was killed on December 1, 2010 as she and her mother walked hand-and-hand together across the street after spending time playing in a nearby park together (Calli Ann Memorial Foundation 2013). Her mother, Ling Murray, was critically injured and suffered numerous broken bones and fractures. Callie and Ling were hit by a car in which the operator, an 18 year old college student, was texting while driving (TWD) instead of paying attention to the road.

On February 20, 2011, 18 year-old Aaron Deveau fatally injured 55 year-old father of three Donald Bowley, when his car crossed the center lane and slammed into Bowley's car (Davis 2012). Phone records indicated that Deveau sent and received text messages within moments of the crash. Deveau was convicted of motor vehicle homicide by texting on June, 2012 and sentenced to 2 years in prison.

Taylor Sauer died on January 14, 2012 after crashing into a semi-truck going over 80 mph (Mims 2012). There was no indication that she applied her brakes before the crash. She had posted on the social networking site, Facebook, shortly before the crash and stated "I can't discuss this matter now. Driving and Facebooking is not safe!"

(Mims 2012:para 6). In addition to the Facebook messages, investigators found numerous incoming and outgoing text messages that were sent on her phone within moments of the crash.

Deaths and injuries resulting from TWD are becoming more common as the number of drivers who engage in this behavior have continued to escalate over recent years (Schroeder, Meyers and Kostyniuk 2013). Drivers who text and drive are 23 times more likely to crash (Drews et al. 2009; Smith 2011). In effect, sending or reading a text message while driving has been compared to driving blind at 55 mph across the length of a football field (Box 2009). TWD has also been found to be more dangerous and distracting than talking on a cell phone while behind the wheel (Libby, Chaparro and He 2013).

Sending or reading text messages while driving is also positively associated with other precarious driving behaviors, such as not wearing a seatbelt and drinking alcohol while behind the wheel (Olsen, Shults and Eaton 2013). In fact, the distraction level created for the driver when he or she is engaged in TWD is equivalent to having a blood alcohol content (BAC) of .08, the legal limit for intoxication (Advocates for Highway and Auto Safety 2013; Lehner, Singer and Heuy 2008). Additionally, TWD has been found to decrease braking reaction time by 18% and to increase the amount of time that a driver spends not looking at the road by upwards of 400% (Hosking, Young and Regan 2009).

Considering the above, the consequences of texting and driving have never been more pertinent concerns. Today there are more drivers and more technologies available for them than ever before, and although some technological advancements have proven

beneficial for drivers, others, such as text messaging, have and continue to cause great safety concerns (Hurts, Angell and Perez 2011). As more reports of crashes, injuries and deaths on America's roadways are attributed to TWD, calls for action have never been higher. Paralleling the manner in which drunk driving steadily became a social and legal issue during the late 20th century, the use of hand-held mobile communication devices while driving seems to be following suit in the beginning of the 21st century.

New laws and policies to combat TWD have been established and implemented at federal, state, and local levels, and overall public support for such endeavors have increased (Lehner et al. 2008; Presidential Documents 2009; Schroeder et al. 2013). Media campaigns, including radio and television spots, highway billboards, anti-text messaging while driving websites, and social networking websites are all publicizing the dangers of TWD. Recently, the state of New York went as far as to enact a measure to post upwards of 300 signs on the state's highways to direct drivers to 91 different locations where they can stop and text, referred to as texting zones (Holeywell 2013). Nevertheless, the overall percentage of drivers who indicate that they text while driving continues to increase even in the face of such efforts to combat the behavior (Schroeder et al. 2013).

Curiously, many drivers also report that even though they engage in TWD behavior, they perceive the behavior itself to be a dangerous one which increases the likelihood of a motor vehicle accident (Atchley, Atwood and Boulton 2011; Atchley, Hadlock and Lane 2012; Harrison 2011; Hurts et al. 2011; Lehner et al. 2008; Nelson, Atchley and Little 2009; O'Brien, Goodwin and Foss 2010; Walsh et al. 2008; Westlake and Boyle 2012). This apparent contradiction between driver perception and behavior

may be explained by attitude, as some research has concluded that driver attitude (one's assessment, either positive or negative, of engaging in a particular behavior), not perceived risk (such as acknowledging the increased likelihood of a crash) is the strongest predictor of TWD behavior (Nemme and White 2010; Walsh et al. 2008). Conceivably then, emphasizing the hazards of TWD in order to increase perception of danger may not be an effective deterrent. The energies placed into highlighting TWD dangers might be better served if they are directed instead toward discovering how TWD attitudes are shaped and why, even in light of known dangers, some individuals choose to engage in it.

One possibility may be that individuals with low levels of self-control are more likely to engage in TWD, even when their respective attitude toward the behavior is negative. Characteristics of a person with 'low self-control' include impulsiveness, a predisposition for immediate gratification, risk taking behavior, self-centeredness, and bad temperament (Gottfredson and Hirschi 1990). The theory of self-control stresses that persons with lower levels of self-control are more likely to participate in precarious behaviors then those with greater levels of self-control who, on the other hand, are more likely to adapt to societal standards. However, the extent to which an individual's level of self-control may effect TWD behavior is presently absent in the criminological literature and as such warrants a primary investigation.

The task of increasing safety on America's roadways by decreasing or eliminating TWD is as perplexing as it is challenging. However, examining factors that may play a pivotal roll in determining the likelihood of an individual engaging TWD is an important and necessary pursuit. As such, this study investigates the research question: to what

extent, if any, are drivers' behaviors with regard to sending and reading text messages while driving (through the use of hand-held wireless telecommunication devices) influenced by their respective level of self-control?

To effectively tackle the research question, the investigation proceeds, in Chapter 2, with a detailed literature review covering the history of texting, followed by an examination of the broader issue of distracted driving, and ends with specific focus on texting and driving. Chapter 3 discusses the theoretical framework which underpins the investigation by displaying previous theoretical research into TWD, the importance of social bond theory as a precursor to self-control theory, and presents self-control theory in full. The research methodology for the study, including survey design, data collection, measurement and analytical strategy are detailed in Chapter 4. Results of the statistical analyses are provided in Chapter 5, followed by a discussion of both the findings and limitations of the current study and suggestions for future research in Chapter 6.

CHAPTER 2

LITERATURE REVIEW

Throughout history, advances in technology have altered the way in which human beings communicate. Gutenberg's printing press, the telegraph, landline phone systems, pagers, email and cell phones have each reshaped social interactions. Similarly, texting is shifting communication patterns today, as cell phone use did a generation ago. The review of extant literature thus begins by tracing the historical and technological origins of texting, followed by an examination of texting while driving (TWD) as a serious form of distracted driving. Lastly, the review of literature focuses on TWD specifically. The theoretical framework for this study is discussed in Chapter 3.

HISTORY OF TEXTING

Texting, defined as a means of communication between cellular devices or between a cellular device and a computer, is simply the most recent form of wireless communication (Mobivity 2013). In fact, "the first form of text messaging is often considered to be Morse telegraphy, which transmitted messages via radio signals before the 1900s" (Abdilova 2011:103). During the 1930s, Teleprinter Exchange integrated the first global network that allowed for text communication between teleprinters and users reached 1.1 million across 155 countries by the end of the 1970s (Abdilova 2011). The development of the facsimile in the 1970s overshadowed teleprinters with their increased speeds and lower costs. Fax machines remained popular throughout the 1980s and 1990s

until personal computers began digitalizing documents, allowing for faster and easier text transfers.

Throughout the early 1980s, the Groupe Spécial Mobile (GSM) formed to develop and implement a European mobile telephone system (Baron 2009) and unintentionally created an base infrastructure for text messaging. According to Baron (2009:4):

> The system was in operation by 1992. Almost as an afterthought, a bit of leftover bandwidth was made available (originally, at no cost) on which users might create short messages on the small phone keypad by hitting the number keys between one and four times to produce alphabetic characters. This Short Message System (SMS) soon became extremely popular, especially with teenagers and young adults.

The first text message that incorporated a cellular device occurred on December 3, 1992 when Neil Papworth used his computer to text Richard Jarvis's mobile phone (Mobivity 2013). The text plainly said "Merry Christmas." In 1993, the first cell phone with texting capabilities was manufactured by Nokia and, by 1995, .04 messages per user were sent on average per month in the United States (Mobivity 2013). This number jumped to 35 messages sent per user on a monthly basis by the year 2000 as cell phones could now send messages between different carriers and some devices had full keyboards, thus making the procedure of creating texting messages easier.

By 2007, the number of texts sent or received each month per user in the United States overtook actual phone calls, averaging 218 texts per month versus 213 phone calls per month. In 2010, texting became even more commonplace than instant messaging, social networking and face to face communication (Lenhart et al. 2010). More recently, the International Association for the Wireless Telecommunications Industry (CITA) reported that, for all users, 2.19 trillion text messages were sent in the United States

(including Puerto Rico, U.S. Territories and Guam) in 2012 at an average of 171.3 billion per month (CTIA 2013). Comparatively, these numbers were 48.1 billion per month in 2007, and only 1.2 million per month in 1997.

While all age groups use cell phones for text messaging, young people have particularly embraced this technology. Ninety-five percent of individuals aged 18 to 24, the largest group of those who text, own a hand-held mobile device and 97% of them use the device for texting (Smith 2011). This cohort averages about 3,200 texts per month per user, almost 110 per day, and sends or receives text messages at an average 23 times greater than that of those over the age of 65. "Generation Txt," referring to those born between 1990 and 1999 (Calcutt 2001; Crispin and Thurlow 2003), are also the group most likely to incorporate new technologies into their social lives and normalize their use. This is certainly the case with hand-held wireless communication devices and, in particular, cellphones and smartphones which provide the means needed to send and receive text messages.

The economic and social benefits of new advancements in technologies such as text messaging are profound. Although these types of innovations bring promises of increased speeds and ease of communication, they can also come with a high price as can presently be seen on our nation's roadways. Sequentially, both cellphone use while driving and TWD have become legal issues. The Insurance Institute for Highway Safety's Highway Loss Data Institute (IIHS-HLDI) reports that currently 12 states have banned the use of a hand-held cellphone while driving, 37 states restrict use by novice drivers (first year drivers), and 21 states, as well as the District of Columbia, prohibit cellphone use while driving a school bus (IIHS-HLDI 2013). Sending or receiving text

messaging while driving is presently prohibited in 41 states and the District of Columbia for all drivers, in 6 states for novice drivers (drivers having a learning permit or a provisional license), and in 3 states for school bus drivers. Numerous localities have also placed their own restrictions on the use of hand-held mobile telecommunication devices while driving.

Nationally, TWD bans became primary offenses (meaning that law enforcement officers can stop vehicles for that offense alone) in all US states in October of 2013 (Governors Highway Safety Association 2013). Federal employees, on the other hand, have been banned from reading or sending text messages while driving government vehicles and while using government issued electronic devices in personal vehicles since October 1st, 2009 (Presidential Documents 2009). At the international level, 66 countries currently have bans on using a hand-held mobile phone while driving in any manner, and 5 countries, including the United States, have prohibited the use of these devices for any purpose while driving in at least one state (Hanson 2013; Ranny 2008; Walsh et al. 2008).

The enactment of recent laws aimed at combating TWD and the increased public campaigns and overall awareness regarding the dangers of the behavior has yet however to permeate into the field of criminology with respect to the establishment of analytical inquiry into the issue. In fact, there is paucity of research with respect to existing criminological studies on TWD. For instance, specific queries into Criminal Justice Abstracts, Sociological Abstracts, and National Criminal Justice Reference Service Abstracts databases, as well as, general Internet searches garner no results. On the other hand, ProQuest Dissertations, Sage, Oxford, and APA PsycNet databases produce the

majority of related scholarly research available, most of which is situated in the Journals of *Accident Analysis and Prevention* and *Traffic Injury Prevention*, and the *American Journal of Public Health.*

In comparison, a search using the above noted databases, with the exception of a general Internet search, for criminological research on drinking and driving provide over six thousands results. This overall lack of criminological research into TWD is disconcerting. The increasing numbers of injuries and deaths attributed to the behavior more than warrant examination of the topic. Moreover, the indication that the awareness of the dangers of texting and driving do not act as a deterrent for those who choose to engage in the activity not only demands that research into the behavior be undertaken, but also calls into question what, if any, affect can be garnered through public awareness campaigns and other efforts for limiting the behavior that are focused on touting its hazardous consequences.

Safety on America's roadways has been a criminal justice issue since motor vehicle and traffic laws were passed early in the 20th century. In fact, one of the primary roles of state police agencies is to enforce traffic laws and deter would be violators. The State Police force in Virginia for example:

> ...was conceived [in 1919] with the passing of The Automobile Acts which stated that the Commissioner of Motor Vehicles and his assistants are vested with the powers of sheriff for the purpose of enforcing the provisions of this law. (Schneider and Virginia State Police 2014:para 12)

Along with the State Police, governmental organizations such as the National Highway Traffic Safety Administration (NHTSA), established by the Highway Safety Act of 1970 (NHTSA 2014), focus on motor vehicle and highway safety in order to prevent injury and death. In turn, uncovering the etiology of TWD behavior may lead to the development

and implementation of effective strategies aimed at preventing the conduct and consequentially averting the harm that it causes.

DISTRACTED DRIVING

Sending or reading text messages while driving is one of many forms of driver distraction. Other forms of driver distraction include the use of a cell phone to make or receive calls, the use of a hand-held mobile device to surf the internet or send and receive emails, using maps and navigation systems, the use of the car stereo, talking to others in the vehicle, personal hygiene, and eating and drinking (Official US Government Website for Distracted Driving 2013). Driver distraction as a whole is a significant source of auto accidents and, consequentially, a major contributor to what the World Health Organization (2011) states will be the 5th leading cause of death worldwide by 2030. In the United States, 7 teens (ages 16-19) die from cars crashes every day and it is the leading cause of death for this cohort (University of Michigan Transportation Research Institute 2012).

To place this in perspective, at any given moment during the daylight hours in the United States roughly 660,000 persons, or .21% of all licensed drivers, are being distracted as a consequence of using electronic devices while driving (Office of Highway Policy Information 2012; Pickrell and Ye 2013). Though this percentage is seemingly small, the number is worrisome when consideration is given to the fact that one driver distraction alone, that of using a cell phone while driving, increases crash culpability by 70% (Asbridge, Brubacher and Chan 2013). In addition, the most recent data available from the NHTSA stated that, in 2011, driver distraction was responsible for 3,331

automotive fatalities and 387,000 injuries (NHTSA 2013). The NHTSA defines driver distraction as a type of inattention that distracts the operator of the vehicle from the primary task of driving and further refines 'distraction' into the following taxonomy:

> [1] Visual distraction: Tasks that require the driver to look away from the roadway to visually obtain information; [2] Manual distraction: Tasks that require the driver to take a hand off the steering wheel and manipulate a device; [3] Cognitive distraction: Tasks that are defined as the mental workload associated with a task that involves thinking about something other than the driving task. (NHTSA 2010:3-4)

Although the NHTSA is not the only source that has provided a clarification of the distracted driving concept, other researchers have embraced similar definitional constructs. For example, Hurts et al. (2011:4) stress that driving requires operators of vehicles to multitask and use a multitude of cognitive, visual, and manual resources while doing so, and define distracted driving as:

> ...the occurrence of any event or object (either inside or outside the vehicle) or driver activity, driving related or not, physical or mental, that claims part or all of the driver's attentional resources, voluntary or not, and divert the driver from what is needed to maintain the safety of the driver or other road users. By attentional resources, we mean cognitive, perceptual, or motor resources that are related to human attentional processes.

