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An Empirical Investigation into the Role that Boredom, Relationships, Anxiety, and Gratification (BRAG) Play in a Driver's Decision to Text

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by

Nathan White

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We hereby certify that this dissertation, submitted by Nathan White, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Submitted to Nova Southeastern University
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Texting while driving is a growing problem that has serious, and sometimes fatal, consequences. Despite laws enacted to curb this behavior, the problem continues to grow. Discovering factors that can reduce such risky behavior can significantly contribute to research, as well as save lives and reduce property damage. This study developed a model to explore the motivations that cause a driver to send messages. The model evaluates the effects that boredom, social relationships, social anxiety, and social gratification (BRAG) have upon a driver's frequency of typing text messages. In addition, the perceived severity of the consequences and the presence of a passenger were also be evaluated for any moderating effects on a driver's texting. Furthermore, a set of hypotheses based on the BRAG model were presented. To investigate these hypotheses, a survey instrument was developed and data was collected from 297 respondents at a mid-sized regional university in the Pacific North west of the United States. Prior to the distribution of the survey, an expert panel and a pilot study were used to ensure the reliability of the instrument.

Partial least squares structured equation modeling (PLS-SEM) was used to evaluate the predictive validity of the BRAG model. This evaluation included an assessment of the reflective measures, as well as a detailed analysis of the structural model. Additionally, knowledge visualization techniques were used to emphasize the significance of the findings. The results of this analysis showed that the social gratification one receives from maintaining their social relationships is a significant predictor of texting while driving. Additionally, the results showed that drivers continued to text, regardless of the consequences. However, boredom and social anxiety were not significant predictors of texting while driving.

This study makes important contributions to the information systems body of knowledge and has implications for state and local lawmakers, in addition to public health officials. Prior research has shown that bored or anxious individuals use texting to relieve those feelings of discomfort. However, this study did not extend those findings to drivers. As this study found that laws banning texting while driving do not deter this behavior, public health officials and lawmakers should investigate other means of deterring texting while driving, given the significant impact it has on the increase of fatal car accidents in recent years.

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Chapter 1

Introduction

Background

From its inception in 1992, text messaging has been one of the most popular uses of the cell phone (Duggan & Rainie, 2012; Snowden, 2006). Of the adults who own cell phones, 80% used their phones to send and receive text messages (Duggan & Rainie, 2012). Additionally, half of these cell phone users also used their phone for sending and receiving email (Duggan & Rainie, 2012). Teens were also frequent texters, with half of all teens texting on a daily basis (Lenhart, 2012). Unfortunately, both adults and teens appeared unable to refrain from texting while driving (Cooper, Yager, & Chrysler, 2011; Strayer, Watson, & Drews, 2011). Nearly half of all adult drivers admitted to texting while driving (Cooper et al., 2011). For teens, 45% reported that they text while driving, and nearly half of all teens reported that they have been in a moving vehicle while the driver was texting (Madden & Lenhart, 2009; Olsen, Shults, & Eaton, 2013). Unfortunately, these numbers continue to increase. From 2009 to 2010, the number of drivers who texted increased by 50% (U.S. Department of Transportation [USDOT], 2011).

As the number of texting drivers has increased, so has the number of crashes and fatalities related to texting while driving (Wilson & Stimpson, 2010). Texting has been shown to have a significant negative impact on driver performance (Owens, McLaughlin,

& Sudweeks, 2011; Rudin-Brown, Young, Patten, Lenné, & Ceci, 2012). Compared with the non-texting driver, the texting driver is four times more likely not to look at the road (Garner, Fine, Franklin, Sattin, & Stavrinos, 2011; Hosking, Young, & Regan, 2009; Strayer et al., 2011). This inattention to the driving task results in erratic driving behavior, and the texting driver is up to 23 times more likely to be involved in a fatal crash (Olson, Hanowski, Hickman, & Bocanegra, 2009; Rudin-Brown et al., 2012; Wilson & Stimpson, 2010). Between 1999 and 2008, the number of fatal car crashes attributed to cell phone use rose by almost 50%. In 2010, one fourth of all fatal car crashes were caused by distracted drivers, with the use of the cell phone cited as the number one cause of driver distraction (Cooper et al., 2011; USDOT, 2010).

Given the serious nature of this problem, there have been efforts to curb texting while driving. As of July, 2013, 41 states and the District of Columbia have passed laws that ban texting by all drivers (Highway Loss Data Institute, 2013). However, these laws have proven inadequate, as there has not been a corresponding reduction in the number of crashes attributed to texting (Braitman & McCartt, 2010; Gostin & Jacobson, 2010; M. L. Smith, Benden, & Lee, 2012). Unfortunately, texting bans have actually been shown to increase the crashes caused by the texting driver (Highway Loss Data Institute, 2010a).

The remainder of this chapter formally states the problem, goal, and research questions for this study. In addition, the relevance and significance of this study are explained, as are the barriers and issues. The chapter concludes presenting the limitations and delimitations to the study.

Problem Statement

The research problem that this study addressed is the increase in automobile accidents attributed to the driver's manipulation of hand-held devices for texting (USDOT, 2010; Wilson & Stimpson, 2010). Texting means

> manually entering alphanumeric text into, or reading text from, an electronic device … Texting includes, but is not limited to, short message service, emailing, instant messaging, a command or request to access a World Wide Web page, pressing more than a single button to initiate or terminate a voice communication using a mobile telephone, or engaging in any other form of electronic text retrieval or entry for present or future communication. (*Public Act 098-0176, Commercial Driver's License*, 2013)

The number of fatal crashes associated with texting drivers has been increasing (USDOT, 2010; Wilson & Stimpson, 2010). This growth may actually be much higher than reported, as there are significant inconsistencies in police reports across the country (Garner et al., 2011).

Given the relative newness of this problem, it is not surprising that there is no consensus on the motivations that lead drivers to text (Nemme & White, 2010). Viewing texting as an addiction may help provide some insight into this problem. An addiction can be described as

> a process whereby a behavior, [*sic*] that can function both to produce pleasure and to provide escape from internal discomfort, [*sic*] is employed in a pattern characterized by (1) recurrent failure to control the behaviour [*sic*]

> (powerlessness) and (2) continuation of the behaviour [*sic*] despite significant negative consequences (unmanageability). (Goodman, 1990, p. 1407)

Using this definition of addiction, the actions of the texting driver can easily be viewed as a technological addiction (Bianchi & Phillips, 2005). Individuals create, develop, and maintain social relationships through their online and texting activities (McKenna, Green, & Gleason, 2002; D. J. Reid & Reid, 2005; Walsh, White, Hyde, & Watson, 2008). Texting drivers may be attempting to maintain their social relationships to experience some level of social gratification or to avoid an increase in their social anxiety level (Liu, Cheung, & Lee, 2010; Stafford, Stafford, & Schkade, 2004). The social interaction that takes place through texting has been shown to increase drivers' social gratification (Liu et al., 2010; Stafford et al., 2004). According to Krishnatray, Singh, Raghavan, and Varma (2010), social gratification is the "gratification Internet users derive from chatting and interaction with friends and others" (p. 20).

Besides increasing social gratification, texting may also help maintain social relationships, which may in turn reduce one's level of social anxiety (Lu et al., 2011). Social anxiety can be described as "a marked concern about the impression one makes on others" (Mansell, Clark, Ehlers, & Chen, 1999, p. 674). Socially anxious individuals have shown a preference toward using relatively low-risk communications, such as texting, to reduce their social anxiety (Caplan, 2007; Lu et al., 2011). In addition, prior research has indicated that an individual addicted to texting is likely to develop increasing levels of social anxiety when prevented from texting (J. Kim, LaRose, & Peng, 2009; Skierkowski & Wood, 2012). Additionally, the boredom experienced by the driver can be seen as "a state of relatively low arousal and dissatisfaction, which is attributed to an inadequately

stimulating situation" (Mikulas & Vodanovich, 1993, p. 3). The driver may be hoping to alleviate this state of discomfort through texting (Kircher, Patten, & Ahlstrom, 2011; Leung, 2008).

Regardless of whether drivers are attempting to reduce their social anxiety, increase their social gratification, or relieve their boredom, the distraction caused by texting has had serious consequences (USDOT, 2010). The percentage of fatal crashes caused by be a distracted driver is an increasing problem (USDOT, 2010). In addition, texting drivers continue to text, despite awareness of the legal liabilities and the potentially fatal consequences of their actions (Drews, Yazdani, Godfrey, Cooper, & Strayer, 2009; Kircher et al., 2011; O'Brien, Goodwin, & Foss, 2010).

Whether seeking pleasure through maintaining social relationships or hoping to avoid discomfort, individuals who compulsively text have been shown to exhibit patterns of an addiction (Rutland, Sheets, & Young, 2007). As uncovered by prior research, non-substance addiction, such as compulsive texting and compulsive use of the Internet, have been shown to have many similarities to substance abuse (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009; Rutland et al., 2007; Shaw & Black, 2008; Young, 1998). Similar to symptoms of Internet addiction, Rutland et al. (2007) found that compulsive texters experienced withdrawal-like symptoms when they were not texting, used texting to relieve uncomfortable feelings, and were unsuccessful in repeated efforts to cut back or stop their messaging behavior. However, little attention has been given to texting addiction fueling the compulsive behavior of drivers who continue to text, despite evidence that the majority of drivers understand the serious, and possibly fatal, consequences of texting while driving (Ginsburg et al., 2008; Strayer et al., 2011).

Dissertation Goal

The main goal of this research study was to validate empirically the influence of boredom, social anxiety, social relationships, and social gratification on an individual's decision to text while driving, as illustrated by the (BRAG) model depicted in Figure 1. Additionally, this study explored the moderating influence that a passenger may have upon a driver's texting behavior. Moreover, this study investigated whether drivers' perceived severity of the potentially fatal consequences of texting while driving influences their texting behavior. In addition, this study examined the role of key demographic variables in helping to explain a driver's texting behavior. The need for this study was demonstrated by the studies of Drews et al. (2009), Hosking et al. (2009), as well as Wilson and Stimpson (2010). These studies showed the detrimental effect of texting on a driver's ability and established a strong relationship between texting while driving and fatal crashes.

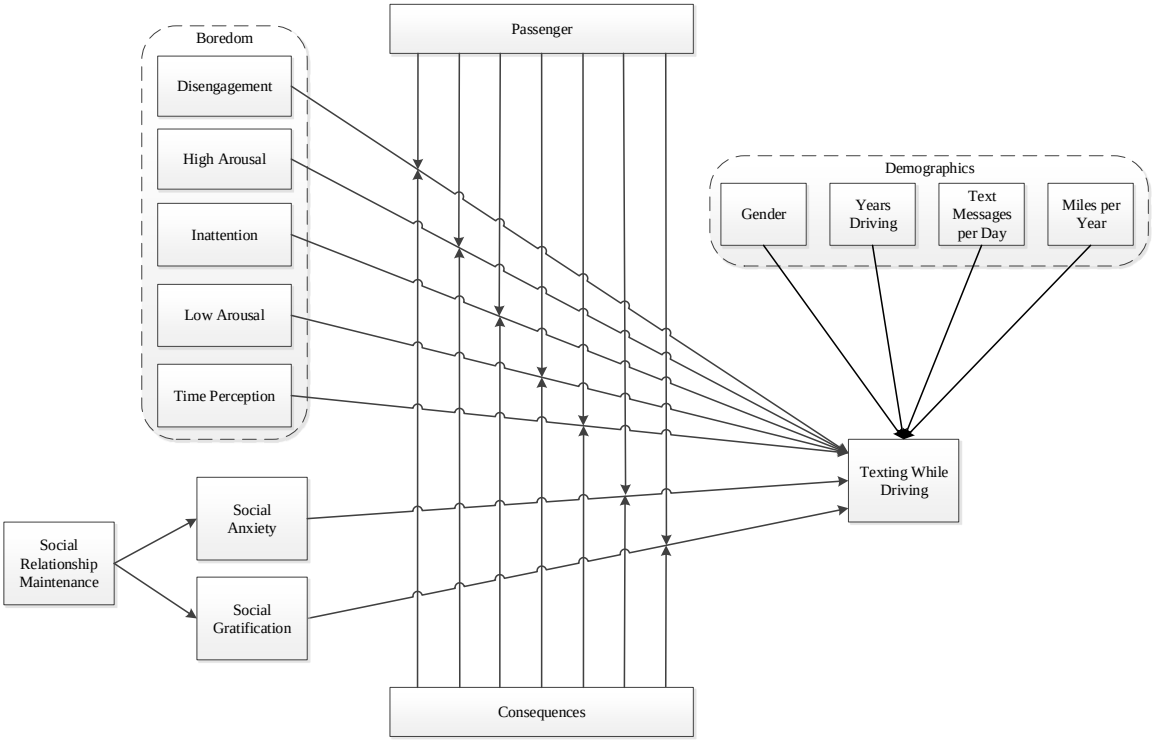

Figure 1. Conceptual research model for investigating the relationships of the BRAG model.

This dissertation built upon previous research by Leung (2008), McKenna et al. (2002), D. J. Reid and Reid (2005), along with Skierkowski and Wood (2012). Leung (2008) established that individuals use texting to relieve feelings of boredom. However, Leung (2008) did not determine if a driver's use of texting would also relieve his feelings of boredom, which will be investigated in this study. Additionally, McKenna et al. (2002) established that individuals form strong and lasting social relationships on the Internet. McKenna et al. (2002) also reported that online interaction decreased an individual's anxiety. D. J. Reid and Reid (2005) then extended McKenna et al. (2002) to text messaging. Besides decreasing one's anxiety, using text messaging to further a meaningful relationship has also been shown to have a positive impact on one's

gratification (Miller-Ott, Kelly, & Duran, 2012). However, D. J. Reid and Reid (2005) did not ascertain if the continual texting with one's social group would also apply to a driver's behavior. Skierkowski and Wood (2012) showed that the absence of texting would significantly increase an individual's anxiety. Although Skierkowski and Wood (2012) acknowledged the deleterious effects that texting has upon young drivers, their study did not explore why drivers continue to text, which was part of the aim of this study.

Boredom

The specific goals of this research study are shown in Figure 1. The first specific goal will use the BRAG model to determine whether the discomfort felt from boredom will lead a driver to text. It is known from prior research that a common solution to boredom is frequent texting (Joshi & Lalbeg, 2011; Madden & Lenhart, 2009). For the compulsive texter, texting is often used as a distraction from boredom (Feldman, Greeson, Renna, & Robbins-Monteith, 2011). When bored, many individuals are confident that they will find at least one friend who will instantly respond to a text message, thereby alleviating some of the boredom those individuals are feeling (Horstmanshof & Power, 2005).

Relationships

Relationships formed and maintained via electronic communication tend to offer deep, meaningful connections for the participants, and are characterized by a significant intimacy in the interactions (Liu et al., 2010; Weiser, 2001). This intimate interaction and chatting leads to greater social gratification (Krishnatray et al., 2010). To extend these studies, the second specific goal of this study was to investigate whether a driver's

texting will further these deep, meaningful relationships and lead to a significant increase in the driver's social gratification.

Individuals also use texting to maintain and enhance their social relationships and stay connected to their social group (Liao & Wan, 2009; Skierkowski & Wood, 2012; Van Bel, Smolders, IJsselsteijn, & de Kort, 2009). The norms of one's social group may also influence the need to maintain these social relationships continually (Nemme & White, 2010). This need to be constantly connected to one's social group has been significantly linked to compulsive texting (Igarashi, Motoyoshi, Takai, & Yoshida, 2008). However, it appears that very limited attention has been provided in research to suggest that maintaining these social relationships would reduce a driver's social anxiety. Therefore, the third goal of this study was to determine if maintaining social relationships decreases driver's social anxiety.

Anxiety

Anxious individuals use texting as a way of maintaining social contact and relieving their social anxiety (D. J. Reid & Reid, 2007). Rutland et al. (2007) found that compulsive texters frequently used texting to relieve their feelings of social anxiety. High levels of social anxiety have also been observed in individuals who are compulsive texters (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Takao, Takahashi, & Kitamura, 2009). Texting affords non-driving individuals a way to maintain their social relationships and reduce their level of anxiousness (F. J. M. Reid & Reid, 2010). However, in the context of texting while driving, it hasn't been determined if texting while driving offers the same affordances to the driver. Therefore, the fourth goal of this

study was to determine whether the discomfort felt from social anxiety will lead a driver to text.

Gratification

Frequent texters use text messages to interact with friends and maintain social connections (Grellhesl & Punyanunt-Carter, 2012). Drivers use cell phones for voice calls, regardless of the risk involved or the laws prohibiting (Horrey, Lesch, & Garabet, 2008; Strayer et al., 2011). Drivers perceive that the gratification from these calls is greater than the risk and then accept the risk by placing the calls (Nelson, Atchley, & Little, 2009). To extend this research to texting, the fifth specific goal of this study was to ascertain the significance of the relationship between gratification and texting while driving.

Passengers

Passengers have indicated that they are uncomfortable riding with a texting driver (Beasley & Adamsen, 2011). Passengers are also likely to confront a texting driver when the driving behavior puts the passenger at risk (Madden & Lenhart, 2009). On the other hand, younger drivers have shown a significant increase in risky driving behavior when passengers are present (Ginsburg et al., 2008; Simons-Morton, Lerner, & Singer, 2005). Unable to delay their need for gratification, younger drivers see their risky behavior as one way to satisfy this need (Bingham & Hockanson, 2008). In addition, socially anxious individuals seek to leave a desirable impression of themselves (Leary, Knight, & Johnson, 1987). Though it has received little attention in previous research, this desire may influence a driver's texting behavior when a passenger is present. Furthermore, conversing with a passenger has been shown to help a driver cope with boredom

(Gershon, Shinar, Oron-Gilad, Parmet, & Ronen, 2011). However, the impact of a passenger on a driver's use of texting to reduce boredom does not appear to be reported in literature. Given this inconsistency in previous research, the sixth specific goal of this study was to determine the influence that a passenger has on a driver's self-reported texting behavior.

Consequences

An individual's intention to misuse an information system is moderated by the perceived severity and the perceived certainty of sanctions (D'Arcy, Hovav, & Galletta, 2008). Most drivers recognize the potentially fatal consequences associated with texting while driving (Drews et al., 2009; Ginsburg et al., 2008; Kircher et al., 2011). However, one in four drivers report that texting has no impact on their driving performance (Tison, Chaudhary, & Cosgrove, 2011). Thus, the seventh specific goal of this study sought to determine the significance of consequences on a driver's self-reported texting behavior.

Demographics

Demographic information was also collected for this study and was used for several purposes. The population for the study comprised students from a medium-sized state university in the Pacific Northwest of the United States. Demographic information was used to ensure that a representative sample had been selected (Stoutenborough, 2008). Finally, although demographics have been widely used in the study of texting, boredom, relationships, anxiety, and gratification, there is considerable contradiction in the findings. Faulkner and Culwin (2005), Harrison (2011), as well as A. Smith (2011) reported that age and gender were significant in a person's texting habits. Contrarily, Lu et al. (2011) and Pettigrew (2009) reported that these demographics played no role in

predicting one's texting habits. Given the conflicting results in prior research, the eighth specific goal of this study was to determine the significance of demographics in a driver's self-reported texting behavior.

Data analytics and knowledge discovery techniques were also used to analyze, visualize, as well as display the data collected in this research study. Data analytics is exploratory in nature and is useful in the building and testing of theories (Fisher, DeLine, Czerwinski, & Drucker, 2012; Shmueli & Koppius, 2011). Visualization techniques associated with data analytics also helps the reader to recognize patterns and relationships better within a data set (Costagliola, Fuccella, Giordano, & Polese, 2009; Levy & Ramim, 2012). Given that this type of research in the context of texting while driving appears to be new, this research study also sought to uncover some additional trends and findings from that data, beyond the ones hypothesized here. As such, these knowledge discovery visualizations improved the interpretation of the data (Leventhal, 2010). Besides providing ways to convey factual information quickly, knowledge visualization techniques afforded ways to express the insights and views developed during this research.

Research Questions and Hypotheses

This research study addressed the following hypotheses:

H1a-e: The discomfort from *boredom* will significantly increase a *driver's self-reported texting*.

H2: Drivers who maintain *social relationships* while driving will significantly decrease their *social anxiety*.

H3: Drivers who maintain *social relationships* while driving will significantly increase their *social gratification*.

H4: The discomfort from *social anxiety* will significantly increase a *driver's self-reported texting*.

H5: The pleasure from *social gratification* will significantly increase a *driver's self-reported texting*.

H6a-e: The *presence of a passenger* will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H6f: The *presence of a passenger* will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H6g: The presence of a *passenger* will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H7a-e: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H7f: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H7g: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H8a: A driver's *gender* will have no significant impact on a *driver's self-reported texting*.

H8b: The *number of years of driving experience* will have no significant impact on a *driver's self-reported texting*.

H8c: The *total number of text messages sent per day* will have no significant impact on a *driver's self-reported texting*.

H8d: The *number of miles driven per year* will have no significant impact on a *driver's self-reported texting*.

Relevance and Significance

This study sought to improve understanding of why drivers continue to text. Despite the numerous laws passed that ban texting while driving, the percentage of drivers who continue to text is increasing (USDOT, 2011). In fact, the laws that ban texting while driving seem to have no impact on a driver's decision to text (Braitman & McCartt, 2010; Goodwin, O'Brien, & Foss, 2012). Moreover, research has shown that laws which ban addictive behaviors have not been successful in reducing those behaviors (Hall et al., 2012; Kuehn, 2013; Peterson, Gable, & Saldana, 1996). Several research studies have addressed the adverse impact of texting upon a driver's ability to control his vehicle (Cooper et al., 2011; Drews et al., 2009; Owens et al., 2011; Rudin-Brown et al., 2012). However, a review of the literature revealed few studies that addressed the underlying reasons why drivers continue to text. Rozario, Lewis, and White (2010) indicated the need to address traits associated with risky behavior, as well as the effects of a passenger on a driver's decision to use a mobile phone. In addition, Beasley and Adamsen (2011) called for research to examine the underlying reasons why drivers

continue to text. Furthermore, Atchley, Atwood, and Boulton (2011) highlighted the need for additional research that examined the social aspect of texting while driving. Harrison (2011) also called for research into the attitudes of the texting driver.

This research study is significant to the information systems domain in that it has provided a better understanding of why drivers continue to text from the holistic information, technology, and the user's perspectives combined. Although legislation has been the main focus of state governments, efforts to educate the public on the dangers of texting while driving are now seen as equally as important (Vermette, 2010). However, these campaigns have focused on the consequences of texting while driving, not the root cause of the behavior (Vermette, 2010). Understanding the root cause of an addictive behavior is essential to designing and implementing successful mediation efforts (Dore, Kauffman, & Nelson-Zlupko, 1995). This study has been able to identify some of the root causes that lead a driver to text.

Barriers and Issues

There were several barriers that this study had to overcome. Obtaining permission to survey participants was one barrier. Approval from the organization's Institutional Review Board was also necessary. Permission from the organization's senior management was obtained prior to seeking IRB approval.

Limitations and Delimitations

Limitations

A limitation to this study was the self-report method that was used to collect the data. Alhough the veracity of information obtained through self-report methods has been questioned, self-report data collected in addiction studies have been proven to be at least

as reliable as data collected through more objective means (Del Boca & Noll, 2000). To improve the validity of the self-reported data on addictions, clear guidance will be necessary for the participants (Del Boca & Noll, 2000). Concerning distracted driving habits, Kass, Beede, and Vodanovich (2010) determined that properly-worded survey questions produced self-reported data which showed a significant correlation with actual driving behavior. To improve the validity of the self-report data and evaluate the clarity of the guidance and questions used in the survey instrument, this study used both an expert panel and a pilot study to evaluate the clarity of the guidance and questions used in the survey instrument (Krosnick & Presser, 2009; Sekaran, 2003; Zikmund, 1988).

Delimitations

The primary delimitation of this study was that all data was obtained from one organization in the Pacific Northwest of the United States. The participants were volunteers and not randomly chosen. This convenience sample has the potential to limit the generalizability of the study's findings (Salkind, 2009; Sekaran, 2003; Zikmund, 1988).

Definitions of Terms

Addiction – "a process whereby a behavior, [*sic*] that can function both to produce pleasure and to provide escape from internal discomfort, is employed in a pattern characterized by (1) recurrent failure to control the behaviour [*sic*] (powerlessness) and (2) continuation of the behaviour [*sic*] despite significant negative consequences (unmanageability)" (Goodman, 1990, p. 1407).

Boredom – "a state of relatively low arousal and dissatisfaction, which is attributed to an inadequately stimulating situation" (Mikulas & Vodanovich, 1993, p. 3).

Internet addiction – "excessive or poorly controlled preoccupations, urges or behaviours [sic] regarding computer use and internet access that lead to impairment or distress" (Shaw & Black, 2008, p. 353).

Response-set – "instances where respondents mark the same score for all items in the survey" (Levy, 2008).

Sexting – "sending explicit, sexually-themed text messages" (Harrison & Gilmore, 2012, p. 515)

SMS – short message service, or a text message

Social anxiety – "a marked concern about the impression one makes on others" (Mansell et al., 1999, p. 674).

Social gratification – "gratification Internet users derive from chatting and interaction with friends and others" (Krishnatray et al., 2010, p. 20).

Social relationship maintenance – "the role of text-messaging in maintaining relationships by presenting an alternative to face-to- face communication" (Lu et al., 2011, p. 1703)

State boredom – "the actual experience of boredom in a given moment" (Fahlman et al., 2013, p. 70).

Technological addiction – "non-chemical (behavioural) [sic] addictions which involve human-machine interaction. They can either be passive (e.g. television) or active (e.g. computer games) and usually contain inducing and reinforcing features which may contribute to the promotion of additive tendencies" (Griffiths, 1996, p. 471).

Texting – "manually entering alphanumeric text into, or reading text from, an electronic device … Texting includes, but is not limited to, short message service, emailing, instant

messaging, a command or request to access a World Wide Web page, pressing more than a single button to initiate or terminate a voice communication using a mobile telephone, or engaging in any other form of electronic text retrieval or entry for present or future communication" (*Public Act 098-0176, Commercial Driver's License*, 2013)

Texting addiction – demonstrating an overdependence on text-messages for one's communication (Igarashi et al., 2008).

Trait boredom – the tendency of one to become bored (Fahlman et al., 2013).

Summary

While texting is one of the most popular means of electronic communication, unfortunately it is increasingly being mixed with driving, oft times with deadly results (Joshi & Lalbeg, 2011; Wilson & Stimpson, 2010). The distraction caused by texting while driving has been well documented (Garner et al., 2011; Hosking et al., 2009; Strayer et al., 2011), as have its fatal consequences (Cooper et al., 2011; Olson et al., 2009; Rudin-Brown et al., 2012; USDOT, 2010; Wilson & Stimpson, 2010). To combat this serious problem, the majority of states have passed laws restricting texting while driving (Highway Loss Data Institute, 2013). However, these laws have proved to be ineffective at best, and have been shown actually to increase the fatalities associated with texting while driving (Braitman & McCartt, 2010; Gostin & Jacobson, 2010; Highway Loss Data Institute, 2010b; M. L. Smith et al., 2012). Unfortunately, a review of the literature has produced little research directed at understanding why, given the serious nature of this behavior, drivers continue to text (Nemme & White, 2010).

This study addressed the problem of the increase in automobile accidents attributable to texting while driving (USDOT, 2010; Wilson & Stimpson, 2010). Viewing

this behavior through the lens of addiction, this study sought to uncover motivations that lead drivers to text. Goodman (1990) described an addiction as an uncontrollable behavior that allows one to escape discomfort or to produce pleasure, regardless of the associated serious negative consequences. Individuals use texting to avoid discomfort and to produce pleasure (Caplan, 2007; J. Kim et al., 2009; Liu et al., 2010; Lu et al., 2011; Skierkowski & Wood, 2012; Stafford et al., 2004). As depicted in the BRAG model, the main goal of this research study was to validate empirically the influence of boredom, social anxiety, social relationships, and social gratification on a driver's decision to text and drive. This study also evaluated the impact that the presence of a passenger and the driver's knowledge of the consequences have upon the driver's decision to text. Given the serious nature of this problem, the results of this study may provide educators and lawmakers with relevant information that will permit significantly better preventative efforts, in lieu of the seemingly ineffective punitive measures that are in place in many states today (Braitman & McCartt, 2010; Goodwin et al., 2012; Vermette, 2010).

Chapter 2

Review of the Literature

Addiction to Texting

Addiction occurs when one is unable to control a behavior that produces pleasure or relieves discomfort, regardless of the consequences (Goodman, 1990; Young, 2004). Though the term *addiction* has traditionally been used to describe the compulsive and uncontrollable use of substances such as drugs and alcohol, the *Diagnostic and Statistical Manual of Mental Disorders (*5th ed., *DSM-5*) has a section on addictive disorders that includes behavioral disorders. Although this section on behavioral disorders is dedicated to compulsive gambling, it is a formal recognition that behavioral addictions are akin to substance addictions. Despite calls for Internet addiction to be included in the DSM-5, it was not, as the DSM-5 work group members decided that the research was insufficient (Block, 2008). However, the DSM-5 work group members listed Internet Gaming Disorder in the third section as a condition warranting further study.

Though lacking the same formal recognition as substance addiction, technological addiction has been garnering considerable attention in the research community for some time (Block, 2008; Chou, Condron, & Belland, 2005; Hansen, 2002; Pawlikowski, Altstötter-Gleich, & Brand, 2013; Pawlikowski, Nader, Burger, Stieger, & Brand, 2013; Widyanto & Griffiths, 2006). During the early years of consumer use of the Internet, Griffiths (1996) recognized the potential harm of technological addictions. Using the criteria related to compulsive gambling in the DSM-IV-TR, Young (1998) developed the

Internet Addiction Diagnostic Questionnaire (IADQ) to help gauge one's level of addiction to the Internet. Although physical impairments were significantly less severe than substance addictions, Young (1998) reported significant impacts that excessive Internet use had on academic achievement, relationships, financial status, and job performance. In addition, this pioneering work caused considerable controversy by suggesting that one could suffer from an addiction to anything other than a substance (Young, 1999). Despite the controversy, numerous studies have since used and adapted the IADQ in the study of technological addictions (Pawlikowski, Altstötter-Gleich, et al., 2013).

Besides the IADQ, several other models and instruments have been developed to study compulsive and problematic usage of the Internet. Morahan-Martin and Schumacher (2000) created a Pathological Internet Use (PIU) scale. This scale focuses on academic, work, and relationship problems that the overuse of the Internet causes (J Morahan-Martin & Schumacher, 2000). Taking a different view, R. A. Davis (2001) created a cognitive-behavioral model of pathological Internet use. This model focuses more on the cognitive aspects of the problematic use of the Internet, rather than the behavior itself (R. A. Davis, 2001). In an effort to operationalize the pathological Internet use model, Caplan (2002) developed the Generalized Problematic Internet Use Scale (GPIUS). The GPIUS measures the PIU cognitions, behaviors, and outcomes identified by Davis (Caplan, 2002). Another widely used scale is the Compulsive Internet Use Scale (CIUS; Meerkerk et al., 2009). The CIUS measures one's compulsive use of the Internet, which include loss of control, dependence, conflict, and obsessive-compulsive behavior (Meerkerk et al., 2009).

Extending previous technological addiction studies, the addiction to mobile phones has also become a source of interest to the research community. Park (2005) developed a mobile phone addiction scale based on criteria from the DSM-IV. This scale focused on two constructs, problem use and guilty use (Park, 2005). In addition, Park (2005) also investigated the relationship between one's level of addiction to the mobile phone and the motivations for use and need for stimulation. Park (2005) found that habit was a significant predictor of mobile phone addiction, and that those who displayed additive traits did not need a high degree of stimulation. In addition to the scale developed by Park, Bianchi and Phillips (2005) created the Mobile Phone Problem Use Scale (MPPUS). The MPPUS used extraversion, neuroticism, low self-esteem, age, and gender as predictors of problem use of a mobile phone (Bianchi & Phillips, 2005). The MPPUS showed strong correlation with time spent using a mobile phone and the Addiction Potential Scale (Bianchi & Phillips, 2005). Additionally, Leung (2008) studied factors relating to mobile phone addiction and developed the Mobile Phone Addiction Scale (MPAS). The four factors measured by the MPAS include the inability to control craving, anxiousness, withdrawal, and loss of productivity (Leung, 2008).

Parallel to Internet and mobile phone addiction, text messaging has been shown that it, too, can be addictive, and this addiction to texting is on the rise (Joshi & Lalbeg, 2011). Building on the work of Griffiths (2005) and Young (2004), Rutland et al. (2007) developed the Short Message Service (SMS) Problem Use Diagnostic Questionnaire (SMS-PUDQ) to measure one's addiction to text messaging. Rutland et al. (2007) adapted the IADQ to reflect text message use, and reported that the SMS-PUDQ corresponded with Griffiths's (2005) six components of addictions: salience, mood

modification, tolerance, withdrawal, conflict, and relapse. In addition, the SMS-PUDQ supported the retention of two factors, pathological use and problematic use (Rutland et al., 2007). Rutland et al. (2007) also reported that scores on the SMS-PUDQ correlated significantly the MPPUS and time spent texting each week.