In the same vein, Klauer et al. (2006:xiv), defined driver distraction as occurring "[w]hen a driver has chosen to engage in a secondary task that is not necessary to perform the primary driving task." All three definitions focus on a critical point: distracted driving involves a diversion away from the principal activity of operating the vehicle. In addition, both the NHTSA (2013) and Hurts et al. (2011) include the further refinement of the concept in terms of three differing types of distraction: cognitive, manual and visual.

Such is the case that each of the above noted resources are required when sending or receiving text messages while driving. Consequently, engagement in the behavior is a particularly treacherous form of distracted driving. In fact, TWD is considered to be the most problematic form of driver distraction because it requires these manual, visual and cognitive resources from the driver (Hurts et al. 2011; NHTSA 2010; NHTSA 2013).

TEXTING AND DRIVING

Although criminological research on the subject of texting and driving is void, linking the findings from various data sources, studies, and reports can provided a baseline from which to investigate the issues, behaviors and perceptions of those who may or may not choose to engage in the conduct. For the purposes of the currently study, the act of TWD is defined as a task in which a driver manually manipulates a cellular device (cell phone or smartphone) using one or both hands to enter in alphanumeric data or to read alphanumeric data that has been sent to his or her cellular device while the vehicle is operation.

In the United States alone, between 2002 and 2007 there was an increase of over 16,000 fatalities resulting from sending or reading text messages while driving (Wilson and Stimpson 2010). The National Safety Council (NSC) estimates that as many as 694,000, or 13% of all motor vehicle crashes in 2011 were a likely consequence of TWD (National Safety Council 2012). According to the 2012 Distracted Driving Survey, the overall percentage of those who indicate that they text while driving is increasing (Schroeder et al. 2013). The latter noted upsurge is particularly the case for teen and young adult drivers, as they are the group most likely to send or receive text messages

while driving, as well as, the group most likely to be involved in traffic accidents. For example, Nelson, Atchley and Little (2009) found that 99% of the 276 college students in their study owned a cell phone and 72% of them indicated that they engage in text messaging while driving at least some of the time.

In the same vein, O'Brien, Goodwin and Foss's (2010) North Carolina study of high school teens also concluded that most teens text while driving; in addition, most teens feel that it is a dangerous activity to engage in when operating a motor vehicle. Similarly, Harrison's (2011) self-report study of college students in the United States who were categorized as frequent drivers indicated that most all (91%) reported that they send or read text messages while driving. Most of the these same respondents believed that such behavior should be against the law and is very dangerous.

Banning the use of hand-held mobile devices while driving does not necessarily mean that the behavior will subside. A recent study on the North Carolina cell phone ban indicated that the law has not had any effect and, in fact, indicated that teenagers seem to be switching to texting more than talking (Goodwin, O'Brien and Foss 2012). Others advocate in-vehicle voice and text messaging system requirements, such as via the use of Bluetooth technology, as these systems have been found to require less cognitive and visual resources from the driver. However, both are still more distracting from the primary task of driving than baseline (without their use) and, as such, also contribute to an increased likelihood of a motor vehicle accident (Owens, McLaughlin and Sudweeks 2011).

The majority of research concerning TWD has been conducted by governmental organizations, such as the NHTSA and the Governor's Highway Safety Administration

(GHSA), insurance agencies, such as the IIHS-HDLI and State Farm Research Center (SFRC), University research centers, such as the Virginia Tech Transportation Institute (VTTI) and the University of Michigan's Transportation Research Institute (UMTRI), as well as, scholars of psychology, public health, transportation, linguistics and communication. In terms of data collection, for instance, the NHTSA uses three data sources in particular: the Fatality Analysis Reporting System (FARS) [fatal crash data census], the National Automotive Sampling Systems (NASS) General Estimates System (GES) [police reported crashes], and National Motor Vehicle Crash Causation Survey (NMVCCS) (NHTSA 2010). In addition, most of the studies on texting and driving have taken the form of observation, crash, and experimental studies in design (Ranny 2008).

Texting as a means of wireless communications has numerous benefits, such as ease and speed of communication. However, like many technologies there can be detrimental aspects as well. The consequences of TWD are clear: it is a dangerous behavior that can and does result in both injury and death. Furthermore, the numbers of those who TWD are increasing, surpassing that of those driving while intoxicated, and many who TWD admit that they are completely aware of the dangers yet continue to engage in the behavior. With the intention of discovering why individuals engage in such life threatening behavior, the perplexing nature of TWD demands that an investigative pursuit involve a theoretical framework. As discussed in the following chapter, self-control theory will provide just such a foundation for the current study.

CHAPTER 3

THEORETICAL FRAMEWORK

This chapter explores the extant theoretical research with respect to TWD that is currently available across multiple academic disciplines and highlights the absence of criminological research into the subject. Subsequently, social bond theory is presented and discussed as a precursor of self-control theory. TWD is then examined within the context of the self-control theory as the perspective is suggested to be an significant predictor on the likelihood of engagement in TWD behavior.

PREVIOUS RESEARCH

Most of the studies that have included a theoretical underpinning with respect to sending or receiving text messages while driving have implemented a psychological perspective referred to as the Theory of Planned Behavior (TPB) to predict TWD (see: Nemme and White 2010; Zhou et al. 2012). Initially proposed as the Theory of Reasoned Action, TPB postulates that "performance of a behavior is a joint function of intentions and perceived behavioral control" (Ajzen 1991:185). In this scenario, intentions are derived from individual attitudes (positive or negative) toward the behavior, as well as, both the subjective and social norms which are relevant to him or her.

Although several studies of the TPB have validated the TPB in the context of TWD, other researchers have come to different conclusions. For example, Bayer and Campbell (2012:2087) found that "habitual orientations" or being on "automatic" predicts TWD. In essence, the driver is unaware they are engaging in the behavior.

Another test of the TPB, using a cognitive and affective mindfulness scale, found that 1/3 of the participants texted while driving and that the behavior to text and drive was positively related to lower mindfulness (Feldman et al. 2011). Low mindfulness is defined as difficulty managing emotions.

TPB is not, however, the only theoretical framework that has been utilized with respect to examining TWD. Atchley et al. (2011) used the theory of cognitive dissonance in a replication of an earlier study by Nelson, Atchley and Little (2009) and found that perceived risk does not seem to affect predisposition for engaging in TWD. Results from this study indicated that 70% of participants specified that they initiated a text while driving, 81% indicated that they replied to a text while driving, and 92% noted that they read a text while driving. In addition, most agreed that texting in general is more dangerous than talking on a hand-held mobile device (Atchley et al. 2011). With consideration in respect to cognitive dissonance theory, the authors suggest that those who initiate a text are more likely to use cognitive dissonance in order to justify the act of reading or sending a text while driving since they had a choice to engage in the behavior. For example, reclassifying driving conditions as being safer than they actually were.

Though psychological theories can be informative, the lack of criminological theoretical insight to date is disconcerting. TWD is not simply a traffic infraction, it is an injurious and often deadly behavior and, paralleling drinking while driving, can result in serious criminal charges such as vehicular homicide. Considering the latter, it is suitable to employ one of the most robust criminological theories as the framework in which to investigate TWD, Gottfredson and Hirschi's (1990) theory of self-control. Also known as low self-control theory and the general theory of crime, the theory of self-control

postulates that all forms of deviant and/or criminal behavior can be explained by an individual's level of self-control. Self-control theory was developed largely from a prior a related perspective, having strong roots in social bond theory.

SOCIAL BOND THEORY

The origins of low self-control theory are found in one of the most well-known and tested control theories of crime, social bond theory. Originating with Travis Hirschi's (1969) work entitled *Causes of Delinquency,* social bond theory posed a very different question than had previous criminological theories. Instead of asking why or what motivates people to commit crime, such as in the case of strain or cultural deviance theories, control theorists posed the alternative view by asking why most people *don't* engage in criminal and/or delinquent activities.

Previous work by control theorists, such as Reiss's (1951) identification of personal and social controls, Nye's (1958) conceptualization of direct, indirect and internal controls, and Matza and Sykes's (1957) techniques of neutralization, each contributed in one respect or another to Hirschi's later development of social bond theory. Particularly important is the conceptualization of the controls that help to maintain one's bond to society. The overarching idea here however is not new, in fact, the suggestion that control plays an important role in human behavior, in particular that of the likelihood to commit criminal and/or deviant acts, dates back to Hobbesian notions of the social contract and, more widely acknowledged, the Durkheimian concept of anomie (Durkheim 1951, Hobbes 1651).

According to Hirschi (1969), delinquency results when an individual's bond to society is weak or broken. This bond can take the form of several varying types of relationships that an individual has to societal groupings, such as the family, school, religion, hobbies, jobs, and peers. The bond that one has to one or more of these social groupings is made up of four elements. These elements are conceptualized as attachment, commitment, involvement, and belief, respectively.

Attachment refers to an individual's relationship with friends, family, and social institutions. It also acknowledges sensitivity toward others as an important factor, stressing that non-delinquents have rich and meaningful relations with others because they have developed the ability to empathize (Hirschi 1969). On the other hand, a lack of attachment can free individuals from moral restraints and predispose them to deviant behaviors because an individual with no attachments has not internalized those norms of society which are based on the shared wishes and expectations of other members.

The element of commitment is the rational component of conformity and implies that individuals make decisive considerations with regard to engaging in either conventional or deviant behavior based on the amount of 'stake' they have in conformity (Hirschi 1969). This is particularly the case when considering the effect of one's behavior on their occupation and/or education. Those invested heavily in conventional avenues of life are much less likely to risk hurting and/or losing those investments by engaging in criminal behavior(s).

Involvement refers to how often and to what extent an individual participates in conventional activities (Hirschi 1969). Spending a great deal of time working, studying, and associating with friends and family leaves little room for one to also engage in

deviant behavior or to even consider engaging in it. Simply put, one becomes too busy or too consumed in conventional behaviors to engage in nonconventional ones. The element of belief refers to the endorsement of conventional lines of behavior and general societal norms, particularly that individuals should be obedient to the law because they believe it to be morally correct. The assumption is that the less a person believes he or she should obey social norms and laws the more likely they are to be predisposed to violate them.

Hirshi (1969) also notes that there are relationships among the elements of the social bond. For example, a person who is attached to others that engage in conventional activities are more likely to be involved in those same activities and more likely to accept conventional lines of behaviors. Interestingly however, attachment and commitment are often suggested to be inversely related, as in the case of the lower-class boy who breaks free of his attachments and is thus more likely to be upwardly mobile. Commitment and involvement are related as can be seen in the obvious link between occupational and educational advancement and involvement in conventional behaviors. Lastly, attachment and belief are related as can be seen through the development of respect in children for adults, especially their parents, and the acceptance of their rules.

Social bond theory, as do all control theories in general, showcases the importance of identifying and examining the factors that control and/or bond individuals to conventional lines of behavior. From this perspective it is also noted that all human beings are innately weak and the social bonds and controlling facets in society are what keep individuals from engaging in deviant behaviors. This latter perspective is a stark contrast to the assumption that underlies social learning theories, which postulate that

individuals are socialized and instead learn to engage in unconventional activities from others. Partly due to much criticism that their theoretical concepts were not operationalized and thus untestable in the real world, Gottfredson and Hirschi (1990) expanded on their theory of social bond and proposed the general theory of crime, often referred to as self-control theory.

SELF-CONTROL THEORY

The reimagining of social bond theory into the general theory of crime incorporated elements of social bond, routine activities, and rational choice theories and implied that 'low self-control' is the cause of crime (Gottfredson and Hirschi 1990). The concept of 'self-control' itself refers to the variances found between individuals with respect to their facility to resist crime and analogous behaviors. Gottfredson and Hirschi (1990) proposed that low self-control levels are traced to ineffective parenting early in the life course which are primarily a result of improper or non-existent disciplining and monitoring techniques, as well as a lack of affection. This proposition parallels, contextually, having a weak attachment bond. In fact, Hirschi (2004) later stated that social bonds are merely an expression of self-control.

Gottfredson and Hirschi's (1990) general theory postulates that individuals with lower levels of self-control are more likely to participate in hazardous behaviors then those with greater levels of self-control who, conversely, are more likely to adapt to societal standards. The authors describe characteristics of a person with 'low self-control' that include impulsiveness, a predisposition for immediate gratification and pleasure from both criminal and non-criminal acts, risking taking behavior, a preference

for simple tasks rather than complex ones, a preference for physical activities rather than mental activities, self-centeredness, and bad temperament. Contrariwise, individuals with high self-control display little to none of these latter characteristics.

Indeed the theory is 'general,' as it sweeps a broad stroke across behavior and "is meant to explain all crime, at all times, and, for matter, many forms of behavior that are not sanctioned by the state" (Gottfredson and Hirschi 1990:117). However, Gottfredson and Hirshi (1990) did not propose a method in which to measure self-control, leaving other researchers to criticize the theory as tautological as the only way to identify if an individual has low self-control would be to measure it after they committed a crime (Akers 1991; Tittle 1991). To alleviate this, Grasmick et al. (1993) developed what would become one of the most commonly used and powerful measures of self-control. As displayed in Table 1, the measure consists of twenty four items broken into six dimensions (impulsivity, simple tasks, temper, risk taking, self-centeredness, and physical activities) and comprising four questions each that, taken cumulatively, provide an effective and consistent measure of a person's level of self-control.

The operationalization of "self-control" and the creation of a dependable scale gave way to real world testability of self-control theory and numerous empirical tests of the perspective have found support for the theory with respect to a wide range of criminal and delinquent behaviors (see Arneklev et al. 1993; Arneklev, Elis and Medlicott 2006; Chapple 2005; Gibbs, Giever and Martin 1998; Higgins and Boyd 2008; Higgins et al. 2012; Keane, Maxim and Teevan 1993; Lilly, Cullen and Bell 2011; Perrone et al. 2004; Piquero and Tibbetts 1996; Reisig and Pratt 2011). In particular, Pratt and Cullen's

Table 1. Components and Indicator Statements of Self-Control (survey questions 22A-23L)

Component and Indicator Statements
Impulsivity
I often act on the spur of the moment.
I don't devote much thought and effort to preparing for the future.
I often do whatever brings me pleasure here and now, even at the cost of some distant goal.
I'm more concerned with what happens to me in the short run than in the long run.
Simple Tasks
I frequently try to avoid things that I know will be difficult.
When things get complicated, I tend to quit or withdraw.
The things in life that are easiest to do bring me the most pleasure.
I dislike really hard tasks that stretch my abilities to the limit.
Risk Taking
I like to test myself every now and then by doing something a little risky.
Sometimes I will take a risk just for the fun of it.
I sometimes find it exciting to do things for which I might get in trouble.
Excitement and adventure are more important to me than security.
Physical Activities
If I had a choice, I would almost always rather do something physical than something mental.
I almost always feel better when I am on the move than when I am sitting and thinking.
I like to get out and do things more than I like to read or contemplate ideas.
I seem to have more energy and a greater need for activity than most other people my age.
Self-Centered
I try to look out for myself first, even if it means making things difficult for other people.
I'm not very sympathetic to other people when they are having problems.
If things I do upset people, it's their problem, not mine.
I will try to get the things I want even when I know it's causing problems for other people.
Temper
I lose my temper pretty easily.
Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.
When I am really angry, other people better stay away from me.
When I have a serious disagreement with someone, it's usually hard for me to talk about it without getting upset.

(2000:952) meta -analysis examined 21 studies that included empirical tests of the general theory of crime and found substantial support for the theory, adding that ...future research that omits self-control from its empirical analyses risks being misspecified." Self-control theory is not, however, solely limited to crime and delinquency, as the perspective is touted to be applicable to any deviant, hazardous or imprudent behavior. Indeed, numerous empirical tests have been conducted with such consideration, such as, college student drinking and binge drinking behaviors (Gibson, Schreck and Miller 2004; Wolfe and Higgins 2008), drunk dialing, public flatulence, and public profanity (Reisig and Pratt 2011), eating disorders (Harrison, Jones and Sullivan 2008), speeding and not wearing seatbelt (Forde and Kennedy 1997), digital piracy (Higgins et al. 2012; Marcum et al. 2011; Morris, Johnson and Higgins 2009; Vandiver, Bowman and Vega 2012), employee deviance (Langton, Piquero and Hollinger 2006), perceptions of prescription drug use (Ricketts and Higgins 2007), self-reported delinquency (Unnever, Cullen and Pratt 2003), disruptive classroom behavior (Nelson and Boisvert 2011), and smoking and gambling (Arneklev et al. 1993).

The popular Grasmick et al. (1993) self-control measure is not, however, without its critics. This is particularly the case with respect given to the unidimensionality of the measure. Some scholars have demonstrated, through the use of exploratory factor analysis and structural equation modelling, that the scale is not an effective aggregate measure of self-control and, instead, actually forms a 6 scale disaggregated measure (Brownfield and Sorenson 1993; Cochran et al. 1998; Higgins 2007; Lagrange and Silverman 1999). Others, such as Marcus (2004), argue that the Grasmick et al. (1993) scale simply does not measure what it intends to as the core construct of self-control is

and has been misspecified. Despite these criticisms, there remains overwhelming support in respect to the internal consistency, validity and reliability of the scale as an effective measure of self-control.

Although the primary focus of the current study is situated in measuring driver level of self-control and its predictive power with respect to the likelihood of engaging in TWD behavior, several familial-based items were also queried from respondents in order to probe the underlying etiology of self-control's influence on driver behavior, including parental texting behavior as well as safe driving discussions. As previously noted, Gottfredson and Hirschi (1990) traced the origins of low self-control to parental deficiencies in child rearing. They also stressed that by ages 8-10 years an individual's level of self-control is and would remain constant throughout the life course. This position, which has found support in the literature (see Gibbs et al. 1998; Perrone et al. 2004; Wright and Cullen 2001), was later retracted by Hirschi (2004) when he allowed that individuals can and do make rational cost calculations before engaging in any particular act as a premise of self-control.

Other researchers have concluded that effective parenting can weaken the association between self-control and deviance far into a child's teenage and college years (Higgins and Boyd 2008; Na and Paternoster 2012) and, in a similar vein, teen driving behaviors have also been associated to what they think about their parents' driving habits and what they see them do behind the wheel (University of Michigan Transportation Research Institute 2012). Harper (2012), for example, found that those teens who do not send or read text messages while driving are more likely to have discussed safe driving

with their parents then teens who do text and drive. Additionally, considering the dimension of risk as it relates to driving behavior:

> Parental attitudes and behaviors can have a significant influence on risk taking by adolescent drivers. Parents provide access to motor vehicles and establish driving privileges, thereby controlling when, how often, and under what circumstances teens drive. (Beck, Shattuck and Raleigh 2001:3)

Accordingly, it is appropriate in this research to include items that tap into familial-based aspects of texting behavior. Probing parental driver behavior along with driver level of self-control will allow for a more effective investigation into the nature of TWD behavior.

Although there is a lack of existing criminological research into TWD, support for self-control theory as a valid and effective predictive measure for the likelihood of engaging in hazardous behaviors is strong. Thus, self-control theory will be used to gain predictive insight into TWD behavior by incorporating the Grasmick et al. (1993) self-control measure along with family based measures that tap into social learning and social control into the broader online questionnaire on TWD which is detailed in the subsequent chapter.

CHAPTER 4

RESEARCH METHODOLOGY

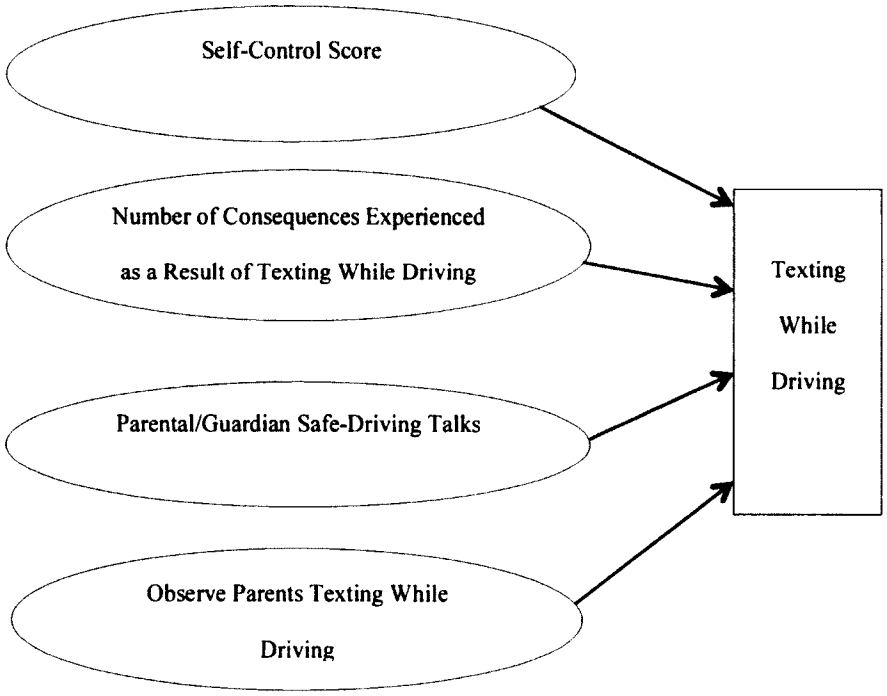
As previously indicated, this study investigates the following research question: to what extent, if any, are drivers' behaviors with regard to sending and reading text messages while driving (through the use of hand-held wireless telecommunication devices) influenced by their respective level of self-control? Specifically, the theoretical framework suggests the following hypothesis: (H1) individuals with low self-control are more likely to report having engaged in TWD during the past week then are individuals with high self-control.

Several key constructs were identified as a result of the review of the literature and the theoretical framework discussed in the preceding chapters and are reflected in the survey. As displayed in Figure 1, these constructs include perception of the dangerous of texting while driving, parental/guardian safe driving talks, and consequences incurred as a result of texting while driving. Age and gender are included as control variables. This chapter details the methods and measurements used to test the aforementioned hypothesis.

DATA COLLECTION

The data for this investigation were collected using an online/web-administered survey (Appendix A). Participation in the survey was requested via student emails and sent campus wide (census) to all students who were registered for classes for either the summer or fall 2014 semesters at Old Dominion University in Norfolk, Virginia.

Figure 1. Conceptual Diagram of Key Variables of Interest and Relationship to Dependent Variable of Texting While Driving



The utilization of student populations to gather data and test criminological theories has been quite common in past research undertakings (Payne and Chappell 2008; Wells et al. 2012). As noted by Payne and Chappell (2008:183), the practice of using student samples to gather data for criminological based investigations is advantageous for the because:

> students are easily accessible;
> student samples are cost-and time-efficient;
> researchers can measure change fairly easily with students;
> students are people too;
> students reflect culture;
> students tend to be close to the age category most often involved in crime/deviance;
> students can learn from the research process.

In addition, student samples have previously been employed to specifically test self-control theory (Piquero, MacIntosh and Hickman 2000; Ricketts and Higgins 2007).

The implementation and use of computer technologies for both the researcher and the respondents makes online surveys possible (Christian, Parsons and Dillman 2009; Couper 2000; Dillman 2000; Dillman and Smyth 2007). Limitations, such as the digital divide and technological problems, can and do pose difficulties with respect to non-response rates and sampling errors. However, numerous pitfalls can be avoided by using a convenience sample of college students. One of the primary benefits of using online/web-based instruments with this population is that all individuals in the sample have access to both a university email account and a computer (Christian et al. 2009).

The online/web-based survey instrument for the current study was presented in the form of an anonymous questionnaire which was designed and distributed using the Qualtrics (2014) survey software, one of the foremost online/web-based survey providers. The Qualtrics software is embedded into the University's network system allowing for

the graphical design of the survey to maintain the appearance of the University's online presence (Appendix B). This provided a recognizable visual format to students. To garner participation in the survey, multiple campus wide emails were sent via Qualtrics to students using their respective "username@odu.edu" email. Student emails were obtained from Old Dominion University's Office of Assessment and uploaded into the Qualtrics system for the study.

The email correspondences (see Appendix C) contained a brief overview of the study's focus, a request to complete the survey with a link to the instrument, a statement ensuring anonymity of participation, a statement indicating that participation is completely voluntary, contact information for the principal investigator and dissertation director, and information pertaining to the monetary incentive for participation. In order to maintain anonymity, the online questionnaire did not collect any personally identifiable information. In addition, with respect to the incentive to participate in the online survey, each student who completed the questionnaire was directed to a separate webpage to be registered into one or more of four random drawings for the chance(s) to win one or more $100 Visa Gift Cards.

At the end of each of the four weeks that the survey was available, one student who participated in the survey and filled out the incentive entry form was randomly selected to win a $100 Visa Gift Card. Students who completed the online/web-based questionnaire earlier had more chances to win as they were eligible for each consecutive drawing. The use of incentives, such as gift cards and other monetary awards, are valuable techniques to employ as they have been shown to increase survey response rates

(Christian et al. 2009, Groves, Presser and Dipko 2004, Ritter and Sue 2007, Wells et al. 2012).

Information regarding the incentive was also provided in the body of the email and in the subject line of the email. In order to maintain anonymity but also be able to contact the winner, participants were redirected after completing and submitting their questionnaire responses to a separate web page on which they could fill out and submit the entry form (see Appendix D) for the chance to win. At a predetermined time after each drawing, the respective winner was notified via email and phone. A series of follow up emails were sent to notify students during each of the four weeks that the survey was available and to inform them of their remaining chances to win. Follow up emails are also significant as they may, and often do, increase response rates (Ritter and Sue 2007).

MEASUREMENT INSTRUMENT AND VARIABLES

The online questionnaire contained eight sections. Preceding the first section, respondents were informed of the following:

> For the purposes of this survey, 'texting' is defined as a means of communication between a cellphone (or smart-phone) and 'driving' is defined as anytime the car or truck is 'running' and you are in the driver's seat; this includes being stopped in traffic or at a stop light or stop sign, but not while parked in wait, such as at a curb or in a driveway. 'Texting while Driving' is defined as the act of using a cell/smart phone to send or read text messages while driving.

Following the baseline information, the first section of the instrument, entitled *Car and Driver Information*, requested car and driver related information from respondents by asking them about the number of miles and hours, on average, that they drive each week (Appendix A: survey questions 1 to 2). Miles driven and hours spent driving were measured as continuous variables. Respondents were additionally queried in this section

as to whether or not the vehicle that they drive has blu-tooth technology which allows for the reading and sending of text messages verbally instead of keying in text messages by hand (survey question 3) . The response anchors for this variable included the following series of possible answer choices, (1) yes and I use blu-tooth technology most of the time for reading and sending text messages, (2) yes but I do not use blu-tooth technology most of the time for reading and sending text messages, (3) no, (4) not sure, and (5) I do not drive.

Section two of the instrument, *Perception of and Influences on Texting While Driving*, focused specifically on TWD and used a series of Likert-type scale response anchors to assess the level of agreement with specific statements regarding the dangerousness of TWD (both reading and sending text messages) in general, as well as in comparison with talking on a smart/cell phone while driving (survey questions 4 and 6). The items and responses were displayed as a matrix and the response anchors included the following statements, coded 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree).

> It is very dangerous for me to read text messages while driving.
> Compared to talking on a cell phone while driving, it is more dangerous for me to read text messages while driving.
> It is very dangerous for me to send text messages while driving.
> Compared to talking on a cell phone while driving, it is more dangerous for me to send text messages while driving.

Factors influencing the decision to read and send text messages while driving were also probed in section two (survey questions 5 and 7). Respondents were asked how likely road conditions (e.g., weather, construction), heavy traffic, risk of fines, and police presence would influence them with respect their decisions about whether or not to read or sent text messages while driving. These factors were displayed in a matrix and the

response anchors included the following choices, (1) very unlikely, (2) unlikely, (3) likely, and (4) very likely.

Section three of the questionnaire, *Texting While Driving Behavior*, focused on texting and driving habits during the past week and began by informing respondents with the subsequent information which focused on differentiating between reading, initiating and sending text messages while behind the wheel:

> The following questions inquire about your texting and driving habits during the past week. Specifically, these questions ask whether or not you have initiated, read, and/or replied to text messages while driving during the past week. Reading a text message while driving is defined as using your cell/smart phone to read a text message that was sent to your cell/smart while you were driving. Initiating a text message while driving is defined as using your cell/smart phone to send a new text message while you were driving. Replying to a text message while driving is defined as responding to a text message that was sent to your cell/smart phone while you were driving.

Specifically, respondents were queried in section two by asking them if they had initiated, read, and/or replied to text messages while driving during the past week (survey questions 8-11). These variables were each measured dichotomously and contained 'yes' or 'no' as the only response anchors. Those respondents who answered 'yes' were branched to three follow-up questions, each of drilled down more precisely by asking them how often during the past week had they initiated text messages while driving, how often had they read text messages while driving during the past week, and how often had they had replied to text messages while driving in the past week, respectively. The response anchors for the preceding queries included the following statements, coded 1 (rarely), 2 (sometimes), 3 (most of the time), 4 (always), and 5 (not applicable). Respondents who indicated that they had not initiated, read, and/or replied to text

messages while driving during the past week were skipped to the subsequent series of questions in section three.

The fourth section of the online questionnaire, *Consequences of Texting While Driving*, probed both the consequences resulting from, and the recklessness created by, TWD (survey question 12). The latter information was acquired through the employment of the following fifteen specific items, measured as dichotomous variables (coded 0 for no and 1 for yes), which requested the respondent to specify whether she/he had ever:

> Run a stop sign while you were texting?
> Damaged your vehicle because you were texting?
> Hit something other than another car because you were texting?
> Hit another car because you were texting?
> Gotten injured from a car accident because you were texting and driving?
> Injured someone else because you were texting and driving?
> Drifted into another driving lane because you were texting?
> Texted while a passenger or passengers were riding in your vehicle?
> Texted while you were driving with a child or children in your vehicle?
> Been so distracted by texting that you know you are being reckless?
> Held up traffic because you were texting?
> Were honked at by another driver because you were texting and driving?
> Scared yourself because you were texting and driving?
> Scared someone else because you were texting and driving?
> Almost caused an accident because you were texting while driving?