Though not as widely used as the SMS-PUDQ, the Self-perception of Text-message Dependency Scale (STDS) is another useful addiction assessment tool, developed by Igarashi et al. (2008). The STDS used three factors – perception of emotional reaction, excessive use, and relationship maintenance – to determine one's dependency on texting (Igarashi et al., 2008). In their study of Internet and texting addiction, Lu et al. (2011) used the STDS and found strong correlations between text messaging dependency and loneliness, anxiety, and depression.

Table 1. Supporting Literature for Addiction to Texting

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Bianchi and Phillips (2005)	Theoretical and survey	195 respondents over 18 years of age who own or use a mobile phone	Mobile Phone Problem Usage Scale	Extraversion, low self-esteem, and age appeared to be important factors in determining whether one is susceptible to problem use.
Block (2008)	Theoretical	–	–	Advocated for inclusion of Internet addiction in the DSM-V.
Caplan (2002)	Theoretical and survey	386 undergraduate respondents	Generalized Problematic Internet Use Scale (GPIUS).	The GPIUS provided a valid operationalization of generalized problematic Internet use as conceptualized by Davis (2001).

Table 1. Supporting Literature for Addiction to Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Chou, Condron, and Belland (2005)	Literature review	–	–	Anonymity and interactivity are two leading causes of pathological use of the Internet. More work was needed on the assessment and treatment of Internet addiction.
R. A. Davis (2001)	Theoretical	–	–	Presented a Problematic Internet Use model based upon cognitive factors rather than behavioral factors.
Goodman (1990)	Theoretical	–	–	Presented a definition and diagnostic criteria for addiction. Investigated both theoretical and practical implications of the definition.
Griffiths (1996)	Theoretical	–	–	Posited that technological addictions were a subset of behavioral addictions and shared the behavioral excess of more recognized addictions.
Griffiths (2005)	Theoretical	–	–	Argued that 1) addictions go beyond drug-ingesting behaviors, 2) addictions were part of a biopsychosocial process, and 3) excessive behaviors of all types may indicate an addiction.
Hansen (2002)	Theoretical	–	–	Provided a critical review of Internet addiction research, analyzed student attitudes towards the Internet, and examined ways to regulate student Internet use.

Table 1. Supporting Literature for Addiction to Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Igarashi et al. (2008)	Theoretical and survey	1,581 high school students	The self-perception of text-message dependency scale, psychological and behavioral symptoms related to text messaging, based on DSM-IV-TR criteria for substance dependencies, and the Big-Five Personality Inventory.	Self-perception of text message dependency had a significant relationship to extroversion and neuroticism. Maintaining a relationship through texting increased psychological/behavioral symptoms.
Joshi and Lalbeg (2011)	Qualitative – questionnaires, interviews, and observations	60 college undergraduate students	Frequency of texting and pleasure from texting	Provided suggestions for ways to limit the addictive nature of texting
Leung (2008)	Telephone survey	Random sample of 624 teenagers and young adults	Mobile phone addictions, self-esteem, leisure boredom, sensation seeking, and cell phone usage	Identified common mobile phone addiction symptoms. Showed significant relationships between mobile phone addiction and sensation seeking and leisure boredom.
Lu et al. (2011)	Theoretical and survey	265 respondents	Internet Addiction Questionnaire and Self-perception of Text-message Dependency Scale	Found a significant relationship between depression and excessive use of mobile phones and Internet. Anxiety related significantly to the use of mobile phones in maintaining a relationship.
Meerkerk, Van Den Eijnden, Vermulst, and Garretsen (2009)	Theoretical and survey	447 heavy Internet users in first study 229 of those 447 in second study 16,925 for the third study	Dependence and Obsessive-Compulsive disorder criteria from the DSM-IV	Developed and validated the Compulsive Internet Use Scale

Table 1. Supporting Literature for Addiction to Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Morahan-Martin and Schumacher (2000)	Theoretical and survey	277 undergraduate students	Pathological Internet use and UCLA Loneliness Scale	Pathological Internet users spent more time online than those with limited or no symptoms. The majority of pathological users tended to be male. Pathological users were significantly lonelier.
Park (2005)	Theoretical and survey	157 respondents	Television Addiction Scale, Television Viewing Motives Scale, UCLA Loneliness Scale, and Need for Cognition Scale	Found a significant correlation between loneliness and mobile phone addiction. Mobile phone addition was better explained by ritualistic motives such as passing time and escape, than by instrumental motives, such as information seeking.
Pawlikowski, Altstötter-Gleich, and Brand (2013)	Theoretical and survey	584 respondents in first study 465 respondents in second study 803 respondents in third study 552 respondents in fourth study	Internet Addiction Test (IAT)	Found a short version of the IAT that loaded on two factors: loss of control/time management and craving social problems.
Pawlikowski, Nader, Burger, Stieger, and Brand (2013)	Theoretical and survey	673 respondents	Internet Addiction Test, Shyness and Sociability Scales for Adults, and Satisfaction of Life Scale	Showed significant differences in shyness, time spent online, and life satisfaction between respondents with general problem Internet usage and those with problematic Internet usage related to gaming or sex sites.
Rutland, Sheets, and Young (2007)	Theoretical and survey	78 undergraduate students	Mobile Phone Problem Use Scale	Developed the Short Message Service-Problem Use Diagnostic Questionnaire (SMS-PUDQ). The SMS-PUDQ can be used to help identify problem and pathological SMS use.

Table 1. Supporting Literature for Addiction to Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Widyanto and Griffiths (2006)	Literature Review	–	–	Asserted the existence of Internet addiction and that addicts experienced negative consequences, such as neglect of work and relationship breakdown. There was conflict in the research relating to whether one is addicted to the Internet itself or to its content.
Young (1998)	Theoretical and survey	596 self-selected Internet users	Adapted criteria for DSM-IV pathological gambling to Internet addiction	Those dependent upon the Internet exhibited difficulties similar to pathological gamblers. The survey used in this study provided a framework for further investigation of Internet addiction.
Young (1999)	Theoretical	–	–	Provided clinicians with an overview of the complications of diagnosing Internet addiction, a summary of the complications caused by Internet addiction, and treatment strategies for pathological Internet use.
Young (2004)	Theoretical	–	–	Provided definitions for addiction and Internet addiction. Provided diagnostic criteria for identifying Internet addiction. Summarized negative consequences for individuals, students, and employees.

Seeking Pleasure through Texting

One aspect of an addiction is that it may provide pleasure to the addict (Goodman, 1990; Young, 2004). Technology has increasingly been used to provide pleasure to those

with addictive tendencies. Individuals have been shown to use interactive technologies, such as the Internet and mobile phone, compulsively, much like an alcoholic looks forward to the next drink or the degenerate gambler anticipates the next bet (Jenaro et al., 2007; Young, 1998). Pathological use of these technologies is partially related to the gratifications that the addicted individuals are seeking (Hwang & Lombard, 2006; Pawlikowski, Nader, et al., 2013).

The Internet provides gratification to millions of people on a daily basis, e.g. connecting with friends, staying abreast of the news, catching up on work, learning, relaxing, playing games (Joshi & Lalbeg, 2011; McKenna & Bargh, 2000; Morahan-Martin & Schumacher, 2003). Unfortunately, some people are unable to pull themselves away from their computer. Compulsive sexual behavior and gambling are two of the early addictions to migrate to the Internet (Griffiths, 1996; Pawlikowski, Nader, et al., 2013; Young, 1998). The sexual arousal and stimulation provided by porn sites and chat rooms provide a potent gratification for the sex addict (Pawlikowski, Nader, et al., 2013). Likewise, online gambling has provided addicted gamblers with a new avenue for obtaining the gratification they seek (Griffiths, 1996, 2005). The Internet also has social networking sites that allow individuals to fulfill their need for belonging and social contact; however, some individuals exhibit addictive behaviors and are unable to pull themselves away (Lee, Chang, Lin, & Cheng, 2014; Quan-Haase & Young, 2010).

The ability to place calls on a mobile phone has also brought gratification to the daily lives of many. The mobile phone has allowed for the reinforcement of social ties, immediate social interactions, escape from loneliness, relief of boredom, or the ability simply to pass the time (Butt & Phillips, 2008; H. Kim, Kim, Park, & Rice, 2007; Leung

& Wei, 2000; Park, 2005). There was also a significant relationship between the mobile phone and those who wished to relieve their loneliness (Park, 2005). With teens especially, the mere ownership of a cell phone was important both as a social status symbol and as gratification (Ling, 2004).

Besides the ability to place voice calls, mobile phones provided users with the ability to send and receive short text messages, which in turn provided a variety of gratifications to the user. One of the most common gratifications obtained from texting is the ability to stay connected with one's friends (Grellhesl & Punyanunt-Carter, 2012; Harrison & Gilmore, 2012; Horstmanshof & Power, 2005; Van Cleemput, 2012). Texting allowed one to maintain social ties and stay in perpetual communication with the friends in one's social circle (Harrison & Gilmore, 2012; Pettigrew, 2009). In fact, two-thirds of teens reported that they would rather text their friends than talk to them on their cell phones (Lenhart, Ling, Campbell, & Purcell, 2010). This ability to stay in constant contact allowed one to feel more connected with one's friends and social groups, regardless of one's location (Horstmanshof & Power, 2005; Jin & Park, 2010). Texting also allows friends to share experiences when separated (Horstmanshof & Power, 2005). As opposed to voice communications, texting also allowed one to craft a message, ensuring the expressive content of the message is carefully thought out (F. J. M. Reid & Reid, 2010). Texting also allowed for conversations to be extended over a considerable period of time (F. J. M. Reid & Reid, 2010). In addition, friends were able to make plans with each other and ask questions of one another (Faulkner & Culwin, 2005; Grellhesl & Punyanunt-Carter, 2012; Harrison & Gilmore, 2012).

Besides staying in contact with one's social circle, texting was also frequently used in romantic relationships (Drouin & Landgraff, 2012). At the start of a relationship, texting was used to flirt and ask for the first date (Byrne & Findlay, 2004; Faulkner & Culwin, 2005). During the relationship, texting was frequently used to communicate affection (Grellhesl & Punyanunt-Carter, 2012; Harrison & Gilmore, 2012; Jin & Park, 2010). Texting afforded a couple a private and direct communication channel for their romantic conversations (Pettigrew, 2009). These phatic communications were a quite common use of texting and facilitated a feeling on interconnectedness (Pettigrew, 2009; Van Cleemput, 2012). With the advent of multimedia text messages, the sending of sexually explicit messages and photos, or sexting, was being used both to flirt and to further a committed relationship (Harrison & Gilmore, 2012). Besides being used to start and maintain a relationship, texting has also been used to end relationships (Pascoe, 2011).

In addition to friendly and romantic relationships, texting was also being increasingly used in work relationships (Horstmanshof & Power, 2005; Lenhart, 2010). Hiring firms were contacting recruits via text message to schedule interviews (Horstmanshof & Power, 2005). Text messaging was also being used to coordinate business activities (Grellhesl & Punyanunt-Carter, 2012). The immediacy of the communication and the low cost have helped texting gain popularity in the business world (Guffey & Loewy, 2011). However, many still found texting to be unprofessional, and some companies have even gone so far as to ban texting by their employees for work-related communication (Guffey & Loewy, 2011; Horstmanshof & Power, 2005)

Table 2. Supporting Literature for Seeking Pleasure through Texting

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Butt and Phillips (2008)	Theoretical and survey	112 respondents	The Coopersmith Self-esteem Inventory, the NEO-Five Factor Inventory, and a mobile phone use survey	Respondents made an effort to control how they presented themselves when using their mobile phones. Personality traits were strong predictors of mobile phone and SMS use, with neurotic individuals more likely to text.
Byrne and Findlay (2004)	Theoretical and survey	266 respondents	Questions regarding respondents' reaction to brief vignette describing a hypothetical situation where they had met someone to whom they were attracted. The Marlowe-Crowne Social Desirability Scale [Short Form].	Overall, males were more likely to initiate a first date. However, if a female initiated a first date, her preference would be to do so via SMS, as opposed to a telephone call.
Drouin and Landgraff (2012)	Theoretical and survey	744 undergraduate students	Experiences in Close Relationships scale	Those who wished to avoid attachment in a relationship tended to text less frequently. Partners in a secure relationship tended to text more frequently.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Faulkner and Culwin (2005)	Theoretical, survey, qualitative	565 respondents in survey 24 respondents completed a diary of SMS activities	Survey sought to find out frequency of texting. Diary sought to understand content of texting and relationships between senders and receivers.	Women tended to text more than men. Texting was used most often to ask questions and to advance relationships.
Goodman (1990)	Theoretical	–	–	Presented a definition of, and diagnostic criteria for, addiction. Investigated both theoretical and practical implications of the definition.
Grellhesl and Punyanunt-Carter (2012)	Theoretical and survey	513 undergraduate students	Uses and gratifications in media	Developed the Text Messaging Gratification Scale. Texting was reported as easier as, and more convenient than, other forms of communication.
Griffiths (1996)	Theoretical	–	–	Posited that technological addictions were a subset of behavioral addictions and share the behavioral excess of more recognized addictions.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Griffiths (2005)	Theoretical	–	–	Argued that 1) addictions go beyond drug-ingesting behaviors, 2) addictions were part of a biopsychosocial process, and 3) excessive behaviors of all types may indicate an addiction.
Guffey and Loewy (2011)	Theoretical	–	–	Discussed pros and cons of text messaging in a business setting.
Harrison and Gilmore (2012)	Theoretical and survey	102 college students	Attitudes and experiences with text messaging in various social situations	Texting was the preferred method of contact. Text messaging was found to be replacing face-to-face communications for many romantic activities.
Horstmanshof and Power (2005)	Qualitative—focus groups	Five focus groups with a total of 20 participants	Use of text messaging in a social context	Texting was primarily used for one-to-one communications. Social norms dictated that text messages should be answered promptly.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Hwang and Lombard (2006)	Theoretical and survey	443 respondents	Use of instant messaging behavior, gratifications sought and obtained from instant messaging, and instant messaging's effect on social presence	Social utility, interpersonal utility, convenience, entertainment/ relaxation, and information were the most common gratifications sought and obtained through instant messaging. Instant messaging allowed one to maintain a social presence.
Jenaro et al. (2007)	Theoretical and survey	337 college students	Beck Anxiety Inventory, Beck Depression Inventory, and General Health Questionnaire	Problematic Internet use was significantly related to high anxiety. Excessive cell phone use was significantly related to being female, high anxiety, and insomnia.
Jin and Park (2010)	Theoretical and survey	232 college students	Frequency of cell phone use, Interpersonal Communication Motives, and UCLA Loneliness Scale.	Respondents used texting to send messages of caring, seek pleasure through texting, and attempted to avoid unpleasant situations by texting.
Joshi and Lalbeg (2011)	Qualitative – questionnaires, interviews, and observations	60 undergraduate students	Frequency of texting and pleasure from texting	Provided suggestions for ways to limit the addictive nature of texting.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
H. Kim et al. (2007)	Theoretical and survey	1,039 respondents	Respondents reported to whom they most frequently contacted via five different communications mediums. Network analysis was then used to establish social roles and relationships associated with each medium.	Students used text messaging far more than other groups. The cell phone was used to maintain everyday relationships.
Lee et al. (2014)	Theoretical and survey	325 respondents	Compulsive phone usage, technostress, locus of control, Social Anxiousness Scale, need for touch, and the Materialism Value Scale	Compulsive smartphone usage was related to social anxiety and the need to reduce discomfort during social interactions. Female respondents showed more compulsive use.
Lenhart (2010)	Survey	2,252 respondents	Cell phone ownership patterns, communication patterns of cell phone use, attitudes towards cell phones, and an adult-teenager comparison of cell phone use	Forty-nine percent of adult respondents reported using text messages for work.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Lenhart et al. (2010)	Survey	800 parents of teens (12-17 years old) and 800 teens (12-17 years old)	Questions regarding cell phone use	Texting was the preferred method of communication amongst teens. Cell phone ownership amongst teens was growing. Over half of the teens who own cell phones texted on a daily basis. Girls texted more frequently than boys. Cell phones provided a sense of safety to both teens and parents. Sixty-nine percent of teens used their phones to relieve boredom. More than a third of 16 to 17 year olds reported that they had texted while driving, and nearly half of them reported that they had been in a car with a texting driver.
Leung and Wei (2000)	Theoretical and survey	834 respondents	Gratification measures, mobile phone usage measures, and subscribed services	Determined that cell phone users sought to relax and relieve boredom by making calls. Mobility, reassurance, and immediacy were also significant factors in mobile phone use.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Ling (2004)	Book	-	-	Discussed mobile phone usage amongst teens, safety issues, phone use while driving, social uses, intrusive nature of the phone, and texting.
McKenna and Bargh (2000)	Literature review	-	-	Found the Internet was not to be the cause of depression or social isolation, but instead has changed the way we form social relationships and maintain social identities.
Morahan-Martin and Schumacher (2003)	Theoretical and survey	277 undergraduate students	UCLA Loneliness Scale, Internet use questions, and Internet behavior questions	Lonely individuals used the Internet more and were more likely to use it to seek emotional support, to meet new people, and to interact with people with the same interests. Lonely people preferred interactions via the Internet over face-to-face interactions. Lonely people tended to go online when they felt lonely, depressed, or anxious.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Park (2005)	Theoretical and survey	157 respondents	Television Addiction Scale, Television Viewing Motives Scale, UCLA Loneliness Scale, and Need for Cognition Scale	Found a significant correlation between loneliness and mobile phone addiction. Mobile phone addition was better explained by ritualistic motives, such as escape, than by instrumental motives, such as information-seeking.
Pascoe (2011)	Qualitative—multi-year, multi-site, collaborative ethnographic research project	40 teenagers	Interviews, diary studies, and a six-month observation of text message use	Participants' daily activities revolved around text messaging and social media. Romance and dating dominated participants' text messaging and social media activities.
Pawlikowski, Nader, et al. (2013)	Theoretical and survey	673 respondents	Internet Addiction Test, Shyness and Sociability Scales for Adults, and Satisfaction of Life Scale	Showed significant differences in shyness levels, time spent online, and life satisfaction between respondents with general problem Internet usage and those with problematic Internet usage, related to gaming or sex sites.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Pettigrew (2009)	Theoretical and qualitative	19 dyads—total of 38 participants	Dyadic interviews were conducted to examine participants' interpretations, experiences, and perceptions of texting	Texting allowed for nearly perpetual contact. Texting was seen as a private way to communicate. Texting facilitated interpersonal connections.
Quan-Haase and Young (2010)	Theoretical and survey	77 undergraduate Facebook users	Facebook usage, gratifications from Facebook, and gratifications from instant messaging	Instant messaging and Facebook both provided similar gratifications to their users: communication and social connectivity. Facebook was used more to share information asynchronously. Instant messaging was used more for social and emotional support.
F. J. M. Reid and Reid (2010)	Theoretical and survey	635 respondents	Text message expressive control measures based on McKenna et al. (2002).	The social functionality of texting allowed socially anxious individuals to enrich their personal lives.
Van Cleemput (2012)	Theoretical and survey	78 teenage students	Survey to determine peer groups and the use of communication technologies to maintain connections within the peer groups.	Texting was used to maintain strong relationships within a peer group, and was considered more intimate than face-to-face communication.