Respondents were also asked in this section to indicate whether or not they had ever received a ticket for texting while driving and, if so, how many tickets they had received and approximately when was their most recent ticket was received (survey questions 13 to 15). Having ever received a ticket was measured dichotomously (yes/no), while number of tickets received was measured as a continuous variable. Most recent ticket received was measure with the following response anchors , (1) in the past week, (2) in the past month, (3) in the past year, and (4) more than one year ago.

Section five of the online/web-based questionnaire, *Parents and Peers*, focused on the parent(s)/guardian(s) of the individual respondents, as well as, their respective friends and peers. With consideration to parent(s)/guardians(s), the questionnaire inquired as to whether or not participants had spoken with their parent(s)/guardian(s) about safe driving, as well as, the dangers associated with TWD (survey questions 16 and 17). The responses were measured dichotomously, coded 0 for no and 1 for yes, and asked the following specific questions:

> Have your parent(s) or legal guardian(s) talked with you about safe driving?
> Have your parent(s) or legal guardian(s) talked to you about the dangers of texting while driving?

Respondents were also queried in section five as to whether or not they had observed their parents(s)/guardians(s) and/or friends texting while driving (survey questions 18 and 20). These variables were each posed dichotomously, having yes/no response anchors. Individuals who answered yes to either one or both of these variables were then branched off and additionally asked how often they had witnessed their parents(s)/guardians(s) and/or friends engage in TWD behavior (survey questions 19 and 21). The number of times the conduct was witnessed was captured using the following response anchors, (1) rarely, (2) sometimes, (3) most of the time, and (4) always. Individuals who responded that they had not observed their parents(s)/guardians(s) or friends texting while driving were filtered directly into the subsequent section of the survey.

Section six of the online/web-based questionnaire, *Self-Control*, utilized the Grasmick et al. (1993) developed self-control measure to access respondents' levels of self-control (survey questions 22 and 23). As displayed in Table 1 in Chapter 3, the measure consists of 24 questions broken into 6 dimensions (impulsivity, simple tasks,

temper, risk taking, self-centeredness, and physical activities) containing four questions each that, taken cumulatively, provide a valid and reliable measure of an individual's level of self-control as conceptualized by Gottfredson and Hirschi (1990). Using Likert-type response anchors, each of the 4 items within each dimension is measured based on the level of agreement (coded 1-4 for strongly disagree, disagree, agree, or strongly agree, respectively) to each corresponding item statement.

To measure the temper component for instance, statements regarding anger and disagreements are posed, whereas, the risk-taking component is measured by level of agreement responses to declarations concerning excitement, risk, and adventure (Grasmick et al. 1993). Computing each score together on all self control items results in composite self control measure with a range of 24-96. Lower scores are indicative of higher levels of self-control and higher scores are indicative of lower levels of self-control.

The seventh section of the questionnaire, *Qualitative Reponses*, posed two open-ended questions and were exploratory in nature (survey questions 24 and 25). Respondents were provided with an expanding text box and not limited in terms of length for their answers. Although not central with respect do resolving the research question, these variables were gathered opportunistically with an expectation of future use in related investigations on TWD. The first of these two questions asked for the respondent to indicate what he or she thought were the three main reasons people text and drive? The second query posed the following:

> Many people believe that texting while driving is dangerous but do so anyway, thereby putting themselves and others at risk. Why do you think this is so?

The eighth and final section of the survey, *Demographics*, measured basic demographic information of sex, age, race/ethnicity, and student college level (survey questions 26 to 30). Sex was measured as a dichotomous variable, coded 1 for female and 2 for male and age was measured as a continuous variable. Student college level was categorized as freshman, sophomore, junior, senior, graduate student, non-degree seeking student, and other, and correspondingly coded 1-7. To capture the most representative data for race and ethnicity, the latest typology and response anchors used by the US Census Bureau (Humes, Jones and Ramirez 2011) were employed (survey questions 29-30) . The 'yes, another' category found in the Hispanic, Latino, or Spanish Origin question and the 'other Asian,' 'other Pacific Islander,' and 'some other race' categories found in the race variable were all posed as open-ended choices.

Upon completing the development and design of the questionnaire and effectively implementing it into the Qualtrics software system, the instrument was critiqued by several fellow doctoral students which resulted in a few minor changes in terms of item ordering and question phrasing. The research design and online/web-based survey instrument were approved by ODU's College of Arts and Letters Human Subjects Review Committee on March 7, 2014.

SCALING AND RELIABILITY

In order to test whether or not TWD behavior could be predicted by an individual's level of self-control, several scales were implemented for the subsequent analyses. The measurement scale for self-control, having already been developed by Grasmick et al. (1993) was checked for reliability. Scales for consequences of texting

while driving and perceptions of the dangerousness of texting while driving were each created utilizing multiple relevant questionnaire items and checked for reliability.

Reliability analyses and scale development are reported in the following sections. Cronbach's Alpha levels are reported for each scale, as well as resulting alphas if each item were deleted from the scale, item means and standard deviations. Cronbach's Alpha is a reliability coefficient ranging between 0-1 which measures the internal consistency of items that are grouped together in measuring a single construct. Scores closer to 1 are superior with .70 or higher being considered acceptable (Field 2013).

Self-Control

Numerous steps were undertaken in order to both validate the Grasmick et al. (1993) measure with the current sample and to make the scale itself more manageable with respect to interpretation. The 24 individual items making up the self-control measure were reverse coded and computed together resulting in a scale with a range of 24-96. Lower scores on this index denote respondents with lower levels of self-control and, in turn, higher scores are indicative of individuals with higher levels of self-control. As displayed in Table 2, a reliability analysis conducted on the scale with the current study's data resulted in a Cronbach alpha coefficient of .869.

Consequences of Texting While Driving

The consequences of TWD scale was created using the following 13 items (survey questions 12 and 13) pertaining to consequences of TWD reported as experienced by respondents:

Table 2. Reliability Analysis of Self-Control Items: Range, Mean, SD, and Alpha if Item Deleted (survey questions 22A-22L and 23A-23L)

Item (range 1-4 low/high self-control)	Mean	SD	Alpha if item deleted
Alpha = 0.869			
I often act on the spur of the moment.	2.68	.755	.864
I don't devote much thought and effort to preparing for the future.	3.50	.679	.865
I often do whatever brings me pleasure here and now, even at the cost of some distant goal.	3.17	.721	.860
I'm more concerned with what happens to me in the short run than in the long run.	3.31	.685	.863
I frequently try to avoid things that I know will be difficult.	2.94	.736	.864
When things get complicated, I tend to quit or withdraw.	3.23	.671	.864
The things in life that are easiest to do bring me the most pleasure.	3.03	.711	.863
I dislike really hard tasks that stretch my abilities to the limit.	3.23	.673	.863
I like to test myself every now and then by doing something a little risky.	2.44	.804	.864
Sometimes I will take a risk just for the fun of it.	2.74	.831	.861
I sometimes find it exciting to do things for which I might get in trouble.	3.12	.822	.861
Excitement and adventure are more important to me than security.	3.22	.725	.861
If I had a choice, I would almost always rather do something physical than something mental.	2.80	.736	.865
I almost always feel better when I am on the move than when I am sitting and thinking.	2.41	.771	.867
I like to get out and do things more than I like to read or contemplate ideas.	2.44	.793	.866
I seem to have more energy and a greater need for activity than most other people my age.	2.65	.797	.871
I try to look out for myself first, even if it means making things difficult for other people.	3.17	.727	.863
I'm not very sympathetic to other people when they are having problems.	3.36	.748	.865
If things I do upset people, it's their problem, not mine.	3.32	.694	.864
I will try to get the things I want even when I know it's causing problems for other people.	3.41	.642	.861
I lose my temper pretty easily.	3.15	.791	.863
Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.	3.40	.708	.861
When I am really angry, other people better stay away from me.	3.14	.815	.862
When I have a serious disagreement with someone, it's usually hard for me to talk about it without getting upset.	2.85	.890	.864

N = 2,374

Regarding texting and driving, have you ever....?
- Run a stop sign while you were texting?
- Damaged your vehicle because you were texting?
- Hit something other than another car because you were texting?
- Hit another car because you were texting?
- Gotten injured from a car accident because you were texting and driving?
- Injured someone else because you were texting and driving?
- Drifted into another driving lane because you were texting?
- Held up traffic because you were texting?
- Were honked at by another driver because you were texting and driving?
- Scared yourself because you were texting and driving?
- Scared someone else because you were texting and driving?
- Almost caused an accident because you were texting while driving?
- Ever received a ticket for texting while driving?

Each of these items was coded as 1 = yes and 0 = no and then all were added together to form a Consequence of TWD Scale with a range of 0 – 13. Scoring 0 on the measure indicates no dangerous consequences have been incurred as a result for TWD and higher scores indicate more instances of danger experienced. As presented in Table 3, a reliability analysis was conducted on the scale with the current study's sample population which resulted in a Cronbach alpha coefficient of .734.

ANALYTICAL STRATEGY

The scaled measure of self-control functioned as the key independent variable for this investigation into TWD. The analytical plan followed several steps, utilizing the SPSS Version 20 statistical software package. The first step involved cleaning the data by checking for any errors in the data file. All categorical and continuous variables were inspected by examining valid and missing cases, frequencies, means, and minimum and maximum values. These procedures were done in order to discover if any values were outside of the acceptable ranges.

Table 3. Reliability Analysis of Consequences Experienced as a Result of Texting While Driving Items: Range, Mean, SD, and Alpha if Item Deleted survey questions 12A-12G, 12K-12O and 13)

Regarding texting and driving, have you ever....? (range 0-1 no/yes)	Mean	SD	Alpha if item deleted
Alpha = 0.734			
Injured someone else because you were texting and driving?	.01	.079	.733
Gotten injured from a car accident because you were texting and driving?	.01	.074	.733
Hit another car because you were texting?	.03	.161	.725
Hit something other than another car because you were texting?	.03	.160	.725
Damaged your vehicle because you were texting?	.02	.154	.725
Almost caused an accident because you were texting while driving?	.09	.283	.700
Received a ticket for texting while driving?	.00	.065	.738
Run a stop sign while you were texting?	.03	.169	.725
Drifted into another driving lane because you were texting?	.40	.490	.709
Been honked at by another driver because you were texting and driving?	.16	.368	.697
Scared someone else because you were texting and driving?	.13	.332	.701
Scared yourself because you were texting and driving?	.35	.476	.698
Held up traffic because you were texting?	.23	.421	.703

N = 2,374

The second step in the analytical plan consisted of the interpretation and description of the sample characteristics and comparison to the overall University target population. Step three entailed the reporting of univariate statistics and bivariate correlations and lastly, a series of binary logistic regressions were employed in order to test the hypothesis (H1) that individuals with low self-control are more likely to report having engaged in TWD during the past week then are individuals with high self-control. The subsequent chapter details the results of the aforementioned step-by-step analysis.

CHAPTER 5

RESULTS

This chapter presents the results of the data analysis identified in the preceding chapter. Requests to complete the survey were sent electronically to the target population via email over a one month period during August of 2014. After the initial email was delivered, three more subsequent reminder emails were then distributed during each of the preceding weeks to those individuals who had not yet completed the instrument as of that respective email date. Overall, the data needed very little cleaning. Forced responses were used for all measures in this research.

The total number of respondents who started the online/web-based survey instrument was 3,191, yielding a response rate of 12.85%. Of those who started the survey, 2,567 respondents completed the entire questionnaire, resulting in a completion rate of 80.4%. Sixty-one individuals who indicated that they did not drive were omitted from the study, as well as 51 cases in which likely erroneous responses were found (39 respondents indicated driving more than 30 hours per week, 7 individuals specified driving 0 hours per week, 3 persons reported driving 0 miles per week, and 2 individuals indicated driving more than 2,000 miles per week). In addition, 2 items, questions Q4a and Q4b on the survey instrument, were posed in a matrix and accidently set to allow multiple responses. Cases that reported more than one response on either of these 2 variables were thrown out and only single responders were kept. This led to the deletion of 81 cases and resulted in total sample size of 2,374 (9.56% of the target population).

SAMPLE CHARACTERISTICS AND UNIVARIATE ANALYSES

According to the most recent information provided by ODU's Office of Institutional Research and Assessment (2014), there were 24,828 individuals enrolled at the University as either full-time (16,957) or part-time undergraduate (7,871) or graduate students during the time period of the questionnaire's deployment. With the omission of 7 individuals who did not report gender, females constituted 13,629 of the individuals in the overall target population, or 54.9%, whereas males accounted for 11,192 persons in the populace, or 45.1%. Both education and age were recoded in the sample data to match the categories provided by the University demographical data in order to showcase comparisons between the sample percentages and the University target population percentages.

Demographics

Table 4 presents demographic data that compares the sample of respondents to the University's student body as a whole. Generally, the sample is highly representative of the target population with similar dispersions on all demographic variables except for that of freshmen class standing and gender. Quite a dramatic difference was found with respect to freshman, as the sample only consisted of 2.3% of respondents indicating freshman standing, whereas freshman made up 18.6% of the overall University population (Office of Institutional Research and Assessment 2014). This discrepancy may have to do with the fact that the survey was sent out during the end of the summer term.

Table 4. Descriptive Statistics of Sample and University Population (survey questions 26-30)

Characteristics	Mean	SD	Min.	Max.
Age (Sample)	27	9.5	17	66
Age (University Population)	26	n/a	n/a	n/a

Variable	Sample %	University %
	N = 2,374	N = 24,828
Age		
Under 18	.5	.5
18-21	34.3	40.8
22-24	18.2	21.4
25-34	28.7	23.5
35-44	10.3	8.2
45-59	7.2	5.1
60 and Up	.8	.5
Sex		
Female	66.3	45.1
Male	33.7	54.9
Race		
White	62.1	54.2
Black	23.2	23.1
Other	14.7	22.7
Education level		
Freshmen	2.4	18.6
Sophomore	13.0	13.0
Junior	21.3	18.3
Senior	34.9	26.7
Graduate	24.5	14.8
Non-Degree Seeking	2.1	5.6
Other	1.9	1.9

n/a - data not available for university population

Females were almost twice as likely as males to have completed the online/web-based survey instrument. Over half of the respondents, as would be expected when targeting a population of college students, fell into the 18-24 age range. The mean age, however, was 27 years and can be attributed to the large number of older students who are returning students, attend the University's numerous graduate programs, and/or distance learning offerings.

Car and Driver Information

Overall the sample is telling of a cohort that spends a great deal of time behind the wheel. Seventy percent of individuals report driving at least 50 miles per week and almost half, 49.7%, report spending at least 5 hours driving per week. Table 5 displays descriptive information about respondents' driving habits with respect to average number of miles and hours reported driving each week, as well as their car's technological capabilities.

The use of blu-tooth technology was very limited among respondents. A majority (73.1%) reported that their respective vehicle did not have this technology and a substantial proportion (16.1%) of individuals indicated that, although their vehicle does have blu-tooth technology, they do not use it. Although this technology is becoming more common, it is still associated with more expensive and newer automobiles which are vehicle characteristics not generally linked with the younger college students who constitute such a large portion of the sample.