Table 2. Supporting Literature for Seeking Pleasure through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Young (1998)	Theoretical and survey	596 self-selected Internet users	Adapted criteria for DSM-IV pathological gambling to Internet addiction	Those dependent on the Internet exhibited difficulties similar to pathological gamblers. The survey used in this study provided a framework for further investigation of Internet addiction.
Young (2004)	Theoretical	–	–	Provided definitions for both addiction and Internet addiction. Provided diagnostic criteria for identifying Internet addiction. Summarized negative consequences for individuals, students, and employees.

Avoiding Discomforts through Texting

Another aspect of an addiction is that the addict may be hoping to relieve some internal discomfort (Goodman, 1990; Young, 2004). Besides using technology to seek gratification, individuals have also used technology to avoid unpleasant feelings or discomfort (Chóliz, 2012; Ebeling-Witte, Frank, & Lester, 2007; Lee et al., 2014). Nichols and Nicki (2004) found that problematic Internet use was significantly related to an individual attempting to relieve feelings of boredom. Additionally, Facebook and online gaming were commonly used to relieve boredom, with many individuals

experiencing addictive behaviors associated with these actions (Leung, 2008; Tosun, 2012).

The mobile phone has also been used to relieve feelings of boredom (Lenhart et al., 2010; Leung & Wei, 2000; Wei & Lo, 2006). In particular, drivers have frequently used the mobile phone to relieve their boredom (Gershon et al., 2011; Kircher et al., 2011). However, Leung (2008) found that there were significant relationships between mobile phone addiction and boredom. Additionally, Soror, Steelman, and Limayem (2012) reported that boredom was a significant predictor of problematic mobile phone usage.

Additionally, many individuals hoped to relieve their boredom through texting (Feldman et al., 2011; Joshi & Lalbeg, 2011). Leung and Wei (2000) found that texting helped individuals to relax and relieve symptoms of boredom. In addition, Horstmanshof and Power (2005) found that many frequent texters announced their feelings of boredom to their friends. This announcement was made with the hope that a friend would respond to help the texter pass the time (Horstmanshof & Power, 2005). Texting also served as a way to escape the present, or any boring situation in which the texters found themselves at that moment (Harrison & Gilmore, 2012; Jin & Park, 2010). Drivers have also used texting to alleviate fatigue and boredom (Kircher et al., 2011).

In addition to helping relieve feelings of boredom, technology has also helped individuals to relieve or reduce their anxiety levels (Caplan, 2007; Morahan-Martin & Schumacher, 2003; Yen et al., 2012). Socially anxious individuals have found that online communications helped them to express themselves better and easee their anxiety levels (Caplan, 2007; Morahan-Martin & Schumacher, 2003). Unfortunately, high anxiety has

been linked to problematic Internet use (Jenaro et al., 2007). While anxiety may be lowered by this online communication, problematic Internet usage has been shown to have a significant relationship to loneliness and depression (Lu et al., 2011; Moody, 2001).

Similarly to the Internet, the mobile phone has also been used to help individuals cope with their anxiety (Lepp, Barkley, & Karpinski, 2014; Leung, 2008). Those anxious about their interpersonal relationships frequently used the mobile phone to help relieve this discomfort (Lu et al., 2011). Individuals have also used their mobile phone to reduce the anxiety felt from loneliness (Park, 2005). Hong, Chiu, and Huang (2012) reported that social anxiety was a significant predictor of mobile phone addiction. Conversely, taking a cell phone away from individuals has increased their anxiety, leading to a vicious circle between anxiety and the mobile phone (Bragazzi & Puente, 2014; Cheever, Rosen, Carrier, & Chavez, 2014; King et al., 2013).

In addition to speaking on the mobile phone, texting also helped relieve the discomfort felt from anxiety (Horstmanshof & Power, 2005). One way that texting helped with anxiety is by preventing its occurrence. Especially amongst the younger age groups, the norm was to respond to text messages as soon as possible, if not immediately (Horstmanshof & Power, 2005). Breaking from this expectation by not replying expeditiously may have resulted in ostracism, and fear of this ostracism was likely to increase the individual's anxiety level (Horstmanshof & Power, 2005; Igarashi et al., 2008). Moreover, being cut off from texting to one's social group was also a cause of anxiety (K. Davis, 2012). When restricted from texting, many frequent texters reported feeling lonely and anxious (Skierkowski & Wood, 2012). Furthermore, the habit/reward

cycle associated with texting helped individuals escape feelings of both boredom and anxiousness (Oulasvirta, Rattenbury, Ma, & Raita, 2012). Many individuals also used texting to maintain their social presence and avoid anxiousness (Hwang & Lombard, 2006). This was particularly true for older adults, as those who texted frequently were less likely to be lonely and anxious (Anderson, 2010).

For individuals who were already anxious, texting was the preferred means of communication and afforded communication sans face-to-face interaction (Butt & Phillips, 2008; Lu et al., 2011; Yen et al., 2012). Similar to the Internet and email, texting is not visually based, so many of the normally anxiety-enhancing factors associated with face-to-face communications were absent (Butt & Phillips, 2008; McKenna & Bargh, 2000). In fact, F. J. M. Reid and Reid (2010) reported that socially anxious individuals routinely used texting to further their personal relationships. Anxious individuals also used texting as a diversionary measure, and texting had a special appeal for these individuals (D. J. Reid & Reid, 2007). Additionally, text messaging afforded anxious individuals a mechanism by which to reach out to their social support network when needing help (Horstmanshof & Power, 2005; Thomée, Härenstam, & Hagberg, 2011). If unable to get help, the texter would at least have had texting itself as a diversion from the anxiety he or she was presently feeling (Feldman et al., 2011). In addition, drivers who text have reported that they have done so to relieve anxiety, by receiving directions or other information pertinent to their immediate driving situation (Atchley et al., 2011).

Table 3. Supporting Literature for Avoiding Discomforts through Texting

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Anderson (2010)	Survey	3,012 older adults	Descriptive profile of lonely adults, loneliness and health, loneliness and use of technology, strategies for coping with loneliness, and predictors of loneliness.	Older adults who frequently communicated by text messages were significantly less lonely than those who either did not text or texted infrequently.
Atchley, Atwood, and Boulton (2011)	Theoretical and survey	348 young adult drivers	Frequency and perceived risk of texting while driving.	Close to 89% of participants reported sending texts while driving and 92% reported reading texts while driving. Participants felt social pressure to respond to texts while driving.
Bragazzi and Puente (2014)	Literature review	-	-	Recommended that mobile phone addiction should be added to the DSM. Discussed the epidemiological characteristics, psychological predictors, comorbidity, and validated psychometric scales associated with mobile phone addiction.
Butt and Phillips (2008)	Theoretical and survey	112 respondents who owned a mobile phone	The Coopersmith self-esteem inventory, the NEO-Five Factor Inventory, and a mobile phone use survey.	Respondents made an effort to control how they presented themselves when using their mobile phones. Personality traits are strong predictors of mobile phone and SMS use, with neurotic individuals more likely to text.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Caplan (2007)	Theoretical and survey	343 undergraduate students	UCLA Loneliness Scale, Social Avoidance and Distress scale, preference for online social interaction items, negative outcomes of Internet use, and several exogenous variables that may influence social anxiety and negative outcomes	Socially anxious individuals preferred online social interaction. Social anxiety and the preference of online interaction predicted negative outcomes associated with online communications.
Cheever et al. (2014)	Experiment	163 undergraduate students	State-Trait Anxiety Inventory, questions related to mobile device usage, and removal of cell phone from one half of the study population	Students who had their cell phones taken away felt more anxious than those who were allowed to keep their cell phone. Heavy cell phone users felt increasing levels of anxiety over time when they were restricted from using their cell phone or it was taken away. Moderate cell phone users felt increasing anxiety only if the cell phone was removed from their possession.
Chóliz (2012)	Theoretical and survey	2,486 adolescents	Mobile phone usage and Test of Mobile-phone Dependence	Discomfort was felt when deprived of phone. Respondents were unable to control their phone usage. Respondents built up a tolerance and had to increase their phone usage to relieve discomfort.

Table 3. Supporting Literature for Avoiding Discomforts through Texting

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
K. Davis (2012)	Qualitative—interviews	32 adolescents aged 13 to 18	Use of communication platforms to communicate with peers, including motivations for using the platforms.	Participants predominately used the communication platforms for casual communications, although females were more likely than males to use the platforms for intimate communications.
Ebeling-Witte et al. (2007)	Theoretical and survey	88 undergraduate students	Revised Cheek and Buss Shyness Scale, Online Cognition Scale, computer/Internet familiarity scale, Eysenck Personality Questionnaire Revised and Abbreviated Duke Social Support Index	Shy individuals were more likely to have problems associated with their Internet use. Shy individuals tended to use the Internet to seek online relationships to make up for their lack of real-life friends, to relieve their feelings of loneliness and depression, and to avoid stressful real-life situations.
Feldman, Greeson, Renna, and Robbins-Monteith (2011)	Survey and theoretical	231 undergraduate students	Cognitive and Affective Mindfulness Scale – Revised, frequency of texting while driving, and emotion- and attention-regulation motives related to texting while driving.	Respondents who were low in mindfulness tended to be unable to regulate their emotions adequately and were more likely to text while driving.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Gershon et al. (2011)	Theoretical and survey	290 respondents	Driving characteristics, methods used to counteract fatigue, and perceived effectiveness of those methods.	The radio and opening of a window were the most frequent coping behaviors. To pass the time and relieve boredom, nonprofessional drivers frequently spoke to a passenger or on a cell phone.
Goodman (1990)	Theoretical	–	–	Presented a definition and diagnostic criteria for addiction. Investigated both theoretical and practical implications of the definition.
Harrison and Gilmore (2012)	Theoretical and survey	102 college students	Attitudes towards with texting in various social situations.	Texting was the preferred contact method between friends. Most respondents used texting for casual communications, romance, and bullying. Texting was frequently used as a distraction from one's current state.
Hong et al. (2012)	Theoretical and survey	269 female university students	Mobile Phone Usage Behavior Scale, Mobile Phone Addiction Scale, Rosenbert's Self-Esteem Scale, and Lai's Personality Scale	A positive correlation existed between social extroversion and mobile phone addiction. Socially anxious individuals used texting to reduce their anxiety. Those with low self-esteem had higher levels of mobile phone addiction.
Horstmanshof and Power (2005)	Qualitative—focus groups	Five focus groups with a total of 20 participants	Use of text messaging in a social context.	Texting was primarily used for one-on-one communication. Social norms dictated that text messages should be answered promptly.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Hwang and Lombard (2006)	Theoretical and survey	443 respondents	Use of instant messaging behavior, gratifications sought and obtained from instant messaging, and instant messaging's effect on social presence.	Social utility, interpersonal utility, convenience, entertainment-relaxation, and information were the most common gratifications sought and obtained through instant messaging. Instant messaging allowed one to maintain a social presence.
Igarashi, Motoyoshi, Takai, and Yoshida (2008)	Theoretical and survey	1,581 high school students	The self-perception of text-message dependency scale, psychological and behavioral symptoms related to text messaging based on DSM-IV-TR criteria for substance dependencies, and the Big-Five Personality Inventory.	Self-perception of text message dependency dependent behavior has a significant relationship to extroversion and neuroticism. Maintaining a relationship increased psychological/behavioral symptoms.
Jenaro et al. (2007)	Theoretical and survey	337 college students	Beck Anxiety Inventory, Beck Depression Inventory, and General Health Questionnaire	Problematic Internet use was significantly related to high anxiety. Excessive cell phone use was significantly related to being female, high anxiety, and insomnia.
Jin and Park (2010)	Theoretical and survey	232 college students	Frequency of cell phone use, Interpersonal Communication Motives, and UCLA Loneliness Scale.	Respondents used texting to send messages of caring, sought pleasure through texting, and attempted to avoid unpleasant situations by texting.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Joshi and Lalbeg (2011)	Qualitative—interview and observation	60 college students	Attitudes towards use of cell phones for texting.	Extensive texting was common amongst respondents. Respondents also derived pleasure from texting.
Kircher, Patten, and Ahlstrom (2011)	Literature review	–	–	Driver performance was impaired by the use of a cell phone. There was no evidence that suggested that hands-free mobile phone use was less risky.
Lee et al. (2014)	Theoretical and survey	325 respondents	Compulsive phone usage, technostress, locus of control, Social Anxiousness Scale, need for touch, and the Materialism Value Scale	Compulsive smartphone usage was related to social anxiety and the need to reduce discomfort during social interactions. Female respondents showed more compulsive use.
Lepp et al. (2014)	Theoretical and survey	490 college students	Satisfaction with Life Scale, Beck Anxiety Inventory, questions about cell phone and texting use, and students' official grade point averages	Cell phone use was positively related to anxiety and negatively related to grade point average. Those with high cell phone use had lower satisfaction with life.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Lenhart et al. (2010)	Survey	800 parents of teens (12-17 years old) and 800 teens (12-17 years old)	Questions regarding cell phone use	Texting was the preferred method of communication amongst teens. Cell phone ownership amongst teens was growing. Over half of the teens who own cell phones texted on a daily basis. Girls texted more frequently than boys. Cell phones provided a sense of safety to both teens and parents. Sixty-nine percent of teens used their phones to relieve boredom. Over a third of 16 to 17 year olds reported that they have texted while driving and nearly half of the teens reported that they have been in a car with a texting driver.
Leung (2008)	Theoretical and survey	624 teenagers and young adults	Mobile phone addictions, self-esteem, leisure boredom, sensation seeking, and cell phone usage	Identified common mobile phone addiction symptoms. Showed significant relationships between mobile phone addiction and sensation seeking and mobile phone addiction and leisure boredom.
Leung and Wei (2000)	Theoretical and survey	834 respondents	Gratification measures, mobile phone usage measures, and subscribed services.	Determined that cell phone users sought to relax and relieve boredom by making calls. Mobility, reassurance, and immediacy were also significant factors in mobile phone use.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Lu et al. (2011)	Theoretical and survey	265 respondents	Internet Addiction Questionnaire and Self-perception of Text-message Dependency Scale.	Significant relationship found between depression and excessive mobile phone and Internet, as well as between anxiety and the use of a mobile phone in maintaining a relationship.
McKenna and Bargh (2000)	Literature review	–	–	Found that the Internet was not the cause of depression or social isolation, but the Internet did change the way we form social relationships and maintain our social identities.
Moody (2001)	Theoretical and survey	166 undergraduate students	Internet usage questions, Social and Emotional Loneliness Scale, social network questions, and Social Anxiety Subscale of the Self Consciousness Scale	Individuals who spent more time online had higher rates of emotional loneliness and lower rates of social loneliness.
Morahan-Martin and Schumacher (2003)	Theoretical and survey	277 undergraduate students	UCLA Loneliness Scale, Internet use questions, and Internet behavior questions	Lonely individuals used the Internet more and were more likely to use the Internet to seek emotional support, to meet new people, and to interact with people of the same interests. Lonely people preferred interactions via the Internet over face-to-face interactions. Lonely people tended to go online when they felt lonely, depressed, or anxious.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Nichols and Nicki (2004)	Theoretical and survey	233 undergraduate students	Internet Addiction Scale, Social and Emotional Loneliness Scale, and Boredom Proneness Scale	The Internet Addiction Scale was highly reliable and had good internal consistency.
Oulasvirta, Rattenbury, Ma, and Raita (2012)	Quasi-experimental, experimental, and qualitative	136 participants in first study 15 participants in the second study 12 participants in the third study	Location of smartphone use, impact of dynamic content on habitual use, and patterns of use.	A majority of smartphone use was to check habitually things like Facebook status and receipt of text messages. Dynamic content may have increased the strength of this checking habit.
Park (2005)	Theoretical and survey	157 respondents	Television Addiction Scale, Television Viewing Motives Scale, UCLA Loneliness Scale, and Need for Cognition Scale	Found a significant correlation between loneliness and mobile phone addiction. Mobile phone addition was better explained by ritualistic motives, such as passing the time and escape, rather than by instrumental motives, such as information seeking.
D. J. Reid and Reid (2007)	Theoretical and survey	158 respondents	Leary Social Anxiousness scale, UCLA Loneliness Scale, and Leung's online chat survey.	Lonely individuals preferred voice calls over texting. Socially anxious individuals preferred texting.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
F. J. M. Reid and Reid (2010)	Theoretical and survey	635 respondents	Text message expressive control measures based on McKenna et al. (2002). Measured duration of extended text message conversations. Determined impact of texting on relationship outcome. Leary social anxiousness scale.	The social functionality of texting allowed socially anxious individuals to enrich their personal lives.
Skierkowski and Wood (2012)	Experiment	23 participants	Collected baseline data on participants' texting patterns. Participants were then restricted from texting for five days. During the restriction period, participants were asked a series of open-ended questions regarding their desire to text and use of other technology-based communications methods.	During the restriction period, participants felt lonely, isolated, and disconnected. There was a significant relationship between rumination about texting during the restriction period and anxiety. More than one-third of the participants reported that their relationships had deteriorated during the restriction period.
Soror et al. (2012)	Theoretical and survey	266 respondents	Boredom, mobile phone usage, negative consequences, anxiety, deficient self-regulation, and habit	Boredom had a significant relationship to deficient self-regulation. When boredom was removed from model, anxiety was a significant predictor of deficient self-regulation.