Table 5. Descriptive Statistics of Car and Driver Information (survey questions 1-7)

Question	%	Mean	SD	Min	Max
On average, approximately how many **miles** do you drive each week?		142.2	134.8	1.0	2,000.0
On average, approximately how many **hours** do you drive each week?		7.1	5.8	.3	40.0
Does the vehicle that you drive have **blu-tooth technology** which allows for the reading and sending of text messages **verbally** instead of keying in text messages by hand?					
Yes and use	7.5				
Yes but do not use	16.1				
No	73.1				
Not sure	3.3				

N = 2,374

TWD Dependent Variable

The dependent variable, TWD, is measured from survey questions 8-11. Table 6 presents results that were anticipated with respect to TWD, displaying that the common reporting trend for the majority of respondents (64%) was that of having initiated, read, and/or sent text messages while driving in the past week. As previously noted in Chapter 3, initiating text messages requires the most use of driver resources and as such is more dangerous to engage in, followed by replying to and then reading text messages. The level of dangerousness associated with each of the latter noted forms of TWD and the amount of engagement in those behaviors by respondents are negatively related, with more individuals engaging in less precarious TWD actions. In sum, although majority of respondents engage in TWD, most of these individuals are engaging in the less dangerous from of this behavior.

Perceptions of Texting While Driving

The overwhelming majority of respondents (92.9%) indicated that they either agreed or strongly agreed that it is dangerous to read texts while driving as presented in Table 7. Similarly, the vast majority (95.6%) of individuals also reported that they either agreed or strongly agreed that it is dangerous to send texts while driving. Respondents also perceived TWD to be more potentially hazardous than using a cell phone while driving. Ninety four percent of respondents either agreed or strongly agreed that reading texts while driving was more dangerous than talking on a cell phone while driving and 95.6% either agreed or strongly agreed that sending texts while driving is more dangerous then talking on a cell phone while driving (survey questions 4A-4B and 6A-6B).

Table 6. Descriptive Statistics of Texting While Driving (survey questions 8-11 and 12H-12I)

Question	N	%
In the past week did you **initiate**, **read**, or **send** text messages while driving?	2,374	
Yes		64.6
During the past week when you were driving how often did you **initiate** text messages while driving?	1,533	
Always		1.5
Most of the time		6.7
Sometimes		36.3
Rarely		49.2
Not applicable		6.2
During the past week when you were driving how often did you **reply** to text messages while driving?	1,533	
Always		3.3
Most of the Time		16.0
Sometimes		45.1
Rarely		32.4
Not applicable		3.2
During the past week when you were driving how often did you **read** text messages while driving?	1,533	
Always		6.3
Most of the time		25.8
Sometimes		52.9
Rarely		14.7
Not applicable		.3

Table 7. Perception of the Dangerousness of Texting While Driving (survey questions 4A-4B and 6A-6B)

Question	% Strongly Disagree	% Disagree	% Agree	% Strongly Agee
It is very dangerous for me to **read** text messages while driving.	2.4	4.7	36.1	56.8
It is very dangerous for me to **send** text messages while driving.	1.3	3.0	31.3	64.3
Compared to talking on a cell phone while driving, it is more dangerous for me to **read** text messages while driving.	2.6	3.4	27.9	66.1
Compared to talking on a cell phone while driving, it is more dangerous for me to **send** text messages while driving.	1.5	2.9	24.5	71.1

N = 2,374

Although not surprising, it is interesting to note that in both areas, perception of danger and comparison to cell phones, respondents were slightly more likely to indicate sending texts while driving as more dangerous than reading text messages while driving.

Table 8 displays the likelihood that various environmental factors have in terms of influencing respondents' decisions to read and send text messages while driving and indicates that the vast majority of respondents are either likely or very likely to be influenced by these factors. More immediate circumstances, such as road conditions (weather and construction) and heavy traffic were reported as more likely influence whether or not respondents would read or send texts while driving then were either police presence or risk of fines. Although these latter two conditions are influential for most, it is logical that they are less significant overall as they are less likely to occur as frequently as poor road conditions involving weather or construction and times of heavy traffic.

Consequences of Texting While Driving

TWD, like any form of distracted driving, can have numerous consequences. Fortunately, the vast majority of respondents indicated that they had not incurred any damages to their vehicles, damaged other property, or had harmed themselves or any one else as a result of sending and/or reading text messages while behind the wheel. These consequences are considered more severe in comparison to the other items queried which were more highly reported, i.e., drifting into another lane, scaring yourself, scaring others, almost causing an accident, being honked at, holding up traffic or running a stop sign since they involve either damage to objects or physical harm to an individual.

Table 8. Environmental Influences on the Likelihood of Reading and Sending Text Messages While Driving (survey questions 5A-5D and 7A-7D)

Question	% Very Unlikely	% Unlikely	% Likely	% Very Likely
How likely are each of the following factors to influence whether or not you **read text messages** while driving?				
Road Conditions (weather, construction)	10.5	5.6	18.8	65.1
Heavy Traffic	8.7	8.2	24.8	58.3
Police Presence	13.0	10.7	22.5	53.8
Risk of Fines	17.6	25.8	24.4	32.1
How likely are each of the following factors to influence whether or not you **send text messages** while driving?				
Road Conditions (weather, construction)	10.8	5.7	16.6	66.8
Heavy Traffic	9.3	7.2	23.7	59.9
Police Presence	12.7	10.3	22.3	54.7
Risk of Fines	16.0	23.5	23.9	36.5

N = 2,374

Table 9 presents the descriptive statistics of consequences experienced as a result of TWD ranked by the percentage of those who reported having experienced the respective consequence. The most reported consequence overall (39.9%) is of respondents having drifted into another lane as a result of TWD, while the least reported consequence (.4%, n = 9) was that of having received a ticket for TWD. Eight individuals reported receiving 1 ticket and only 1 respondent stated that he or she had received 2 tickets for TWD. One respondent indicated receiving their most recent ticket for TWD within the past week of the time they took the survey, 1 within the past month, 4 within the past year, and 3 stated they had received a ticket from TWD more than one year prior. Table 10 presents descriptive statistics for the number of consequences experienced as a result of TWD and indicates that over half of the sample (56.4%) has incurred at least one consequence of TWD.

Peers and Parent(s)/Legal Guardian(s)

Discussions with parent(s) or legal guardian(s) about safe driving, both in general and more specifically with respect to texting while driving, was quite common for respondents overall as displayed in Table 11. Almost three quarters (73.7%) of the respondents in the sample indicated having talked with their parent(s) or legal guardian(s) about safe driving and more than half (60.9%) of all individuals indicated that their parents had spoken with them about the dangers of texting while driving. Although most respondents (69.2%) did not report observing their parent(s) or legal guardian(s) engaging in TWD, over half (59.2%) of those who did indicated that they observed their parent(s) texting while driving at least some of the time.

Table 9. Descriptive Statistics of Consequences Experienced as a Result of Texting While Driving (survey questions 12A-12G, 12K-12O and 13)

Regarding texting and driving, have you ever....?	% Yes
Drifted into another driving lane because you were texting?	39.9
Scared yourself because you were texting and driving?	34.7
Held up traffic because you were texting?	23.0
Been honked at by another driver because you were texting and driving?	16.1
Scared someone else because you were texting and driving?	12.6
Almost caused an accident because you were texting while driving?	8.8
Run a stop sign while you were texting?	2.9
Hit another car because you were texting?	2.7
Hit something other than another car because you were texting?	2.6
Damaged your vehicle because you were texting?	2.4
Injured someone else because you were texting and driving?	.6
Gotten injured from a car accident because you were texting and driving?	.5
Received a ticket for texting while driving?	.4

N = 2,374

Table 10. Descriptive Statistics for Number of Consequences Experienced as a Result of Texting While Driving

Number of consequences	% of Sample	Mean	Median	SD
0	43.6			
1	18.0			
2	14.9			
3	9.5			
4	6.3			
5	3.7			
6	2.1			
7	1.1			
8	.2			
9	.2			
10	.2			
11	.1			
12	.1			
		1.47	1.84	1.00

N = 2,374

Table 11. Descriptive Statistics for Safe Driving Talks with and Texting While Driving Observations of Parent(s) or Legal Guardian(s) (survey questions 16-21)

Question	N	%
Have your parent(s) or legal guardian(s) talked with you about safe driving?	2,374	
Yes		73.7
Have your parent(s) or legal guardian(s) talked to you about the dangers of texting while driving?	2,374	
Yes		60.9
Have you observed your parent(s) or legal guardian(s) texting while driving?	2,374	
Yes		30.8
How often have you observed your parent(s) or legal guardian(s) texting while driving?	732	
Always		2.2
Most of the Time		9.8
Sometimes		47.8
Rarely		40.2

Univariate Statistics on Scales of Interest

As discussed in Chapter 4, scales were constructed through the combination of questionnaire items and were central to the examination of the research question. The univariate statistics for each of these measures are presented in Table 12. The mean for the self-control score scale of 72.7 (range = 24-96) indicates a fairly high level of self-control on average for respondents. Not surprisingly, individuals tend to perceive TWD as a dangerous behavior to engage in as indicated by a mean score of 7.0 (range = 2-8) for the perception of dangerousness of texting while driving scale. Fortunately, the average number of consequences as a result of TWD is quite low overall for respondents at 1.5 (range = 0-12).

BIVARIATE ANALYSES OF TEXTING WHILE DRIVING BEHAVIOR

In order to determine if any statistically significant relationships existed between the dependent variable and the key variables and constructs of interest, several bivariate analyses were performed and are detailed in the subsequent sections. These procedures included a series of cross-tabulations and Chi-Square tests of significance and examined the demographic items (age, sex, race, education level) and the independent variables of interest (perception of dangerousness of texting while driving, environmental influences, parental factors, consequences of texting while driving) against TWD. Chi-square analysis tests for associations between categorical data by comparing expected and reported frequencies (Field 2013). In addition, Pearson's correlation coefficient was used for the bivariate analyses conducted on the scales of interest and TWD. Pearson's correlation coefficient standardizes the covariance between two variables and provides a

Table 12. Univariate Statistics for Scales of Interest

Scale	Mean	SD	Min	Max
Self-Control Score	72.71	8.98	28	96
Perception of Dangerousness of Texting While Driving	7.06	1.18	2	8
Number of Consequences Experienced as a Result of Texting While Driving	1.47	1.84	0	12

N = 2,374

value between -1 and 1 where values closer to -1 or 1 indicate stronger correlations. Negative values indicate that the variables are correlated in a negative direction and positive values indicate positive correlations.

Demographic Items and Texting While Driving Behavior

Table 13 presents the bivariate statics for the demographic variables by the dependent variable TWD. Younger age groups were more likely than older age groups to report having texted while driving in the past week. The 18-24 age cohort, for instance, contained the largest number or respondents (69.4%) in the sample who indicated having engaged in TWD behavior in the past week. In comparison, older respondents were much less likely to report having texted while driving in the past week. For example, of those 45 years of age or older (n = 190), only 34.8% reported engagement in TWD behavior in the past week. The relationship between age and TWD was statically significant (Chi Square = 80.98, $df = 6, p < .001$).

Respondent gender (Chi Square = 16.12, $df = 1, p < .001$), race (Chi Square = 6.87, $df = 2, p = .032$) and education level (Chi Square = 15.20, $df = 6, p = .019$) were also each shown to be associated with having engaged in texting while driving behavior in the past week. Females were more likely to report past week TWD than males and Blacks were slightly more likely to report engaging in texting while driving in the past week then were Whites. Surprisingly, with respect to education level, freshmen were the least likely cohort to report past week TWD behavior in comparison to all other educational groups. Additionally, freshmen were the only group to have less than half of respondents indicate engaging in TWD past week behavior.

Table 13. Demographic Items by Dependent Variable of Texting While Driving in the Past Week

Variable	% of Respondents	Texted While Driving During Past Week % Yes	X^2
Age			80.984**
Under 18	.5	50.0	
18-21	34.3	67.6	
22-24	18.2	72.9	
25-34	28.7	66.2	
35-44	10.3	55.3	
45-59	7.2	40.7	
60 and Up	.8	27.8	
Sex			16.122**
Male	33.7	59.1	
Female	66.3	67.4	
Race			6.873*
White	62.1	64.5	
Black	23.2	68.1	
Other	14.7	59.5	
Education level			15.199*
Freshmen	2.4	46.4	
Sophomore	13.0	61.2	
Junior	21.3	65.9	
Senior	34.9	66.6	
Graduate	24.5	64.1	
Non-Degree Seeking	2.1	73.5	
Other	1.9	54.5	

N = 2,374. **p<.001, *p<.05.

Perception of Dangerousness and Texting While Driving Behavior

The examination of respondent perceptions of the dangerousness of reading or sending text messages while driving in association with whether or not they had engaged in past week TWD behavior themselves resulted in some interesting outcomes as shown in Table 14. Statistically significant results are reported by perception of dangerousness and TWD. Although those who disagreed that reading or sending text messages while driving was very dangerous were most were likely to TWD, even those who agreed that is was dangerous also engaged in the behavior.

Parental/Legal Guardian Factors and Texting While Driving

As displayed in Table 15, statistically significant Chi-Square were found for three questions measuring parental instruction and behavior on TWD behavior. Interestingly, two of these were in unexpected directions. Respondents who indicated that they had discussed safe-driving with their parent(s) or legal guardian(s) were actually more likely to report past week TWD than those who had not discussed safe driving with their parent(s) or legal guardian(s). Similarly, individuals who reported that they had talked about the dangers of TWD with their parent(s) or legal guardian(s) were also more likely to have engaged in past week TWD than those who had not discussed the dangerous of TWD with their parent(s) or legal guardian(s). However, as expected, those individuals who indicated that they had observed their parent(s) or legal guardian(s) engage in TWD were more likely to report past week engagement in TWD then those respondents who did not specific that the had witnessed their parent(s) or legal guardian(s) read or send text messages while driving.

Table 14. Perception of the Dangerousness of Texting While Driving by Dependent Variable of Texted While Driving in the Past Week

Question	% of Respondents	Texted While Driving During Past Week % Yes	X^2
It is very dangerous for me to **read** text messages while driving.			222.143*
Strongly Agree	56.8	52.3	
Agree	36.1	80.3	
Disagree	4.7	93.7	
Strongly Disagree	2.4	61.4	
It is very dangerous for me to **send** text messages while driving.			219.892*
Strongly Agree	64.3	54.0	
Agree	31.3	83.3	
Disagree	3	95.8	
Strongly Disagree	1.3	62.5	

N = 2,374. *p<.001.