Table 3. Supporting Literature for Avoiding Discomforts through Texting (continued)

Study	Methodology	Sample	Instrument/ Constructs	Main Findings or Contributions
Thomée, Härenstam, and Hagberg (2011)	Theoretical and survey	4,156 respondents	Patterns of mobile phone use. Mental health factors related to use.	Stress, sleep disturbances, and depression were linked to frequent cell phone use.
Tosun (2012)	Theoretical and survey	143 university students	Individual motives for Facebook use	Maintaining long-distance relationships was the primary reason for using Facebook. Facebook was also used for entertainment purposes and as a distraction from boredom. Posting photos and organizing social events were also reasons given for using Facebook.
Wei and Lo (2006)	Theoretical and survey	909 undergraduate students	34 Gratification measures that included information-seeking, social utility, affection, fashion and status, mobility, and accessibility	Early adopters of cell phones used phones to relieve boredom or relax. Lonely and shy people were late adopters and used it less for social purposes.
Yen et al. (2012)	Theoretical and survey	2,348 college students	Brief Version of Fear of Negative Evaluation Scale, Center for Epidemiological Studies Depression Scale, Chen Internet Addiction Scale, and the BIS/BAS scales.	For individuals with high social anxiety, the level of social anxiety was lower during online interaction than in face-to-face interactions.
Young (2004)	Theoretical	–	–	Provided definitions for addiction and Internet addiction. Provided diagnostic criteria for identifying Internet addiction. Summarized negative consequences for individuals, students, and employees.

Summary of What is Known and Unknown in Research Literature

The preceding literature review analyzed the behavior of texters through the lens of addiction. Addictions were characterized by an individual seeking to avoid a discomfort or attain some pleasure by means of an uncontrollable behavior, regardless of the consequences (Goodman, 1990). Though not yet included in the DSM, a review of the research suggested that technological addictions do indeed exist (Bragazzi & Puente, 2014; Griffiths, 1999; Young, 1998, 2004). Whether it was the Internet, a mobile phone call, or texting, individuals routinely used these technologies to seek some gratification or to escape feelings of discomfort (Hong et al., 2012; Young & Rogers, 1998). Unfortunately, this use has turned pathological for some, impacting their lives and the lives of those around them (Chóliz, 2012; Cooper et al., 2011; Lu et al., 2011).

Despite the fatal consequences associated with texting while driving and the ineffectiveness of laws banning that behavior, a limited number of research studies have been done that focused on the reasons why one would choose to text and drive (Bayer & Campbell, 2012; Braitman & McCartt, 2010; Highway Loss Data Institute, 2010a). The legal and physical consequences of texting while driving have been well documented (Cooper et al., 2011; Hosking et al., 2009; Wilson & Stimpson, 2010). Likewise, much research has also been accomplished on pathological texting behavior (Hong et al., 2012; Sultan, 2014; White, Buboltz, & Frank, 2011). Bayer and Campbell (2012) recommended that future research investigate the impulses that trigger a driver to text.

Chapter 3

Methodology

Research Design

This study was a descriptive study that described the effect that boredom, social relationship maintenance, social anxiety, and social gratification have upon an individual's decision to text while driving. The study used a survey methodology, with a survey created in Qualtrics. The survey was administered to students and faculty of a medium-sized university in the Pacific Northwest of the United States.

The main research question that this study addressed was: What affect do boredom, social relationship maintenance, social anxiety, and social gratification have upon an individual's decision to text while driving? This proposed research set out to address the following hypotheses:

H1a-e: The discomfort from *boredom* will significantly increase a *driver's self-reported texting*.

H2: Drivers who maintain *social relationships* while driving will significantly decrease their *social anxiety*.

H3: Drivers who maintain *social relationships* while driving will significantly increase their *social gratification*.

H4: The discomfort from *social anxiety* will significantly increase a *driver's self-reported texting*.

H5: The pleasure from *social gratification* will significantly increase a *driver's self-reported texting*.

H6a-e: The *presence of a passenger* will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H6f: The *presence of a passenger* will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H6g: The presence of a *passenger* will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H7a-e: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H7g: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H7g: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H8a: A driver's *gender* will have no significant impact on a *driver's self-reported texting*.

H8b: The *number of years of driving experience* will have no significant impact on a *driver's self-reported texting*.

H8c: The *total number of text messages sent per day* will have no significant impact on a *driver's self-reported texting*.

H8d: The *number of miles driven per year* will have no significant impact on a *driver's self-reported texting*.

Survey Instrument and Measures

Social Relationship Maintenance

After a review of valid literature, the instrument selected to measure social relationship maintenance comprised the five relationship maintenance items from the Self-perception of Text-message Dependency Questionnaire (Igarashi et al., 2008). These items measure one's fear that, by not texting, one will disrupt existing social relationships (Igarashi et al., 2008). Lu et al. (2011) validated this instrument and also determined that relationship maintenance was correlated with anxiety.

Igarashi et al. (2008) found this measure both valid and reliable, with a Cronbach's Alpha of .78. In a subsequent study, Lu et al. (2011) reported a Cronbach's Alpha of .90, showing very good reliability. Though Igarashi et al. (2008) used a five-point Likert scale in their study, the scale was expanded in this to seven points, in an effort to improve the measurement (Krosnick & Presser, 2009). The items are provided in Appendix A and numbered SRM1 through SRM5.

Social Gratification

The items used to measure social gratification came from Hwang and Lombard's (2006), which were used to measure gratifications sought from the use of instant messaging. For this study, the seven items that measure the social utility of instant messaging were used (Hwang & Lombard, 2006). These seven items demonstrated good

reliability, obtaining a Cronbach's Alpha of .88 (Hwang & Lombard, 2006). To achieve consistency with the other questions, these seven items were reworded slightly; mainly, *instant messaging* was changed to *texting*. The seven-point Likert scale originally used in the study by Hwang and Lombard (2006) was retained. These items are numbered SG1 through SG7 in Appendix A.

Social Anxiety

To measure social anxiety in this study, a review of valid literature was conducted and the Brief Version of the Fear of Negative Evaluation Scale (BV-FNE) was selected (Leary, 1983). The BV-FNE is a 12-item version of the Watson and Friend (1969) Fear of Negative Evaluation scale (Leary, 1983). The BV-FNE showed very good correlation with the original scale (r =.96), and also showed good internal reliability (Cronbach's Alpha = .90) (Leary, 1983). The BV-FNE has been used to evaluate social anxiety in a variety of studies, including examining individual's anxiety levels in their offline and online interactions (Yen et al., 2012). As Krosnick et al. (2009) reported that a seven-point Likert scale was a more optimal measure, the five-point scale used in the original BV-FNE was expanded to a seven points. The 12 items associated with this scale can be found in Appendix A and are numbered SA1 through SA12.

Boredom

A review of valid literature indicated that the Multidimensional State Boredom Scale (MSBS) would be most suitable for this study (Fahlman et al., 2013). As reported by Fahlman et al. (2013), the Boredom Proneness Scale has been widely used to measure trait boredom, but the MSBS was the first scale that measures state boredom. Fahlman et al. (2013) used the MSBS to identify successfully individuals who had been

experimentally manipulated into a state of boredom. The MSBS uses a seven-point Likert scale, which was retained in this study (Fahlman et al., 2013). The 29 items that make up the MSBS can be found in Appendix A and are numbered BOR1 through BOR29. The items that make up the MSBS loaded to five factors: disengagement (BOR2, BOR7, BOR9, BOR10, BOR13, BOR17, BOR19, BOR22, BOR24, & BOR28), high arousal (BOR5, BOR12, BOR14, BOR21, & BOR27), low arousal (BOR4, BOR8, BOR15, BOR25, & BOR29), inattention (BOR3, BOR16, BOR20, & BOR23), and time perception (BOR1, BOR6, BOR11, BOR18, & BOR26) (Fahlman et al., 2013). These factors also showed good reliability. The Cronbach's Alpha for disengagement, high arousal, low arousal, inattention, and time perception were .87, .85, .86, .80, and .88, respectively (Fahlman et al., 2013).

Texting While Driving, Passengers, and Consequences

For this study, the National Highway Traffic Safety Administration's survey on distracted driving behavior was the source for the items used to measure a driver's texting behavior, the influence of a passenger on that behavior, and the knowledge of state laws banning texting while driving (Tison et al., 2011). Only the questions concerning texting were selected from the survey. To increase the accuracy of the responses, a seven-point Likert scale was used for the texting-while-driving items (Krosnick & Presser, 2009). The remaining three texting-while-driving items will retained their original categories for this proposed study. The items used for these measures can be found in Appendix A. The measures are numbered TWD1 through TWD5, PASS1 through PASS2, and CON1.

Expert Panel

According to Krosnick et al. (2009), survey instruments are "likely to benefit from pretesting: a formal evaluation carried out before the main survey" (p. 52). To ensure that respondents in any survey understand the survey's questions, will follow the order of the questions, and are able to understand the survey's instructions, Zikmund (1988) recommended that surveys be screened by other qualified research professionals prior to administering them. Sekaran (2003) also recommended the use of an expert panel to ensure content validity of the measures within a survey. Sekaran (2003) stated that content validity "ensures that the measure includes an adequate and representative set of items that tap the concept" (p. 206).

All items in this study were selected through a thorough review of previously published research. In addition, each of the measures was validated in prior research (Fahlman et al., 2013; Hwang & Lombard, 2006; Igarashi et al., 2008; Leary, 1983; Rutland et al., 2007; Tison et al., 2011). However, it does not appear that these measures were used previously in the context of texting while driving, nor does it appear that the measures have ever been used in one study. In addition, the scales for many of the items were changed from a five-point Likert scale to a seven-point Likert scale, which allows more variability. Therefore, the survey instrument for this study was reviewed by an expert panel, comprised of terminally-degreed experts in the field of psychology, law enforcement professionals, a director in Washington State's Traffic Safety Commission, a medical doctor, and a practicing physiologist. The expert panel was presented with a copy of the instrument and asked to review and provide comments.

Pilot Study

In an effort to find problems with a survey instrument before the survey is sent to every respondent, Zikmund (1988) recommended the use of a pilot trial run of a survey with a small group of respondents. Any problems in the survey design can then be corrected with minimal impact on the research (Zikmund, 1988). Sekaran (2003) also recommended the use of a pretest of a survey, to ensure that the questions are not misunderstood, the wording is appropriate, and the measurements do not have problems. Krosnick et al. (2009) stated that a pretest with a small group of respondents can be invaluable in the design and wording of a survey instrument. Straub (1989) recommended the pretesting of instruments to test as many validities as possible. Therefore, this study included the use of a pilot study prior to sending the survey out to the entire study population. A group of 30 respondents comprised the pilot study.

Validity and Reliability

Reliability is "the degree to which measures are free from error and, therefore, yield consistent results" (Zikmund, 1988, p. 260). In other words, if a respondent were to take the same survey several times, and provide the same answer to an item each time, that would indicate that the item is unambiguous, and therefore, reliable (Straub, 1989). In addition, Zikmund (1988) defined validity as "whether a measure … measures what it is supposed to measure" (p. 262). A researcher needs to be concerned with both internal and external validity (Sekaran, 2003). *Internal validity* is concerned with the accuracy of the measures, while *external validity* relates to the ability of the researcher to generalize a study's results to the external environment (Sekaran, 2003). In addition, reliability is

necessary, but not alone sufficient, for a measure to be valid (Hair, Hult, Ringle, & Sarstedt, 2014).

To ensure the validity and reliability of the measures for this proposed study, the partial least squares structured equation modeling (PLS-SEM) methodology proposed by Hair et al. (2014) was used. Included in the methodology were steps to assess the reliability and validity of both reflective and formative measures (Hair et al., 2014). The purpose of this assessment was to reduce measurement error and improve the fit of the overall model (Hair et al., 2014).

Reflective Measures

Hair, Ringle, and Sarstedt (2011) defined reflective measures as "functions of the latent construct, and changes in the latent construct [that] are reflected in changes in the indicator (manifest) variables" (p. 141). In assessing reflective measures, Hair et al. (2014) recommended the use of three criteria. The first of these criteria is internal consistency reliability (Hair et al., 2014). Though Cronbach's Alpha has been widely used for testing internal consistency, composite reliability (ρ_c) is recommended for PLS-SEM (Hair et al., 2014). Reliable values for ρ_c range between 0.70 and 0.90 (Hair et al., 2014).

Convergent validity was the second criterion recommended by Hair et al. (2014) to assess reflective measures. Convergent validity is "the extent to which a measure correlates positively with alternative measures of the same construct" (Hair et al., 2014, p. 102). This criterion is measured with the outer loadings and average variance extracted (AVE) of the reflective measure's items (Hair et al., 2014). If the outer loading of a reflective item is above 0.70, the item should be retained (Hair et al., 2014). If the outer

loading is between 0.40 and 0.70, the AVE should be analyzed and, if deletion of the item causes the AVE to fall, the item should be retained (Hair et al., 2014). If the AVE rises when the item is dropped or the outer loading of the item is below 0.40, the item should be dropped (Hair et al., 2014).

The third assessment criterion that Hair et al. (2014) suggested is discriminant validity. Discriminant validity measures whether a construct is actually unique within a model (Hair et al., 2014). One way to determine the discriminant validity of a construct is to examine the cross loadings of its items, ensuring that each item loads higher on its associated construct than it does on the other constructs within the model (Hair et al., 2011). Another way to determine discriminant validity is by using the Fornell-Larcker criterion, which ensures that the variance attributable to a latent variable's items is higher than any variance between the construct and any other construct in the model (Hair et al., 2011).