Table 15. Safe Driving Talks with and Texting While Driving Observations of Parent(s) or Legal Guardian(s) by Dependent Variable of Texted While Driving in the Past Week

Question	% of Respondents	Texted While Driving During Past Week: % Yes	X^2
Have your parent(s) or legal guardian(s) talked with you about safe driving?			13.415*
Yes	73.7	66.7	
No		58.6	
Have your parent(s) or legal guardian(s) talked to you about the dangers of texting while driving?			26.243*
Yes	60.9	68.6	
No		58.3	
Have you observed your parent(s) or legal guardian(s) texting while driving?			28.363*
Yes	30.8	72.4	
No		61.1	

N = 2,374. *p<.001

Consequences Experienced as a Result of TWD and TWD

The relationships between past week TWD behavior and the more serious consequences of TWD (those involving personal injury or damage to property) were not found to be significant with the exception of having hit something other than another car because you were texting while driving. In addition, as displayed in Table 16, having received a ticket was not found to be statistically significant either. However, those consequences considered less serve were found to be significant and included having run a stop sign while you were texting and driving, drifted into another driving land because you were texting, held up traffic because you were texting, been honked at by another driver because you were texting and driving, scared yourself because you were texting and driving, someone else because you were texting and driving, and almost caused and accident because you were texting and driving.

Bivariate Statistics on Scales of Interest

Pearson Correlations were conducted on the scales of interest and the dependent variable TWD and are presented in Table 17. Each of the three scales (self-control, number of consequences of experienced as a result of texting while driving, perception of dangerousness of texting while driving) were found to be significantly related with TWD. As expected, self-control is negatively related with TWD ($r = -.10, p < .001$). Though the relationship is not strong, lower self-control scores would be indicative of a higher likelihood to engage in TWD and higher self-control scores denote lower likelihood of past week TWD.

Table 16. Descriptive Statistics of Consequences Experienced as a Result of TWD (survey questions 12A-12G, 12K-12O and 13)

Regarding texting and driving, have you ever....?		% of Respondents	TWD During Past Week % Yes	X^2	
Drifted into another driving lane because you were texting?	Yes	39.9	85.0	287.43	***
	No		51.0		
Scared yourself because you were texting and driving?	Yes	34.9	82.0	167.54	***
	No		55.3		
Held up traffic because you were texting?	Yes	23.0	84.8	127.43	***
	No		58.5		
Been honked at by another driver because you were texting and driving?	Yes	16.1	87.4	104.00	***
	No		60.2		
Scared someone else because you were texting and driving?	Yes	12.6	88.0	82.37	***
	No		61.2		
Almost caused an accident because you were texting while driving?	Yes	8.8	89.0	59.75	***
	No		62.2		
Run a stop sign while you were texting?	Yes	2.9	78.6	6.78	*
	No		64.1		
Hit another car because you were texting?	Yes	2.7	73.0	2.02	
	No		64.3		
Hit something other than another car because you were texting?	Yes	2.6	80.6	7.18	**
	No		64.1		
Damaged your vehicle because you were texting?	Yes	2.4	74.1	2.38	
	No		64.3		
Injured someone else because you were texting and driving?	Yes	.6	66.7	.03	
	No		64.6		
Gotten injured from a car accident because you were texting and driving?	Yes	.5	53.8	.66	
	No		64.6		
Received a ticket for texting while driving?	Yes	.4	90.0	2.84	
	No		64.5		

N = 2,374. ***p<.001; **p<.01; *p<.05.

Table 17. Bivariate Correlations on TWD and Scales of Interest

Variable	1	2	3	4
1. Texting While Driving	1			
2. Self-Control Score	-.103**	1		
3. Number of Consequences Experienced as a Result of Texting While Driving	.330**	-.148**	1	
4. Perception of Dangerousness of Texting While Driving	-.280**	.132**	-.108**	1

**p<.01. Two Tailed.

The number of consequences experienced as a result of texting while driving was found to have a moderate positive relationship with past week TWD ($r = .33$, $p < .001$). Those reporting having incurred more consequences as a result of TWD are more likely to have engaged in the behavior during the past week. Perception of the dangerousness of texting while driving presents with a weak negative relationship to TWD ($r = -.28$, $p = p < .001$). In this case, the more dangerous TWD is perceived to be the more likely that past week TWD did not occur.

BINARY LOGISTIC REGRESSION ANALYSIS

Logistic regression is a form of multiple regression that is used when the dependent or outcome variable is categorical, allowing for the prediction of likelihood or odds of membership in one of the outcome variable's categories (Field 2013). In situations where the outcome variable has only two categories, as is the case with the dependent variable TWD in this study, the logistic regression is referred to as binary logistic. In turn, a series of binary logistic regression models were performed in order to test the predictive strength of the key independent variable, self-control score, on the likelihood of having engaged in texting while driving during the past week while also determining the impact of the each additional independent variable of interest in conjunction with self-control score.

Binary logistic regressions were performed on the dependent variable TWD, one with only the self-control score measure and six including self-control score with one of the other key independent variables. Categorical items were coded 0 for males, 1 for females, 0 for not having safe driving talks, 1 for having safe driving talks, 0 for not

having observed parent(s) or legal guardian(s) texting while driving, and 1 for having observed parent(s) or legal guardian(s) texting while driving. Though each of the regressions were significant, they were also all poor fits with respect to their predictive power on TWD as seen in Table 18. However, interpretation of the direction of the relationships between the independent and dependent variables, as well as the differences between model Nagelkerke R^2 values, allows for some insightful considerations and suggest further analysis.

Summarization of all the models indicates that respondents who have lower self-control scores, perceive TWD as less dangerous, have had safe-driving talks with parents, whose parents TWD, have higher numbers of consequences incurred as a result of TWD, are female or are younger, are, in all cases, more likely than their counterparts to report engagement in past week TWD behavior. More precisely, the negative relationship between self-control score and TWD was expected as the model indicates that individuals with lower levels of reported self-control are more likely to have reported engaging in TWD during the past week. For every unit increase in self control score the odds of reporting having engaged in past week TWD decrease by a 2%.

Surprisingly however, the number of consequences experienced as a result of texting while driving was shown to have a positive relationship with past week TWD. In this case, the odds of reporting past week TWD increases by a factor of 1.74 for additional consequence experienced. Perception of the dangerousness of texting while driving displayed a negative relationship, indicating that for each unit increase in perception of dangerousness the odds of having engaged in past week TWD decreases by 56%.

Table 18. Binary Logistic Regression Models of Texting While Driving on Each Independent Variable of Interest

Item		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Self-Control Score	Exp(B)	.98**	.99*	.99*	.98**	.98**	.98**	.97**
	B(s.e)	-.02(.01)	-.01(.01)	-.02(.01)	-.02(.01)	-.02(.01)	-.02(.01)	-.03(.01)
Number of Consequences Experienced as a Result of Texting While Driving	Exp(B)		1.74*					
	B(s.e)		.55(.04)					
Perception of Dangerousness of Texting While Driving	Exp(B)			.54*				
	B(s.e)			-.62(.05)				
Safe Driving Talks	Exp(B)				1.44**			
	B(s.e)				.04(.10)			
Observe Parents Texting While Driving	Exp(B)					1.61**		
	B(s.e)					.47(.10)		
Age	Exp(B)						.97**	
	B(s.e)						-.03(.01)	
Gender	Exp(B)							1.56**
	B(s.e)							.44(.09)
Nagelkerke R^2		.02	.18	.13	.02	.03	.04	.03
X^2		25.18	332.82	226.06	39.2	49.4	74.67	48.48
df		1	2	2	2	2	2	2

N = 2,374. **p<.001; *p<.01.

An unanticipated positive relationship is also found between having had safe driving talks with parents while observation of parents TWD behavior was found to be in the expected direction. Respondents who reported having had safe driving discussions with their parent(s)/parental guardian(s) were actually 1.44 times more likely to indicate engagement in past week TWD. Similarly, individuals who indicated that they had observed their parent(s)/parental guardian(s) engaging in TWD were 1.61 times more likely to report engagement in past week TWD.

Age and gender were also found to result in one expected and one unexpected outcome in terms of relationship directionality in the respective models. For each year increase in age the odds of reporting past engagement in TWD decreases by 3%. In terms of gender, females are 1.59 times more likely to report past week engagement in TWD than are males.

The Nagelkerke R^2 values indicate that although each of the models are weak overall in terms of explanatory power of past week TWD, two of the models had substantially more influence than the others. Specially, number of consequences experienced as a result of texting while driving and perception of dangerousness of texting while driving, each in conjunction with self-control score. Considering that self-control is not effective by itself in predicting past week TWD behavior and is more effective in conjunction with one of the independent variables, another series of binary logistic regressions were performed in order to further investigate if the inclusion of multiple independent variables in conjunction with self-score score might produce a better fitting model with respect to predicting past week TWD.

As displayed in Table 19, the first model included only the key independent variable, self-control score. The second model included the additional independent variables number of consequences experienced as a result of texting while driving and perception of the dangerousness of texting while driving along with self-control score. Model 3 included the aforementioned variables with the addition of safe driving talks and observe parent(s) or legal guardian(s) texting while driving. Lastly, gender and age were added into the fourth model providing for a full model which incorporated all of the independent variables.

Model 1 included self-control score alone and, although statistically significant, explained only 2% of the variance in past week TWD behavior and was considered a very poor fit. The second model was also significant but a poor fit and, interestingly, self-control is no longer statistically significant. However, this model, which included number of consequences experienced as a result of texting while driving and perception of dangerousness of texting while driving along with self-control score, explained substantially more (26%) of the variance in past week TWD. Model 3, which included the addition of safe driving talks and observe parents texting while driving, explained slightly more of the variance in past week TWD (27%) but again, self-control score is not significant in the model.

The addition of gender and age increased the variance explained yet again in the fourth model, but only slightly (28%). This full model was significant and had the most explanatory power in comparison to all previous regressions with respect to predicting past week TWD engagement. Self-control score was not significant in the full model and

Table 19. Binary Logistic Regression Models of Texting While Driving on Independent Variables of Interest

Item		Model 1	Model 2	Model 3	Model 4
Self-Control Score	Exp(B)	.98**	1	1	1
	B(s.e)	-.02(.01)	-.01(.01)	.00(.01)	.00(.01)
Number of Consequences Experienced as a Result of Texting While Driving	Exp(B)		1.70**	1.68**	1.67**
	B(s.e)		.53(.04)	.52(.04)	.51(.04)
Perception of Dangerousness of Texting While Driving	Exp(B)		.55**	.55**	.56**
	B(s.e)		-.59(.05)	-.59(.05)	-.59(.05)
Safe Driving Talks	Exp(B)			1.32*	1.15
	B(s.e)			.28(.11)	.14(.12)
Observe Parents Texting While Driving	Exp(B)			1.28*	1.11
	B(s.e)			.25(.11)	.10(.11)
Age	Exp(B)				.98**
	B(s.e)				-.02(.01)
Gender	Exp(B)				1.48**
	B(s.e)				.38(.10)
Nagelkerke R^2		.02	.26	.27	.28
X^2		25.18	501.87	515.19	541.62
df		1	3	5	7

N = 2,374. **p<.001; *p<.05.

the addition of age and gender negated the significant contributions found in model 3 with respect to both safe driving talks and observe parent(s) legal guardian(s) texting while driving.

Although self-control score alone was not found to be an effective predictor of the odds of past week TWD behavior in any of the models, further interpretation of the full model allows for additional characterizations of the likelihood of having engaged in TWD during the past week with respect to those variables found to have significantly contributed to the model. Being female and/or younger, for instance, significantly increases the odds of reported having engaged in TWD during the past week. Controlling for other factors in the model, the odds of having reported engagement in past week TWD increases by 48% for females. With respect to age, for each year increase in age the odds of a respondent indicating past week engagement in TWD decreases by 2%.

The number of consequences experienced as a result of texting while driving also increases the odds of having reported engaging in past week TWD behavior when controlling for other factors in the model. More specifically, for each additional consequence reported, the odds of reporting having texted while behind the wheel during the past week increases by 67%. In addition, controlling for other factors in the model, for each unit increase with respect to perception of dangerousness of texting while driving respondents were .56 times less likely to have reported engaging in TWD behavior during the past week.

To summarize, being female, young, having incurred more consequences as a result of TWD and perceiving TWD as less dangerous are more effective, though still very small, predictors of past week engagement in TWD than is one's level of self-

control. Although these outcomes were unexpected overall, there are several intriguing results that emerge. The latter findings are discussed in the subsequent chapter, as well as the limitations of this study, suggestions for future research and policy implications.

CHAPTER 6

DISCUSSION

The costs associated with TWD behaviors have never been more relevant concerns. Unfortunately, severe and numerous consequences attributable to TWD are becoming more commonplace (Drews et al. 2009; Hurts et al. 2011; Schroeder et al. 2013; Smith 2011). Even though new laws and have been established, such as state wide bans and the reclassification of TWD as a primary offense in October of 2014 (Governors Highway Safety Association 2013), more and more drivers report that they engage in the behavior, concurrently, research into the conduct is significantly lacking from the criminological literature. As reports of injuries and death increase and are paralleled by direct and indirect emotional and financial costs, it is important to uncover why, even in the face of disastrous potential consequences, individuals engage in this behavior. This study examined texting while driving behavior in the context of self-control theory by postulating that low self-control is a significant predictor of the conduct. As specified by self-control theory (Grasmick et al. 1993), persons with lower levels of self-control are more likely to partake in hazardous behaviors than are those with high levels of self-control.

This chapter first considers the major findings of the current study and what factors may be at the root of TWD behavior and, secondly, ruminates on the implications of this investigation with respect to self-control theory. The subsequent chapter will also expose both the limitations and challenges of the current study and provide discourse regarding how future investigations into TWD may be more effectively developed and

implemented. Lastly, implications for policy will be discussed based on the findings of this research with an emphasis on reducing or eliminating TWD.

FINDINGS

The sample was representative of the Old Dominion University population as a whole, with the exception of an overrepresentation of females and underrepresentation of freshmen. Most respondents indicated that they spent a great deal of time driving and although perceived TWD as a dangerous activity, indicated that they engaged in the behavior. Being female, young, having incurred more consequences as a result of TWD and perceiving TWD as less dangerous were all associated with an increased likelihood of past week TWD engagement.

Self-control was not found to be a significant predictor of TWD when controlling for other factors, although it was found to be significant at the bivariate level. The lack of support for self-control in this context is certainly an unexpected finding considering the amount of overall support that the theoretical proposition of self-control has gained as an etiological factor with respect to numerous other types of risky behaviors. Although the absence of a significant link between the likelihood to participate in TWD behavior and self-control does indeed diminish the strength of the theory as applied to this form of conduct, the interpretation of the findings still allows for an array of meaningful considerations.

The full regression model, which explained 28% of the variance in past week TWD participation, indicated that there were several significant associations outside of self-control. The direction and association found in reference to gender is quite

perplexing as it is counterintuitive to the results typically found in the criminological literature with respect to participation in deviant and/or criminal behaviors where males, rather than females, are overall more likely to engage in such conduct. Perhaps this indicates that females are more socially embedded with respect to communicative technologies than are males. The relationship found between the likelihood to report past week TWD and age, on the other hand, was expected and is consistent within the current literature.

In addition to both females and younger respondents being more likely to report to having engaged in TWD in the past week, those who had observed their parent(s) or legal guardians(s) reading texts while behind the wheel were also more likely to report the behavior. This parallels the earlier noted finding by the University of Michigan Transportation Research Institute (2012) which concluded that teen driving behaviors have been linked to what young people think about their parents' driving behaviors and what they see them do behind the wheel. Unexpectedly, having had safe-driving talks with parent(s) or legal guardian(s) was positively associated with past week TWD. This relationship is at odds with Harper's (2012) conclusions that teens who do not send or read text messages while driving are more likely to have discussed safe driving with their parents then teens who do text and drive. These findings are suggestive of socialization processes that may be better explored by way of alternate theoretical pathways which have a more extensive emphasis within that milieu, such as Aker's (1998) application of social learning theory (also see Bandura 1977) to deviant behaviors and/or integrated life-course theories, such as the age-graded theory of informal social control proposed by Sampson and Laub (1993).

The association between the odds of having engaged in TWD behavior in the past week and the perception of the dangerousness of reading and sending texts while driving was an unexpected finding in consideration of the previous research on TWD. As noted previously, drivers regularly report that even though they identify the behavior itself to be a hazardous one, they continue to participate in TWD activity (Atchley et al. 2011; Atchley et al. 2012; Harrison 2011; Hurts et al. 2011; Lehner et al. 2008; Nelson et al. 2009; O'Brien et al. 2010; Walsh et al. 2008; Westlake and Boyle 2012). In the current study, respondents who perceived sending or reading text messages while driving as very dangerous were less likely to engage in TWD than those drivers who did not perceive the behavior as dangerous. The overall increased public awareness and amplified media campaigns touting the dangerousness of TWD, as well as the enhanced penalties for TWD might very well be acting as informative deterrents and creating a more logical relationship between TWD perception and behavior. Then again, while these might have some effect, the fact remains that the majority of respondents in the sample (64.6%) reported that they had engaged in TWD behavior in the past week.

Perhaps the most remarkable finding uncovered by the present study pertains to those respondents who indicated that they had incurred dangerous consequences in the past due to TWD. These individuals were more likely to report having texted while driving in the past week than were those respondents reporting fewer to no dangerous consequences as a result of past TWD behaviors. Certainly, the more engagement one has in TWD behavior increases the likelihood for hazardous results, however this apparent relationship also begs the question as to why such dangerous outcomes do not act as deterrents with respect to the behavior. Perhaps, for this cohort, as Bayer and

Campbell (2012:2087) state, TWD is a matter of "habitual orientations" or being on "automatic," where the driver is unaware that they are engaging in the behavior. Or, TWD may be behavior that is extraordinarily commonplace while disastrous consequences are quite rare.

It is important to note that the consequence of TWD scale was developed by combining 13 items which each described hazardous situational results having come about as a result of TWD. Although the reliability analysis indicated strong internal consistently for the combination of these items, it may be that the scale itself is not unidimensional. Items that query vehicle damage and injury for example, may be better used to describe severe consequences as a result of TWD, whereas, items that ask about being honked at, scaring yourself, or lane drifting as a consequence of TWD may be more effective conceptually at describing light consequences. In turn, an exploratory principal components analysis would be warranted to determine if these items are measuring more than one dimension of TWD consequences. It is quite possible that those respondents who reported more severe consequences are less likely to have engaged in TWD in the past week then are those individuals who specified light consequences.

The link between self-control and various forms of criminal and/or impudent conduct is well documented. Behaviors such as binge drinking (Gibson et al. 2004; Wolfe and Higgins 2008), speeding and not wearing seatbelt (Forde and Kennedy 1997), self-reported delinquency (Unnever et al. 2003), and smoking and gambling (Arneklev et al. 1993) have all been significantly linked with self-control. The lack of effect of self-control on TWD in the current study is then, fairly surprising. As noted previously,

however, the Grasmick et al. (1993) measure of self-control has borne its share of criticism (Cochran et al. 1998; Higgins 2007; Marcus 2004) and one of these criticisms, that of questionable unidimensionality in particular, happens to parallel the implication set forth earlier with respect to the consequence of TWD measure.

The individual items that make up the self-control measure utilized in this study were developed based on interpretation of the overarching theory of self-control (Grasmick et al. 1993), a theory which stems from rational choice, social bond, and routine activities theories (Gottfredson and Hirschi 1990). Although some critics, such as Marcus (2004), have called into question the operationalization of self-control as a concept, suggesting that there has not been an acceptable and definitive agreement on what self-control is, the majority of concern with the theory is not *actually* with theory, but instead lies within its most prominent and utilized measurement tool and the claim that it is not unidimensional (see Brownfield and Sorenson 1993; Cochran et al. 1998; Higgins 2007; Lagrange and Silverman 1999). Perhaps then, while not supportive in the aggregate, there is more to be uncovered by disaggregating the measure of self-control as suggested by these critics.

There may also be a stronger, more encapsulating, factor at work that could potentially account for the overall lack of support found in this study for self-control alone as a powerful predictor of past week engagement in TWD behavior. As noted previously, "Generation Txt" refers to those born between 1990 and 1999 (Calcutt 2001; Crispin and Thurlow 2003) as this group consists of those individuals who are most likely to incorporate new technologies into their social lives and normalize their use. Indeed,

the current study found that respondents falling into this cohort reported more past week TWD behavior than did other respondents.

An increasing amount of research suggests that immersion in today's wide array of communicative technologies, such as computers and mobiles devices, may lead to habitual behaviors with respect to their usage (Khang, Kim and Kim 2013; Salehan and Negahban 2013; Tarafdar 2013); thus, there may be an underlying compulsion driving some individuals to engage in TWD. Put another way, the immersion of today's youth and young adults in such media may produce a need to stay connected or "wired in" at all times. Case in point, according to the International Center for Media & the Public Agenda (ICMPA) (2010:para 4), who studied the effects college student abstention from media for 24hrs, "most people could not stand to be without texting because they could not bear the thought of being excluded from anything their friends were doing." Certainly, if the continued exposure to and use of texting develops into an underlying urge to stay connected through media, then it is reasonable to propose that this factor may be at the root of TWD behavior or, at least, may play a role in reducing the strength of self-control as a predictor.

The longevity of such a compulsion is also of great concern. It may be a decade or more before we know the power of this idea of TWD as compulsive behavior rooted in a need to be "wired in" as that answer may be revealed in traffic fatality data. Younger drivers, much of which this sample falls into, have generally higher auto crash rates in comparison to older drivers and TWD can only augment the matter. If this behavior truly is compulsive, then crash rates will rise as younger cohorts age. Thus, time alone may help tell the story of TWD as compulsive behavior.

LIMITATIONS

This study collected data from currently enrolled students during the summer session of 2014 at Old Dominion University in Norfolk, Virginia and, consequently, generalizations based on this sample should be interpreted with caution as the sample may not be representative of other populations. While the sample was representative of the target population, the overall feature of any University population is of young adults. Young teen, middle age, and older drivers are thus not adequately represented.

The implementation and distribution of the survey instrument through the use of emails and internet protocol, although effective in many ways, can also be problematic. Certainly this method saves both time and money (not to mention trees) and, dependent on instrument design, can increase completion rates, but it can also be limiting. Perhaps some of the most obvious concerns are that emails are easy to ignore and, particularly with emails that request survey participation, are often treated as spam by the potential respondent and/or by the email software itself. In addition, as is the case with any technology, glitches can arise quickly and at any point in time, and data can be lost or corrupted with no hardcopies as backups.

In order to alleviate some the above concerns, the administration of both an online/web-based version of the questionnaire and a hardcopy form would be beneficial on numerous fronts. This would include the ability to tap students who may have more limited access and time to a computer, such as those students who do not have a personal computer and must use University computers labs where time may be more delegated specifically toward studies. In addition, considering that the questionnaire was distributed during a summer session, it may be more effective in future investigations of

this type to employ data collection methods during either the spring or fall terms when more students are actively attending classes and are subsequently more likely to be keeping up-to-date with University related email and activities.

SUGGESTIONS FOR FUTURE RESEARCH

Prospective criminological research into TWD should consider the findings in this research as guideposts in forthcoming examinations. To summarize these, being female, young, having incurred more consequences as a result of TWD and perceiving TWD as less dangerous are more effective, though relatively, predictors of past week engagement in TWD than is one's level of self-control. In turn, future studies may want to consider other theoretical frameworks in which to explore TWD and/or place more emphasis toward the other factors found as contributors to the behavior and what role they play, such as gender, consequences, perception, and familial characteristics in the likelihood to engage in TWD.

With respect to self-control, as discussed earlier, Gottfredson and Hirschi (1990) traced the roots of low self-control to parental deficits. In addition, effective parenting has been shown to weaken the association between self-control and deviance far into a child's teenage and college years (Higgins and Boyd 2008; Na and Paternoster 2012). Although this study included safe driving discussions with parent(s) or legal guardian(s) as an independent variable, it did not explore further relationships in the familial context that may play a role in the initial devolvement of self-control, such as abuse and/or neglect, and how these facets, in turn, may effect the likelihood to engage in TWD.

In addition, ecological conditions can and certainly do impact driver decision making. For example, respondent decisions to engage in either reading or sending text messages while driving were found to be influenced by road conditions (weather, construction), heavy traffic, risk of fines, and police presence. However, this research did not inquire specifically if these conditions impacted respondent TWD decision making during the past week and instead was a more generalized inquiry. A more precise examination of when and where these conditions occurred and their possible effects on the likelihood to TWD would most assuredly provide insightful information on this issue.

Furthermore, as technology is constantly changing, it would also be pertinent to include using smart cellular devices while driving for other purposes aside from TWD in future research. Social media apps, such as Facebook Messenger, Instagram and Twitter are becoming more and more popular and are often used instead of, or in conjunction with, the standard built in text message program found in smart phones. For example, defining TWD as any interaction with a message and response device while driving may be a more appropriate route in which to more accurately measure the frequency of these behaviors.

To conclude, forthcoming efforts focused on TWD should consider alternative theoretical approaches. In addition, a more encompassing examination of parental/legal guardian effects is justifiable, and environmental conditions should be investigated using more specific measures. Lastly, a reconceptualization of TWD may also be warranted in order to encompass the increasing number of alternative methods of smart phone communications that can be engaged in while behind the wheel.

POLICY IMPLICATIONS

As the number of injuries and deaths attributed TWD escalate (Schroeder et al. 2013) there is no better time to implement and continue endeavors to investigate TWD and enact and/or revise strategies aimed at reducing and/or eliminating the behavior. TWD is not just illegal, it is also considered the most dangerous form of distracted driving (Hurts et al. 2011; NHTSA 2010; NHTSA 2013) and despite increased awareness, media campaigns, and legal changes, TWD continues. This is not to say that current policies are ineffective, but instead that existing approaches might be better served through the consideration of other strategies.

It is important to note that both the media campaigns and legal changes directed at increasing public awareness about the dangers of TWD and penalizing individuals that engage in the behavior are still in their infancies and as such, the impact of these policies may not yet be measurable. In fact, this study identified that those individuals who engaged in TWD were more likely to view the behavior as less dangerous then those who did not TWD, overall however, most respondents reported engaging in TWD regardless of their perception of how dangerous it is. Likewise, both police presence and the risk of fines are indicated as factors that influence decisions to TWD, though other conditions, such as weather and road conditions may have a substantial effect on these choices. Thus, instead of being abandoned and/or quickly revised in some way, fines and police presence should continue.

The utilization of technology to help reduce the use of technology, fighting fire with fire so to speak, may also be a viable pathway with respect to efforts to reduce TWD. Applications, such as Live2Txt and DriveOFF, which are designed to block

incoming texts and calls on mobile devices while an individual is behind the wheel or to shut down notification alerts on the device after passing a certain speed, may also be an effective way to curb TWD behavior (Verizon Wireless 2015). Although these applications are fairly new, it may be that both awareness and use of them will increase in future.

It is also essential to note that respondents were more likely to report TWD if they have witnessed their parent(s) or legal guardian(s) engaging in the same behavior. Thus parents and legal guardians also need to take action, keeping in mind that children often do what they see rather than what they are told. In addition, an important three-fold thread also runs through the findings of this study that encapsulates a larger social phenomenon that may be central in the consideration of any future policies that are implemented to curb TWD. Younger individuals are the most likely to incorporate the use of new technologies into their everyday lives, have less experience behind the wheel, and are, in general, less likely to consider the consequences of their actions than are older individuals. Although it may be that increased awareness and penalties could begin to reduce TWD, the current trend is upward and thus demands attention.

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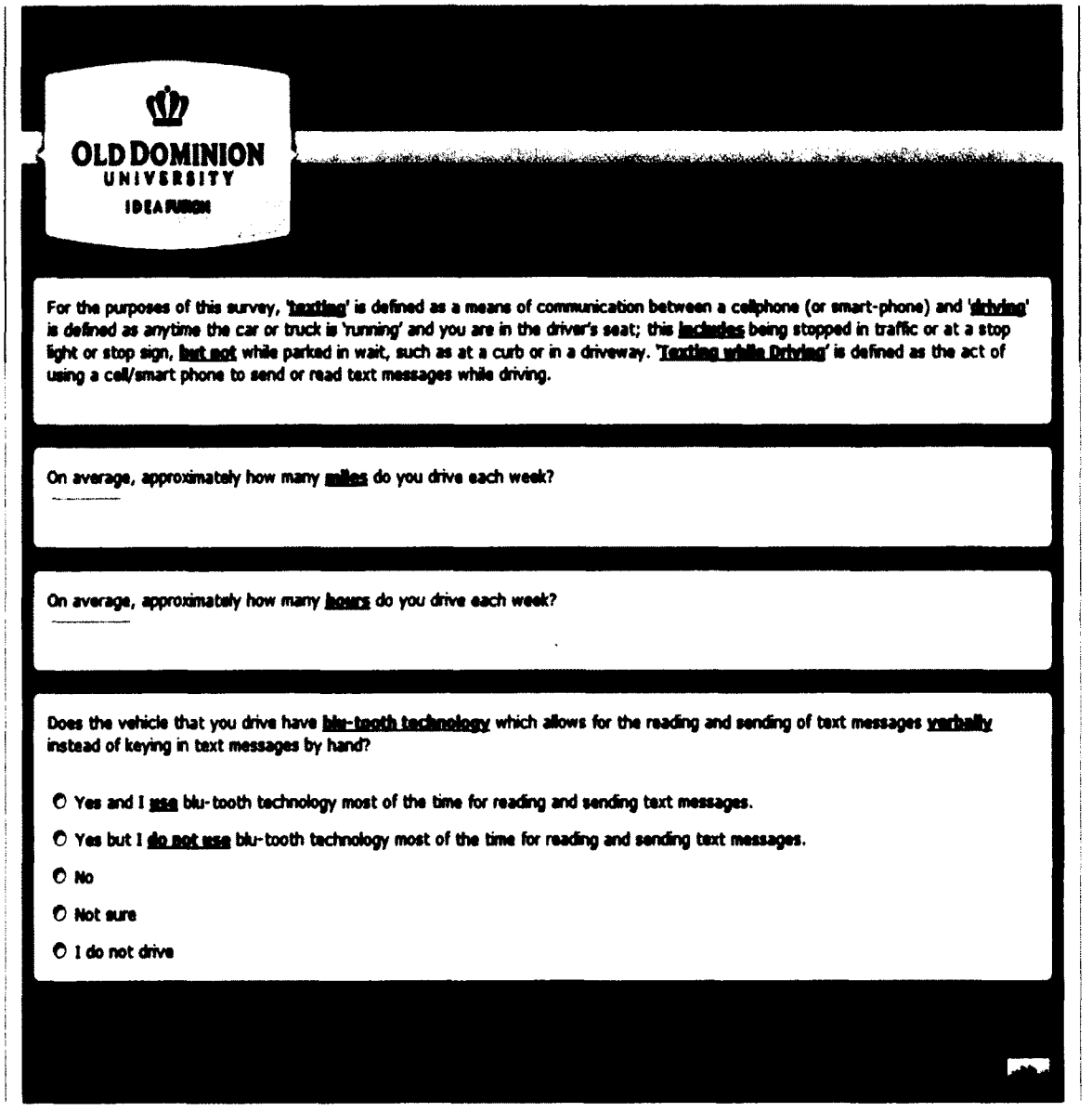
APPENDIX A

SURVEY INSTRUMENT EXAMPLE AS APPEARED ONLINE



APPENDIX B

SURVEY INSTRUMENT

This survey is intended to gather information about texting while driving habits. **Your responses are valuable and will help us understand the thoughts and actions of college students**. Your participation is voluntary and completely anonymous. The survey should take approximately 20 minutes to complete.