Pre-screening of Participants

Individuals interested in participating in this study were pre-screened to ensure that they drove on a regular basis and owned a cell phone capable of texting.

Sample

The data for this study was gathered from a medium-sized state university in the Pacific Northwest of the United States. At the time of data collection, there were 10,139 students at this university. About 51% of the population was female. From this population, a minimum sample size of 124 was needed to obtain an 80% power rating

with a significance of 5% and the ability to detect minimum R^2 values of 0.10 (Hair et al., 2014).

Pre-analysis Data Screening

To ensure that valid conclusions could be drawn from collected data, the data was screened to make certain that any quality issues were properly addressed (Mertler & Vannatta, 2010). In PLS-SEM, several types of quality checks should be made prior to analyzing the structural model (Hair et al., 2014). The first of these checks is to look for missing data (Hair et al., 2014). If missing data are found, they can be replaced by the estimated value of the associated indictor, or by the case that has missing values (Hair et al., 2014; Mertler & Vannatta, 2010). In addition to checking for missing data, suspicious response patterns, such as response-set, were also examined (Hair et al., 2014; Levy, 2008). Inconsistent answers should also be screened (Hair et al., 2014). Next, outliers, or cases with unusual or extreme values, would be identified through the use of Mahalanobis distance (Mertler & Vannatta, 2010). If outliers exist, a decision was made whether to drop the cases or to acknowledge the existence of a subgroup (Hair et al., 2014; Mertler & Vannatta, 2010). The final screening step was to check the skewness and kurtosis of the data (Hair et al., 2014). Although PLS-SEM does not depend on data distributed normally, the data should not be extremely non-normal (Hair et al., 2014). Ideally, the skewness and kurtosis of the data should both be between +1 and -1 (Hair et al., 2014).

Data Analysis

Structural Model

To assess the results of a structural model, Hair et al. (2014) recommended following five steps. The first step assesses the collinearity within the model (Hair et al., 2014). To assess collinearity within the model, each set of predictor constructs should be evaluated and, if a set of constructs has a tolerance level below 0.20, the constructs could be merged or some of the predictor constructs could be deleted (Hair et al., 2014). The second step in assessing the structural model is to examine the path coefficients (Hair et al., 2014). The path coefficients should indicate a strong, significant relationship.

The third step in assessing the structural model is to examine the coefficient of determination (R^2) for each of the model's endogenous latent variables (Hair et al., 2011). These R^2 values indicate the level of predictive accuracy of the exogenous variables have on the endogenous variables, with values above 0.75 indicating a strong level, values between 0.25 and 0.50 indicating a moderate level, and values 0.25 or below indicating a weak level of predictive accuracy (Hair et al., 2011). For the fourth step, after the R^2 values for the endogenous variables have been evaluated, the f^2 effect size needs to be evaluated (Hair et al., 2014). The f^2 effect size is computed by measuring the impact that the removal of a exogenous variable has upon on the R^2 values (Hair et al., 2014). Values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects (Hair et al., 2014). The fifth and final step of evaluating the structural model involves assessing the predictive relevance evaluated using Stone-Geisser's Q^2 value (Hair et al., 2014). The Q^2 values will indicate the predictive relevance of the endogenous constructs within the BRAG model

(Hair et al., 2011). Hair et al. (2011) recommended Q^2 values above 0.35 for a construct to have high predictive relevance while Chin (2010) recommended Q^2 values above 0.50.

Following these five steps made it possible to evaluate the hypotheses associated with the BRAG model. For each hypothesis, the endogenous variable, exogenous variable, and path were evaluated. The path coefficient of each hypothesis was expected to indicate a strong, significant relationship. Equally important, the R^2 value was expected to be above 0.50 for the endogenous variable in the hypothesis. In addition, the f^2 values of the exogenous variable's contribution to the endogenous variable were expected to be above 0.15. Similarly, the Q^2 value was expected to be above 0.35 for the endogenous variable. If the endogenous variable, exogenous variable, and path of a hypothesis all indicated moderate to substantial relevance, the hypothesis was considered proven.

Resources

Prior to collecting data, permission from the Human Subject Review Council and the Enrollment Management Director was obtained. Qualtrics used to administer the survey and collect the data. Microsoft® Excel® was used in the prescreening of the data. For data analysis software, the Statistical Package for the Social Sciences® and SmartPLS were used.

Summary

This chapter detailed the research methodology used in this descriptive study. A survey methodology was used and the survey was administered to the students of a medium-sized state university in the Pacific Northwest of the central United States. The

study used existing, validated measures to assess the relationships that texting while driving has to social relationship maintenance, social gratification, social anxiety, boredom, the presence of passengers, and the knowledge of consequences. Prior to administering the survey, an expert panel reviewed the survey instrument to help ensure the readability and content validity of the instrument (Sekaran, 2003; Zikmund, 1988). After the expert panel review, the survey was administered to a pilot group to ensure further the readability of the questions and the avoidance of problems with the measurements used in the survey (Sekaran, 2003). After the pilot study, the survey was then administered to the entire study population.

Once the data was gathered, it was screened for missing data, suspicious response patterns, outliers, skewness, and kurtosis (Hair et al., 2014; Levy, 2008). Additionally, the reliability and validity of the data was checked to reduce measurement error and improve the overall fit of the model (Hair et al., 2014). The methodology that was used to check the reflective measures in the BRAG model is the PLS-SEM methodology proposed by Hair et al. (2014). Following the pre-screening of the data, the five-step method recommended by Hair et al. (2014) was used to assess the results of the structural model. After these five steps, each hypothesis was evaluated by examining the associated endogenous variable, exogenous variable, and path.

Chapter 4

Results

Overview

This chapter presents the results of the research performed in this study. This study used an expert panel to review the survey instrument and a small pilot study to further validate the survey instrument further. The data collected was then analyzed, following the process recommended by Hair et al. (2014). The results of the study are presented in this chapter as well.

Expert Panel

As recommended by Krosnick and Presser (2009), Sekaran (2003), as well as Zikmund (1988), an expert panel reviewed the survey instrument and suggested minor changes to the word use in some of the questions, e.g., change crash to accident. The expert panel also recommended that some of the questions be reworded in order to make the questions easier to understand. Additionally, the expert panel provided guidance on the ordering of the questions within the survey instrument. The final suggestion was to make several of the demographic questions open-ended, as opposed to giving a range. The questions for age (DEMO_1), miles driven per year (DEMO_4), number of years driving (DEMO_5), number of text messages sent (DEMO_6), and number of text messages received (DEMO_7) were changed to open-ended, per this advice.

Pilot Study

To identify any additional problems in the survey, a small pilot study was conducted (Krosnick & Presser, 2009; Sekaran, 2003; Zikmund, 1988). There were 30 respondents, all of whom completed the survey fully.

After analysis of the data from the pilot study, the reliability and validity of one indicator, BOR_23, was found questionable and removed from the study. The outer loading of this indicator was 0.5555, which is in the range that Hair et al. (2014) suggested for further investigation. BOR_23 was part of the Boredom-Inattention (BOR_I) construct, which had a Cronbach's Alpha of 0.795. With the BOR_23 indicator removed, the Cronbach's Alpha of BOR_I increased to 0.817, indicating the internal validity of BOR_I was improved with the removal of BOR_23. Similarly, the average variance extracted (AVE) for BOR_I increased from 0.6207 to 0.7229 with the removal of BOR_23, which means that the BOR_I construct explained more of the variance of its indicators with BOR_23 removed. Based on the changes in Cronbach's Alpha and AVE, BOR_23 was not included in the full study.

Data Collection

The survey instrument was distributed to the students of a medium-sized, regional university in the Pacific Northwest of the United States by the communication management department of that university. Of the 453 respondents that started the survey, 144 students did not finish it. Additionally, 12 respondents did not provide their consent. The remaining 297 respondents fully completed the survey.

Pre-Analysis Data Screening

To detect irregularities or other problems with the data collected by this research study, pre-analysis data screening was performed (Mertler & Vannatta, 2010). Following the process laid out by Hair et al. (2014), the first check was for missing data. For the main constructs in the BRAG model, no data was found to be missing. However, for the open-ended demographic questions, some textual input, ranges, and vectors had been entered. Words like "miles" and "years" were simply removed from the input. For any ranges that were given, the midpoint of the range was used. For any vectors, the number anchoring the vector was used. For DEMO_4, there were 27 cases where "unknown" or "a lot" had been entered. For DEMO_6, there were five cases with this type of entry and there were three cases for DEMO_7. These cases were treated as missing data and were replaced with the mean for the respective indicator (Hair et al., 2014).

The next pre-analysis check was for suspicious response patterns, such as response set which may potentially threaten the validity of the data (Levy, 2008). To check for suspicious response patterns, the frequency of choices was calculated for each respondent. After a careful review of those frequencies, no suspicious response patterns were detected.

Hair et al. (2014) recommend that a check for outliers be performed. Outliers are "cases with unusual or extreme values at one or both ends of a sample distribution" (Mertler & Vannatta, 2010, p. 27). An outlier has the potential to influence significantly the results of statistical tests, allowing for either the false acceptance or the rejection of a hypothesis to occur (Mertler & Vannatta, 2010). Within this study, the Mahalanobis distance statistical test in IBM Statistical Package for Social Sciences (SPSS) Version 22

was used to check for outliers. The results of this test are shown in Table 4 and Figure 2. These results show that no extreme values were significant with $p < 0.001$, which indicates that no outliers were found to exist within the data.

Table 4. Mahalanobis Distance Extreme Values

			CaseID	Value
Mahalanobis Distance	**Highest**	1	231	138.91103
		2	273	134.02976
		3	27	130.77959
		4	168	128.22234
		5	154	113.68197
	Lowest	1	69	10.08035
		2	264	10.51475
		3	131	11.45658
		4	297	14.43811
		5	126	15.40909

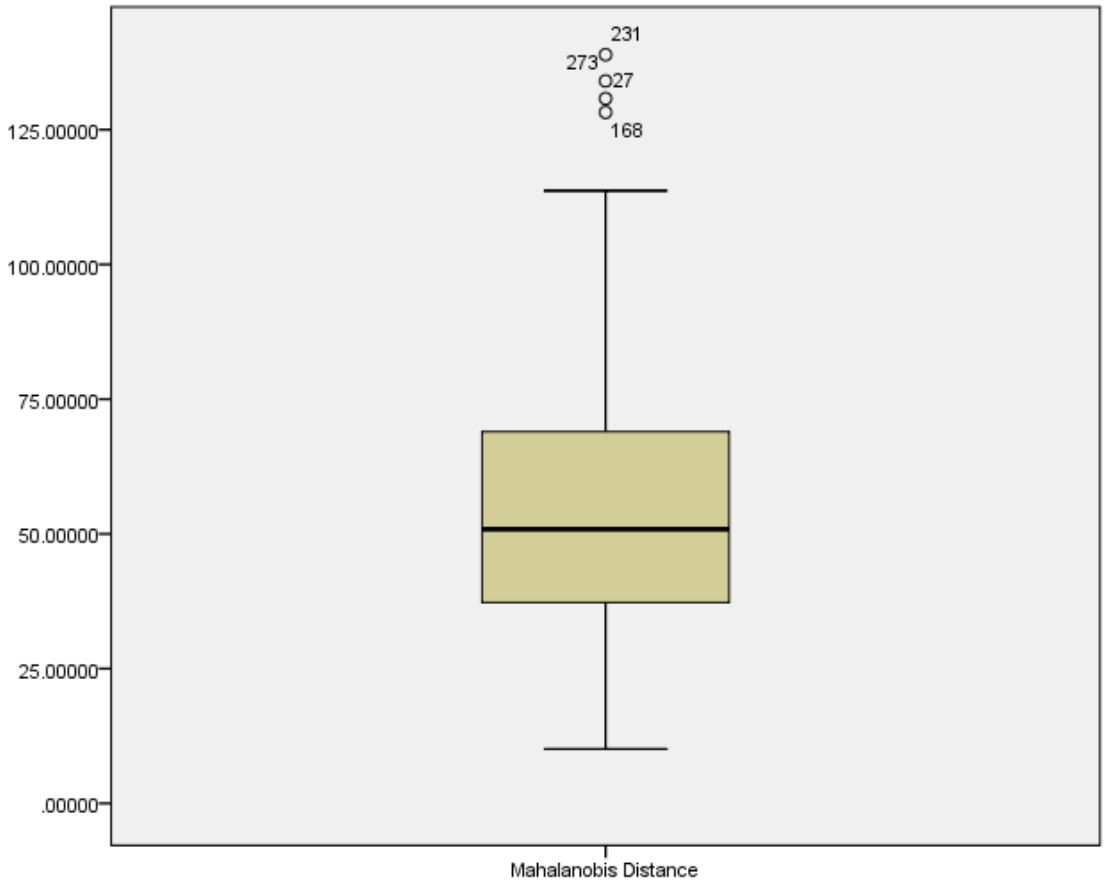

Figure 2. Mahalanobis Distance Results

Structural Model Analysis

After the pre-analysis data screening, the data was entered into SmartPLS 2.0. SmartPLS 2.0 and SPSS were then used in the analysis of the BRAG model and its data. The analysis followed the process laid out by Hair et al. (2014).

Internal Consistency Reliability

To determine whether a reflective construct's indicators were positively correlated, internal consistency was measured with composite reliability (ρ_c) and Cronbach's Alpha (Hair et al., 2014; Sekaran, 2003). Table 5 shows both of these measures. Both measures showed strong internal consistency for each reflective construct.

Table 5. Internal Consistency

Construct	ρ_c	Cronbach's Alpha	Number of Items
BOR-D	0.9199	0.903	8
BOR-HA	0.9136	0.884	5
BOR-I	0.8863	0.817	3
BOR-LA	0.9072	0.867	5
BOR-TP	0.9578	0.944	5
SA	0.9746	0.971	12
SG	0.9522	0.938	7
SRM	0.8970	0.852	5
TWD	0.9697	0.937	2

Convergent Validity

To determine convergent validity, the indicatory reliability and AVE was assessed (Hair et al., 2014). The indicator reliability, which is the square of the outer loading, should be above 0.50 (Hair et al., 2014). In this study, Table 6 shows that three indicators, BOR_7, BOR_13, and SRM_4, fell below this threshold. Hair et al. (2014) stated that any indicator with an outer loading in the range 0.40 and 0.70, which is where

these three fall, should be considered for removal if this leads to an increase in AVE. As can be seen in Table 7, the removal of these indicators increased both the AVE and the Cronbach's Alpha for the respective constructs. Therefore, BOR_7, BOR_13, and SRM_4 were removed from the model.

On the construct level, AVE is used to determine convergent validity (Hair et al., 2014). The AVE for each reflective construct should be 0.50 or higher (Hair et al., 2014). In Table 6, all constructs in the BRAG model had an AVE higher than 0.50.