Upon completion of the survey, you will be redirected to a separate entry form page and asked if you would like to enter for a chance to win a **$100 Visa Gift Card**. There will be one random drawing held on 8/06/14. You will be entered as soon as you complete the entry form but must complete the survey before 11:59pm EDT on 8/05/14. The separate entry form page is not connected to your survey responses. The winner will be contacted via email after the drawing. You can opt out of the survey at any point simply by closing your browser window. You can only complete the survey once.

If you have any questions and/or concerns please contact:
Charles R. Gray, MA and PhD Candidate in Criminology and Criminal Justice (crgray@odu.edu)
Dissertation Director: Dr. Mona Danner (mdanner@odu.edu)

For the purposes of this survey, '**texting**' is defined as a means of communication between a cellphone (or smart-phone) and '**driving**' is defined as anytime the car or truck is 'running' and you are in the driver's seat; this **includes** being stopped in traffic or at a stop light or stop sign, **but not** while parked in wait, such as at a curb or in a driveway. '**Texting while Driving**' is defined as the act of using a cell/smart phone to send or read text messages while driving.

Survey Section 1

1) On average, approximately how many **miles** do you drive each week? _____

2) On average, approximately how many **hours** do you drive each week? _____

3) Does the vehicle that you drive have **blu-tooth technology** which allows for the reading and sending of text messages verbally instead of keying in text messages by hand?

- o Yes and I **use** blu-tooth technology most of the time for reading and sending text messages.
- o Yes but I **do not** use blu-tooth technology most of the time for reading and sending text messages.
- o No
- o Not sure
- o I do not drive

4) Please indicate your level of agreement with each of the following statements with respect to **reading text messages** while driving.

a) It is very dangerous for me to read **text** messages while driving.	o	o	o	o
b) Compared to talking on a cell phone while driving, it is more dangerous for me to **read** text messages while driving.	o	o	o	o

5) How likely are each of the following factors to influence whether or not you **read text messages** while driving?

a) Road conditions (e.g., weather, construction)	o	o	o	o
b) Heavy traffic	o	o	o	o
c) Risk of fines	o	o	o	o
d) Police Presence	o	o	o	o

6) Please indicate your level of agreement with each of the following statements with respect to **sending text messages** while driving.

a) It is very dangerous for me to **send** text messages while driving.	o	o	o	o
b) Compared to talking on a cell phone while driving, it is more dangerous for me to **send** text messages while driving.	o	o	o	o

7) How likely are each of the following factors to influence whether or not you **send text messages** while driving?

a) Road conditions (e.g., weather, construction)	o	o	o	o
b) Heavy traffic	o	o	o	o
c) Risk of fines	o	o	o	o
d) Police Presence	o	o	o	o

Survey Section 2

The following questions inquire about your texting and driving habits during the past week. Specifically, these questions ask whether or not you have initiated, read, and/or replied to text messages while driving during the past week.

- **Reading a text message while driving** is defined as using your cell/smart phone to read a text message that was sent to your cell/smart while you were driving.
- **Initiating a text message while driving** is defined as using your cell/smart phone to send a new text message while you were driving.
- **Replying to a text message while driving** is defined as responding to a text message that was sent to your cell/smart phone while you were driving

---

8) In the past week did you **initiate**, **read**, or **send** text messages while driving?
- o Yes
- o No

9) During the past week when you were driving how often did you **initiate** text messages while driving?
- o Rarely
- o Sometimes
- o Most of the Time
- o Always
- o Not Applicable

10) During the past week when you were driving how often did you **read** text messages while driving?
- o Rarely
- o Sometimes
- o Most of the Time
- o Always
- o Not Applicable

11) During the past week when you were driving how often did you **reply** to text messages while driving?
- o Rarely
- o Sometimes
- o Most of the Time
- o Always
- o Not Applicable

Survey Section 3

12) Regarding texting and driving, have you ever....?

	Y...	N...
a) Run a stop sign while you were texting?	o	o
b) Damaged your vehicle because you were texting?	o	o
c) Hit something other than another car because you were texting?	o	o
d) Hit another car because you were texting?	o	o
e) Gotten injured from a car accident because you were texting and driving?	o	o
f) Injured someone else because you were texting and driving?	o	o
g) Drifted into another driving lane because you were texting?	o	o
h) Texted while a passenger or passengers were riding in your vehicle?	o	o
i) Texted while you were driving with a child or children in your vehicle?	o	o
j) Been so distracted by texting that you know you are being reckless?	o	o
k) Held up traffic because you were texting?	o	o
l) Been honked at by another driver because you were texting and driving?	o	o
m) Scared yourself because you were texting and driving?	o	o
n) Scared someone else because you were texting and driving?	o	o
o) Almost caused an accident because you were texting while driving?	o	o

13) Have you ever received a ticket for texting while driving?
- o Yes
- o No

14) How many tickets have you received for texting while driving?

15) Approximately when did you receive your **most recent** ticket for texting while driving?
- o In the past week
- o In the past month
- o In the past year
- o More than one year ago

Survey Section 4

16) Have your **parent(s) or legal guardian(s)** talked with you about safe driving?
- o Yes
- o No

17) Have your **parent(s) or legal guardian(s)** talked to you about the dangers of texting while driving?
- o Yes
- o No

18) Have you observed your **parent(s) or legal guardian(s)** texting while driving?
- o Yes
- o No

19) How often have you observed your **parent(s) or legal guardian(s)** texting while driving?
- o Rarely
- o Sometimes
- o Most of the Time
- o Always

20) Have you observed your **friends or peers texting while driving**?
- o Yes
- o No

21) How often have you observed your **friends or peers texting while driving**?
- o Rarely
- o Sometimes
- o Most of the Time
- o Always

Survey Section 5

22) Please indicate your level of agreement or disagreement with each of the following statements.

a) I often act on the spur of the moment.	o	o	o	o	o
b) I don't devote much thought and effort to preparing for the future.	o	o	o	o	o
c) I often do whatever brings me pleasure here and now, even at the cost of some distant goal.	o	o	o	o	o
d) I'm more concerned with what happens to me in the short run than in the long run.	o	o	o	o	o
e) I frequently try to avoid things that I know will be difficult.	o	o	o	o	o
f) When things get complicated, I tend to quit or withdraw.	o	o	o	o	o
g) The things in life that are easiest to do bring me the most pleasure.	o	o	o	o	o
h) I dislike really hard tasks that stretch my abilities to the limit.	o	o	o	o	o
i) I like to test myself every now and then by doing something a little risky.	o	o	o	o	o
j) Sometimes I will take a risk just for the fun of it.	o	o	o	o	o
k) I sometimes find it exciting to do things for which I might get in trouble.	o	o	o	o	o
l) Excitement and adventure are more important to me than security.	o	o	o	o	o

23) Please indicate your level of agreement or disagreement with each of the following statements.

a) If I had a choice, I would almost always rather do something physical than something mental.	o	o	o	o	o
b) I almost always feel better when I am on the move than when I am sitting and thinking.	o	o	o	o	o
c) I like to get out and do things more than I like to read or contemplate ideas.	o	o	o	o	o
d) I seem to have more energy and a greater need for activity than most other people my age.	o	o	o	o	o
e) I try to look out for myself first, even if it means making things difficult for other people.	o	o	o	o	o
f) I'm not very sympathetic to other people when they are having problems.	o	o	o	o	o
g) If things I do upset people, it's their problem, not mine.	o	o	o	o	o
h) I will try to get the things I want even when I know it's causing problems for other people.	o	o	o	o	o
i) I lose my temper pretty easily.	o	o	o	o	o
j) Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry.	o	o	o	o	o
k) When I am really angry, other people better stay away from me.	o	o	o	o	o
l) When I have a serious disagreement with someone, it's usually hard for me to talk about it without getting upset.	o	o	o	o	o

Survey Section 6

24) What are the three main reasons you think people text and drive?

25) Many people believe that texting while driving is dangerous but do so anyway, thereby putting themselves at risk. Why do you think this is so?

Survey Section 7

26) How old are you today? (enter age) _____

27) What is your sex?
- o Male
- o Female

28) Please indicate your current student standing:
- o Freshman
- o Sophomore
- o Junior
- o Senior
- o Graduate Student
- o Non-Degree Seeking Student
- o Other (7) _____

Please answer **BOTH** of the following questions about Hispanic origin and race. For this survey, Hispanic origin are not races.

---

29) Are you of Hispanic, Latino, or Spanish Origin?
- o No, not Hispanic, Latino, or Spanish Origin
- o Yes, Mexican, Mexican Am., Chicano
- o Yes, Puerto Rican
- o Yes, Cuban
- o Yes, another Hispanic, Latino, or Spanish Origin -- Please enter origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.

  _____

30) What is your race?
- o White
- o Black, African Am.
- o American Indian or Alaskan Native -- Please enter principal tribe.

  _____
- o Asian Indian
- o Japanese
- o Native Hawaiian
- o Chinese
- o Korean

- o Guamanian or Chamorro
- o Filipino
- o Vietnamese
- o Samoan
- o Other Asian -- Please enter race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on. _____
- o Other Pacific Islander -- Please enter race, for example, Fijian, Tongan, and so on. _____
- o Some other race. _____

APPENDIX C

SURVEY REQUEST EMAIL

To:
ODU EMAIL POP LIST _ TWD STUDY

Send Date:
July 9, 2014 @ 10:49 AM

Subject:
$100 Visa Gift Card Giveaways to Complete Texting While Driving Survey

Message:
We are conducting a survey on texting while driving behaviors of Old Dominion University students. Your responses are valuable and will help us understand the thoughts and actions of college students. Your participation is voluntary and completely anonymous. The survey should take approximately 20 minutes to complete. Data gathered from this survey will be used for research purposes only and will serve as the basis for a PhD dissertation in Criminology and Criminal Justice.

Upon completion of the survey, you will be redirected to a separate entry form page and asked if you would like to enter the $100 Visa Gift Card Giveaways. There will be one random drawing held each week for four weeks (on 7/16/14, 7/23/14, 7/30/14, and 8/06/14, respectively). You will be entered as soon as you complete the entry form and will stay entered each week. So, the earlier you complete the survey, the more chances you will have to win! The separate entry form page is not connected to your survey responses. Winners will be contacted via email after each drawing.

You can opt out of the survey at any point simply by closing your browser window. You can only complete the survey once.

If you have any questions and/or concerns please contact:
- **Charles R. Gray, MA and PhD Candidate in Criminology and Criminal Justice (crgray@odu.edu)**
- **Dissertation Director: Dr. Mona Danner (mdanner@odu.edu)**

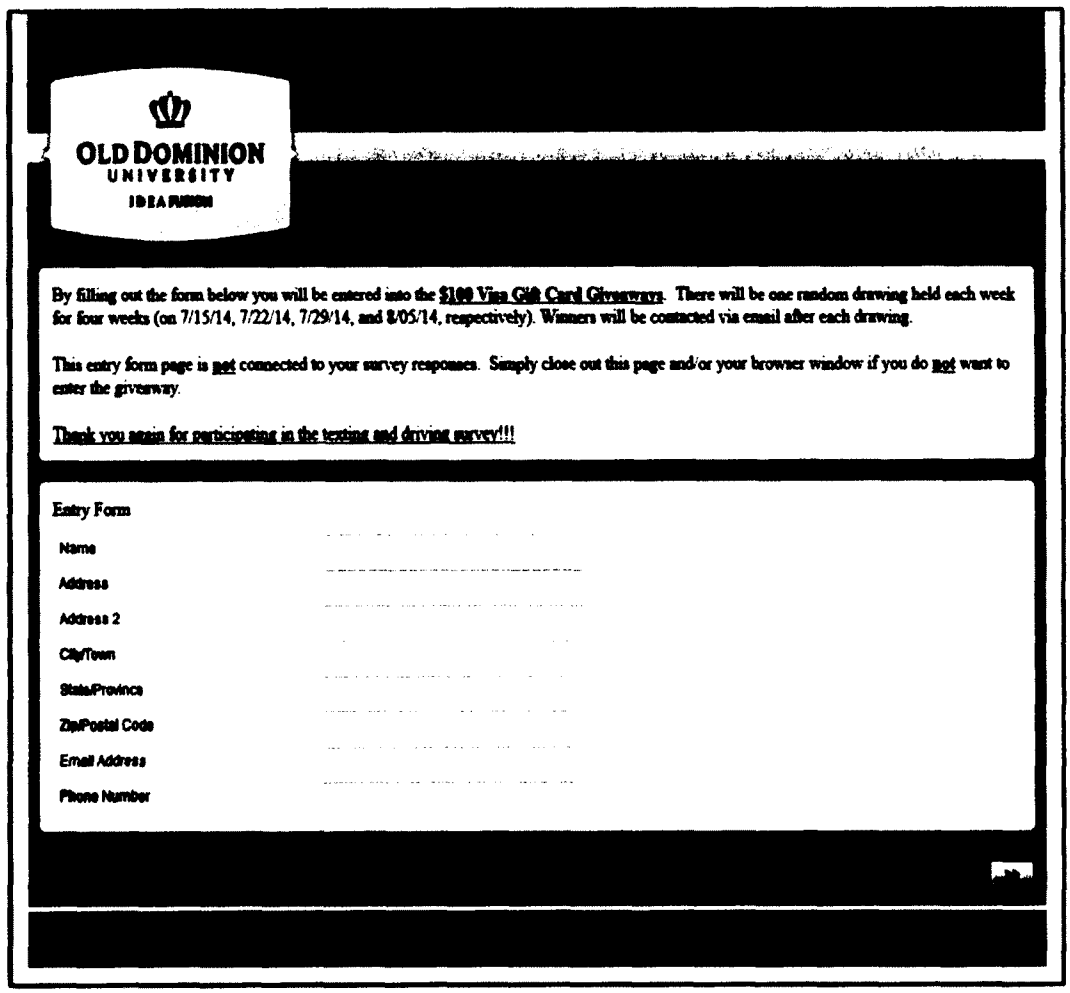
Thanks for your time and consideration!

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

APPENDIX D

SURVEY INCENTIVE ENTRY FORM



VITA

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A.A.	Adirondack Community College, 1994

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