Table 6. Convergent Validity

Construct		Indicator	Outer Loading	Indicator Reliability	AVE	AVE if Indicator is Deleted‡	Cronbach's Alpha	Cronbach's Alpha if Indicator is Deleted
BOR	Disengagement	BOR_19	0.8158	0.6656	0.5385		0.9030	0.8876
		BOR_2	0.7882	0.6213				0.8887
		BOR_10	0.7847	0.6158				0.8905
		BOR_22	0.7810	0.6100				0.8923
		BOR_28	0.7514	0.5645				0.8915
		BOR_24	0.7466	0.5574				0.8923
		BOR_17	0.7410	0.5490				0.8907
		BOR_9	0.7167	0.5136				0.8918
		BOR_7	**0.6810**	**0.4637**		**0.5546**		0.8980
		BOR_13	**0.4733**	**0.2241**		**0.5738**		**0.9052**
	High Arousal	BOR_21	0.8570	0.7345	0.6790		0.8840	0.8683
		BOR_5	0.8254	0.6812				0.8571
		BOR_27	0.8225	0.6765				0.8611
		BOR_14	0.8153	0.6647				0.8513
		BOR_12	0.7987	0.6379				0.8584
	Inattention	BOR_3	0.9184	0.8434	0.7229		0.8170	0.7510
		BOR_16	0.8256	0.6817				0.7290
		BOR_20	0.8022	0.6436				0.7670
	Low Arousal	BOR_4	0.8709	0.7584	0.6622		0.8670	0.8322
		BOR_15	0.8325	0.6931				0.8282
		BOR_29	0.8029	0.6446				0.8495
		BOR_8	0.7943	0.6310				0.8441
		BOR_25	0.7641	0.5838				0.8439

Table 6. Indicator Reliability and Convergent Validity (continued)

Construct	Indicator	Outer Loading	Indicator Reliability	AVE	AVE if Indicator is Deleted‡	Cronbach's Alpha	Cronbach's Alpha if Indicator is Deleted
BOR (Time Perception)	BOR_11	0.9341	0.8725	0.8195		0.9440	0.9218
	BOR_26	0.9226	0.8511				0.9228
	BOR_18	0.9120	0.8318				0.9263
	BOR_6	0.8830	0.7797				**0.9446**
	BOR_1	0.8731	0.7623				0.9407
SA	SA_6	0.9169	0.8407	0.7618		0.9710	0.9675
	SA_5	0.9042	0.8176				0.9679
	SA_3	0.8943	0.7998				0.9681
	SA_4	0.8854	0.7839				0.9683
	SA_8	0.8806	0.7754				0.9688
	SA_11	0.8792	0.7730				0.9687
	SA_7	0.8773	0.7696				0.9686
	SA_9	0.8662	0.7503				0.9690
	SA_10	0.8593	0.7384				0.9692
	SA_12	0.8522	0.7262				0.9696
	SA_2	0.8293	0.6877				0.9701
	SA_1	0.8241	0.6792				0.9702
SG	SG_1	0.8920	0.7957	0.7399		0.9380	0.9232
	SG_3	0.8691	0.7553				0.9269
	SG_4	0.8642	0.7468				0.9267
	SG_2	0.8569	0.7343				0.9280
	SG_7	0.8563	0.7333				0.9281
	SG_5	0.8474	0.7180				0.9294
	SG_6	0.8341	0.6956				0.9326
SRM	SRM_2	0.8682	0.7537	0.6368		0.8520	0.7957
	SRM_1	0.8464	0.7164				0.8061
	SRM_3	0.8230	0.6774				0.8062
	SRM_5	0.7513	0.5645				0.8376
	SRM_4	**0.6870**	**0.4720**		**0.7046**		**0.8597**
TWD	TWD_2	0.9724	0.9455	0.9412		0.9370	
	TWD_1	0.9680	0.9370				

‡ Computed only for indictors with an outer loading < 0.70.

Discriminant Validity

The last step in analyzing the indicators for the reflective constructs was to assess discriminant validity to determine if a construct is truly unique within a model. The indicator cross loadings and the Fornell-Larcker criterion were used to assess the discriminant validity (Hair et al., 2014). Table 7 shows the outer loadings of each indicator to all constructs. All indicators loaded to the appropriate construct, indicating discriminant validity in the model.

Table 7. Indicator Cross Loadings

Construct		Ind.	BOR_D	BOR_HA	BOR_I	BOR_LA	BOR_TP	SA	SG	SRM	TWD
BOR	Disengagement	BOR_19	0.8316	0.4159	0.4761	0.6093	0.6668	0.1736	0.2142	0.1257	0.2160
		BOR_2	0.7891	0.4718	0.5435	0.6443	0.6699	0.2106	0.2687	0.2486	0.1889
		BOR_10	0.7954	0.4921	0.4449	0.6835	0.8065	0.1422	0.2479	0.1614	0.2156
		BOR_22	0.7834	0.4066	0.4391	0.5600	0.5938	0.1917	0.2534	0.1803	0.2493
		BOR_28	0.7618	0.5197	0.5018	0.6887	0.5121	0.2710	0.2281	0.1632	0.1619
		BOR_24	0.7539	0.3834	0.5393	0.5552	0.4594	0.2959	0.2808	0.1708	0.2409
		BOR_17	0.7454	0.4087	0.5678	0.6084	0.5066	0.2766	0.2387	0.1963	0.1125
		BOR_9	0.7058	0.4553	0.4679	0.6630	0.5508	0.2546	0.2179	0.1991	0.0826
	High Arousal	BOR_21	0.4962	0.8570	0.3971	0.4260	0.3975	0.1748	0.2569	0.2736	0.2772
		BOR_5	0.4266	0.8254	0.3537	0.3982	0.3922	0.2068	0.2393	0.2641	0.1827
		BOR_27	0.4227	0.8225	0.3108	0.4264	0.3464	0.2179	0.2252	0.2154	0.1821
		BOR_14	0.4636	0.8153	0.3716	0.4564	0.4071	0.2814	0.2023	0.2878	0.1189
		BOR_12	0.5381	0.7987	0.4171	0.5135	0.4935	0.2592	0.2822	0.2321	0.1366
	Inattention	BOR_3	0.4843	0.3452	0.9184	0.4351	0.4003	0.2362	0.4194	0.1712	0.3795
		BOR_16	0.5341	0.4324	0.8256	0.4914	0.4293	0.3202	0.3418	0.2283	0.1953
		BOR_20	0.6793	0.4179	0.8022	0.5198	0.5216	0.2728	0.2630	0.2099	0.2063
	Low Arousal	BOR_4	0.6925	0.4336	0.4706	0.8709	0.6124	0.2227	0.3214	0.2188	0.1855
		BOR_15	0.6488	0.4382	0.4665	0.8325	0.5269	0.2692	0.2723	0.2241	0.1015
		BOR_29	0.6748	0.3999	0.4183	0.8029	0.5900	0.2779	0.2541	0.1638	0.1404
		BOR_8	0.6358	0.4962	0.4523	0.7943	0.5318	0.2183	0.2414	0.1862	0.1137
		BOR_25	0.5651	0.3997	0.4185	0.7641	0.4624	0.2751	0.1690	0.1592	0.0980
	Time Perception	BOR_11	0.7698	0.4589	0.4640	0.6719	0.9341	0.1434	0.2421	0.1392	0.1762
		BOR_26	0.7355	0.4777	0.4575	0.6431	0.9226	0.1656	0.1895	0.1458	0.1301
		BOR_18	0.7175	0.4206	0.4715	0.6455	0.9120	0.1317	0.1792	0.0948	0.1425
		BOR_6	0.6814	0.4521	0.4293	0.5541	0.8830	0.1847	0.2703	0.1387	0.2197
		BOR_1	0.6243	0.3834	0.4803	0.5782	0.8731	0.1059	0.2211	0.1269	0.1830

Table 7. Indicator Cross Loadings (continued)

Construct	Ind.	BOR_D	BOR_HA	BOR_I	BOR_LA	BOR_TP	SA	SG	SRM	TWD
SA	SA_6	0.2822	0.2496	0.2787	0.3177	0.1762	0.9162	0.1840	0.2549	0.0037
	SA_5	0.2597	0.2359	0.2806	0.3199	0.1508	0.9037	0.1903	0.2605	0.0188
	SA_3	0.2588	0.2438	0.2866	0.2680	0.1386	0.8948	0.1879	0.2430	0.0006
	SA_4	0.2325	0.2235	0.2221	0.2279	0.1244	0.8856	0.1602	0.2294	0.0083
	SA_8	0.2741	0.2355	0.3137	0.2922	0.1639	0.8798	0.1800	0.3176	0.0127
	SA_11	0.2531	0.2411	0.2852	0.2885	0.1493	0.8784	0.2189	0.2390	0.0537
	SA_7	0.2590	0.2308	0.2789	0.2701	0.1762	0.8774	0.2376	0.2071	0.0606
	SA_9	0.2286	0.2199	0.2765	0.2331	0.1176	0.8654	0.1586	0.2268	-0.0072
	SA_10	0.2457	0.2282	0.2488	0.2357	0.1373	0.8602	0.2837	0.2519	0.0736
	SA_12	0.2541	0.2142	0.3070	0.3037	0.1721	0.8510	0.1570	0.2933	-0.0218
	SA_2	0.2132	0.1962	0.2098	0.1985	0.1156	0.8315	0.3085	0.2639	0.1075
	SA_1	0.1909	0.2225	0.2299	0.2154	0.0811	0.8253	0.2481	0.2484	0.0712
SG	SG_1	0.3095	0.2724	0.4123	0.3039	0.2384	0.2179	0.8919	0.2863	0.6024
	SG_3	0.2530	0.2418	0.3837	0.2418	0.1992	0.1601	0.8695	0.2620	0.6644
	SG_4	0.2867	0.2681	0.2974	0.2820	0.2183	0.2508	0.8638	0.2783	0.5538
	SG_2	0.2736	0.2533	0.3178	0.2731	0.2057	0.2181	0.8567	0.3134	0.5468
	SG_7	0.2507	0.2830	0.3198	0.3105	0.1978	0.2204	0.8561	0.3309	0.5472
	SG_5	0.3394	0.2249	0.3665	0.3307	0.2869	0.2166	0.8472	0.3002	0.5296
	SG_6	0.2128	0.2273	0.3880	0.1926	0.1735	0.1754	0.8346	0.2889	0.6707
SRM	SRM_2	0.2226	0.3240	0.2163	0.2113	0.1635	0.2591	0.3032	0.8951	0.2394
	SRM_1	0.2043	0.2758	0.2195	0.2438	0.1318	0.2683	0.3048	0.8766	0.2277
	SRM_3	0.1305	0.2056	0.1906	0.1338	0.0648	0.2244	0.2266	0.8170	0.2196
	SRM_5	0.1948	0.2166	0.1308	0.1864	0.1120	0.2293	0.3010	0.7624	0.2419
TWD	TWD_2	0.2556	0.2287	0.3247	0.1644	0.1923	0.0325	0.6916	0.2579	0.9724
	TWD_1	0.2446	0.2307	0.3209	0.1573	0.1864	0.0381	0.6412	0.2804	0.9680

The Fornell-Larcker criterion can also be used to assess discriminant validity (Hair et al., 2014). Table 8 shows the results of the Fornell-Larcker criterion assessment. All but one construct, BOR_HA, showed discriminant validity using this assessment. Prior research is divided on which method is the best for determining discriminant validity (Henseler, Ringle, & Sarstedt, 2015). Given that the two methods gave contradicting results for BOR_HA and the lack of clear guidance from literature, the results from the cross loadings were accepted and analysis proceeded with the belief that all constructs have discriminant validity.

Table 8. Fornell-Larcker criterion

	BOR_D	BOR_HA	BOR_I	BOR_LA	BOR_TP	SA	SG	SRM	TWD
BOR_D	0.7338								
BOR_HA	0.5658	**0.4419**							
BOR_I	0.6341	0.4467	0.8502						
BOR_LA	0.7953	0.5280	0.5455	0.8137					
BOR_TP	0.7777	0.4847	0.5085	0.6788	0.9052				
SA	0.2827	0.2617	0.3087	0.3043	0.1634	0.8728			
SG	0.3178	0.2937	0.4149	0.3186	0.2508	0.2406	0.8602		
SRM	0.2275	0.3081	0.2264	0.2350	0.1441	0.2936	0.3414	0.7980	
TWD	0.2579	0.2367	0.3328	0.1659	0.1953	0.0363	0.6878	0.2770	0.9702

Collinearity Assessment

The first step in assessing the complete structural model is to assess collinearity (Hair et al., 2014). To assess collinearity amongst the BRAG model's predictor constructs, the latent variable scores were used to calculate the tolerance and variance inflation factor (VIF) in SPSS. As can be seen in Table 9, the tolerance of all constructs was greater than 0.20 and the VIF of all constructs was below 5.0, indicating that there was no collinearity among the constructs in the BRAG model.

Table 9. Collinearity Assessment

Construct	Tolerance	VIF
BOR_D	.227	4.409
BOR_HA	.639	1.566
BOR_I	.532	1.879
BOR_LA	.342	2.925
BOR_TP	.377	2.650
SA	.848	1.179
SG	.799	1.252

Structural Model Path Coefficients

The next step in assessing the BRAG model was to examine the hypothesized relationship amongst the constructs, i.e. the path coefficients. In Figure 3, the paths on the BRAG model had been updated to show the corresponding hypothesis and path coefficient. As can be seen in Figure 3, several paths showed no significance. Three of the paths from the Boredom subcomponents to the Texting While Driving construct were not significant. Similarly, three of the paths moderated by Passenger were not significant. None of the paths moderated by Consequences were significant. Neither were the paths from Gender or Years Driving. The rest of the paths in the model showed significance to at least $p < 0.01$.

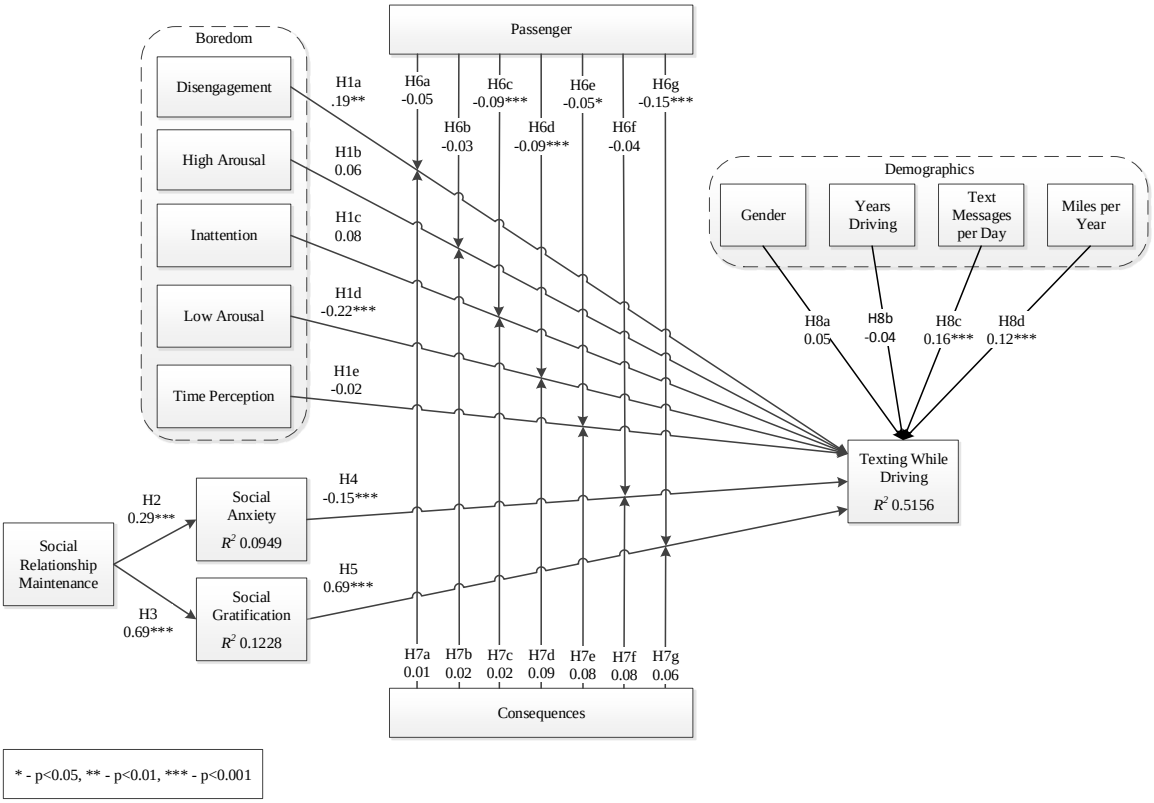

Figure 3. BRAG Model Path Coefficients

Coefficient of Determination (R^2)

Evaluating the coefficient of determination (R^2) for the endogenous variables was the next step in assessing the BRAG model (Hair et al., 2014). Although Hair et al. (2014) stated that R^2 values should be above 0.25 to at least to show weak predictive accuracy and should be above 0.50 to indicate moderate predictive accuracy for marketing research, the nature of the this study determined what values were acceptable for R^2 (Gotz, Liehr-Gobbers, & Krafft, 2010). In exploratory psychological studies, R^2 values of 0.10 and below were considered to have small predictive accuracy, R^2 values between 0.10 and 0.25 were considered to have medium predictive accuracy, and R^2 values greater than 0.25 were considered to have large predictive accuracy (Murphy, 2004). As this study is more closely aligned with an exploratory psychological study than a marketing study, the latter set of criteria was used to evaluate the R^2 values. Table 10 shows the R^2 values for the endogenous variables in the BRAG model. All of the endogenous variables had some predictive accuracy.

Table 10. R^2 Values

Endogenous Variable	R^2	**Predictive Accuracy**
SA	0.0862	Small
SG	0.1165	Medium
TWD	0.5166	Large

Effect Size (f^2)

The f^2 effect size was used to determine the relative impact on predictive accuracy of an exogenous variable (Hair et al., 2014). Values above 0.02, 0.15, and 0.35 represent small, medium, and large effects (Hair et al., 2014). As can be seen in Table 11, none of

the boredom variables had a significant effect size; however, social anxiety had a small effect on TWD and social gratification had a large effect.

Table 11. f^2 Effect Size

	R^2 of TWD	f^2	Effect Size
BRAG	0.5156		
Without BOR_D	0.5191	-0.0071	Not Significant
Without BOR_HA	0.5214	-0.0119	Not Significant
Without BOR_I	0.5125	0.0065	Not Significant
Without BOR_LA	0.5082	0.0153	Not Significant
Without BOR_TP	0.5228	-0.0148	Not Significant
Without SA	0.5019	0.0284	Small
Without SG	0.1667	0.7204	Large

Blindfolding and Predictive Relevance (Q^2)

The predictive relevance of a endogenous construct is measured with Sone-Geisser's Q^2 value (Hair et al., 2014). The Q^2 values were obtained by using the blindfolding technique in SmartPLS, with an omission distance of seven. This blindfolding technique used the cross-validated redundancy approach in its calculations. Any resulting Q^2 values above zero indicated the model had predictive relevance (Chin, 2010; Hair et al., 2014). As can be seen in Table 13, all endogenous variables in the BRAG model had predictive relevance.

Table 12. Q^2 Values

Endogenous Variable	Q^2
SA	0.0639
SG	0.0865
TWD	0.4743

Effect Size (q^2)

The q^2 effect size was used to assess the predictive relevance of exogenous variables, similar to how f^2 was used to assess the relative predictive accuracy of the exogenous variables (Hair et al., 2014). The relative measure of the q^2 is also similar to that of f^2, with values above 0.02, 0.15, and 0.35 representing small, medium, and large effects respectively (Hair et al., 2014). As can be seen in Table 13, only social gratification had a significant predictive relevance.

Table 13. q^2 Effect Size

	Q^2 of TWD	**q^2**	**Effect Size**
BRAG with all main constructs	0.4743		
Without BOR_D	0.4749	-0.0012	Not Significant
Without BOR_HA	0.4814	-0.0136	Not Significant
Without BOR_I	0.4807	-0.0123	Not Significant
Without BOR_LA	0.4689	0.0101	Not Significant
Without BOR_TP	0.4839	-0.0184	Not Significant
Without SA	0.4659	0.0159	Not Significant
Without SG	0.1145	0.6843	Large

Moderating Effects of Passengers and Consequences

The moderating effects of passengers and consequences were computed with the two-stage approach (Hair et al., 2014). A separate two-stage approach was used for each moderator. The path coefficients of the moderator variable to the respective latent variable were previously shown in Figure 3 and are summarized in Table 14. The presence of a passenger had a significant effect on BOR-I, BOR-LA, BOR_TP, and SG. Interestingly, the knowledge of the consequences about texting while driving did not have a significant effect on any of the BRAG model's constructs.

Table 14. Moderating Effects of Passengers and Consequences

Moderator Variable	Path	Path Coefficient	Significance Levels‡
PASS	BOR_D * PASS -> TWD	-0.0527	NS
	BOR_HA * PASS -> TWD	-0.0264	NS
	BOR_I * PASS -> TWD	-0.0893	***
	BOR_LA * PASS -> TWD	-0.0875	***
	BOR_TP * PASS -> TWD	-0.0532	*
	SA * PASS -> TWD	-0.0380	NS
	SG * PASS -> TWD	-0.1527	***
CON	BOR_D * CON -> TWD	0.0069	NS
	BOR_HA * CON -> TWD	0.0249	NS
	BOR_I * CON -> TWD	0.0188	NS
	BOR_LA * CON -> TWD	0.0915	NS
	BOR_TP * CON -> TWD	0.0778	NS
	SA * CON -> TWD	0.0847	NS
	SG * CON -> TWD	0.0598	NS

‡* - $p<0.05$, ** - $p<0.01$, *** - $p<0.001$

Demographic Analysis

The survey instrument gathered demographic information that included age, number of years the respondent had been driving, the number of miles per year the respondent drove, and the number of text messages per day that the respondent sent. This demographic information was used in the testing of hypotheses H8a through H8d. Table 15 summarizes the information collected and provides the descriptive statistics of the demographic information collected. More females than males responded to the survey, 26.3% vs 73.7%. This sample is not representative of the student body at the university where the data was collected. In the 2014-2015 school year, females accounted for 51.1% and males accounted for 48.9% of the student body.

Table 15. Descriptive Statistics and Demographics (N = 297)

Item	Frequency	Percentage (%)
Gender		
Male	78	26.3
Female	219	73.7
Years Driving		
5 or less	141	47.5
6 to 10	89	30.0
11 to 15	19	6.4
16 to 20	14	4.7
More than 20	34	11.4
Text Message Sent per Day		
25 or less	168	56.6
26 to 50	58	19.5
51 to 75	10	3.4
76 to 100	36	12.1
More than 100	25	8.4
Annual Miles Driven		
5,000 or less	106	35.7
5,001 to 10,000	70	23.6
10,001 to 15,000	75	25.3
15,001 to 20,000	20	6.7
More than 20,000	26	8.8

To determine whether these demographic variables impacted a driver's decision to text, each variable was added independently to the BRAG model. The path coefficients of each were then checked for significance, as shown in Figure 3 and listed in Table 16. The path coefficients showed that gender and number of years driving did not have a significant impact on texting while driving. However, the number of text messages sent per day and the annual number of miles driven were significant.

Table 16. Path Coefficients of Demographic Variables

Path	Path Coefficient	Significance Levels‡
GEN -> TWD	0.0433	NS
YRD -> TWD	0.0452	NS
MSG -> TWD	0.0379	***
MIL -> TWD	0.0399	***

‡* - $p<0.05$, ** - $p<0.01$, *** - $p<0.001$

Data Visualization Analysis

Heat maps were used in this study to analyze the collected data further, as well as to provide a visual representation of the results. In addition to providing a colorful way of displaying associations between attributes, heat maps also facilitate data interpretation (Toddenroth, Ganslandt, Castellanos, Prokosch, & Bürkle, 2014). Visually displaying multivariate data is an excellent way to communicate complex quantitative ideas (Tufte, 2001).

The heat maps shown in Figure 4a through 4g depict the indicators of the endogenous variable TWD and the indicators of the latent variables that have a direct path to TWD within the BRAG model. All indicators were measured on a seven-point Likert scale. TWD is represented in shades of red, while the other latent variables are represented in shades of either blue or green. The lightest shades represent a value of one for an indicator and the darkest shades represent a value of seven.

A visual analysis of the heat map shown in Figure 4 supports results previously reported in this study. The significant relationship between social gratification and texting while driving can easily be seen in Figure 4a. Additionally, Figure 4b shows the lack of a positive relationship between social anxiety and texting while driving. Furthermore, the Figures 4c through 4g do not show any clear relationships between the boredom

subcomponents and text while driving, which matches the results obtained from the PLS-SEM modeling.

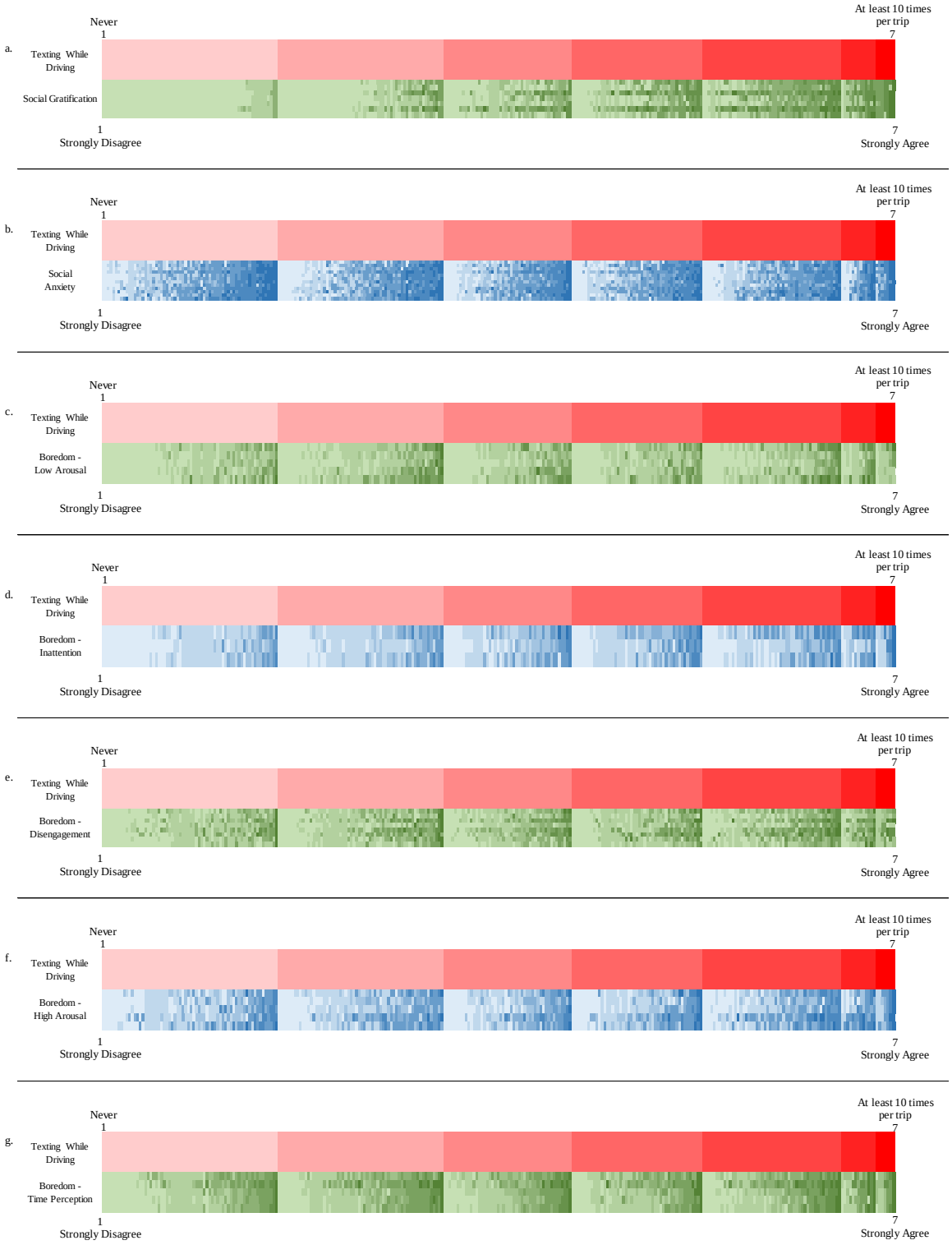

Figure 4. Heat Map of TWD

The heat maps shown in Figures 5 and 6 represent the relationship of the exogenous variable, social relationship maintenance, to the endogenous variables, social anxiety and social gratification, respectively. As seen in Figure 5, there did not appear to be a positive significant relationship between social relationship maintenance and social anxiety, matching the result of the PLS-SEM modeling. While not as clearly seen as in the PLS-SEM modeling, there did appear to be a positive relationship between social relationship management and social gratification, as shown in Figure 6.

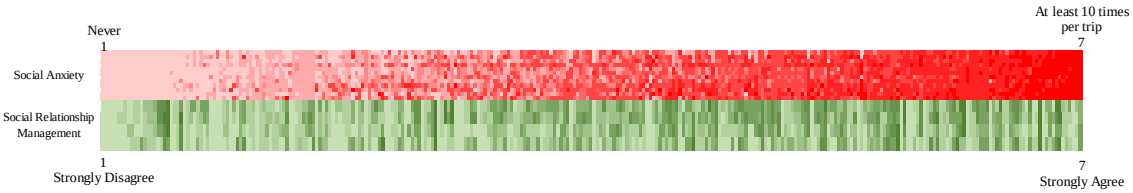

Figure 5. Heat Map of SA

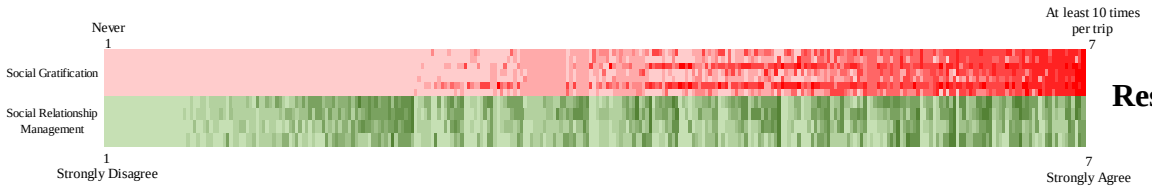

Figure 6. Heat Map of SG

Summary of Results

This chapter presented the results of this research study. It began with a discussion of the steps taken to validate the survey instrument used in the research. An expert panel was asked to review and validate the wording used in the survey instrument. Small changes were made based on the feedback from these experts. A pilot study was also used to validate the survey instrument. The results of this pilot study led to the deletion of one indicator that showed weak reliability and validity.

The pre-analysis data screening steps were then presented for the data supplied by the 297 respondents who fully completed the survey instrument. There was no missing

data for the major constructs of the BRAG model, though some demographic information was missing. Additionally, no response sets or outliers were detected in this data.

Next, an analysis of the reflective constructs in the BRAG model was presented. The internal consistency of these indicators was checked with Cronbach's Alpha and composite reliability. Both of these measures showed that all constructs had good internal consistency. The convergent validity of these indicators was then checked and three were determined to fall below the threshold recommended by Hair et al. (2014) and were removed from the dataset. The final step in assessing the reflective constructs was to check the discriminant validity of each. All constructs were determined to have good discriminant validity.

Following the analysis of the reflective constructs, the analysis of BRAG's structural model was then presented. This analysis was conducted using SmartPLS 2.0 and SPSS, and followed the recommendations of Hair et al. (2014). The moderating impact of a passenger and the knowledge of consequences were also reported, as was the impact of the demographic variables. Social gratification proved to be a significant predictor of TWD, and knowledge of consequences did not significantly moderate the relationship of any latent variables with TWD.

Finally, an analysis using data visualization was reported. Heat maps were used for this analysis. Although this analysis brought no new insight, it did confirm many findings from the PLS-SEM modeling. The relationship between social gratification and TWD was quite evident.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

Conclusions

This chapter presents the conclusions that were drawn from this study. The conclusions are presented through the tests of the research questions and hypotheses presented in this study. The implications of the research to the IS body of knowledge are then presented. Finally, recommendations for further research are discussed.

The main goal of this study was to validate empirically the influence of boredom, social anxiety, social relationships, and social gratification on an individual's decision to text while driving. This study built upon previous work of McKenna et al. (2002), D. J. Reid and Reid (2005), as well as Leung (2008), which investigated how texting affects one's boredom, social anxiety, social relationships, and social gratification. This study also extended the work of Skierkowski and Wood (2012) by investigating the reasons someone would text and drive.

The tests of the hypotheses of this study are summarized in Table 17, with a detailed explanation to follow. H1 through H5 represent the BRAG model without any moderating or demographic variables present. H6 and H7 test the effects that the two moderator variables, passengers and consequences, have upon TWD. Finally, H8 tests the impact that the four demographic variables upon TWD.

Table 17. Summary of Hypotheses Results

	Hypotheses	Path	Results
H1a:	The discomfort from *boredom* will significantly increase a *driver's self-reported texting*.	BOR_D -> TWD	Not Supported
H1b:		BOR_HA -> TWD	Not Supported
H1c:		BOR_I -> TWD	Partially Supported
H1d:		BOR_LA -> TWD	Partially Supported
H1e:		BOR_TP -> TWD	Not Supported
H2:	Drivers who maintain *social relationships* while driving will significantly decrease their *social anxiety*.	SRM -> SA	Not Supported
H3:	Drivers who maintain *social relationships* while driving will significantly increase their *social gratification*.	SRM -> SG	Supported
H4:	The discomfort from *social anxiety* will significantly increase a *driver's self-reported texting*.	SA -> TWD	Not Supported
H5:	The pleasure from *social gratification* will significantly increase a *driver's self-reported texting*.	SG -> TWD	Supported
H6a:	The *presence of a passenger* will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.	BOR_D * PASS -> TWD	Supported
H6b:		BOR_HA * PASS -> TWD	Supported
H6c:		BOR_I * PASS -> TWD	Not Supported
H6d:		BOR_LA * PASS -> TWD	Not Supported
H6e:		BOR_TP * PASS -> TWD	Not Supported
H6f:	The *presence of a passenger* will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.	SA * PASS -> TWD	Supported
H6g:	The presence of a *passenger* will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.	SG * PASS -> TWD	Not Supported
H7a:	The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.	BOR_D * CON -> TWD	Supported
H7b:		BOR_HA * CON -> TWD	Supported
H7c:		BOR_I * CON -> TWD	Supported
H7d:		BOR_LA * CON -> TWD	Supported
H7e:		BOR_TP * CON -> TWD	Supported
H7f:	The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.	SA * CON -> TWD	Supported
H7g:	The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.	SG * CON -> TWD	Supported
H8a:	A driver's *gender* will have no significant impact on a *driver's self-reported texting*.	GEN -> TWD	Supported
H8b:	The *number of years of driving experience* will have no significant impact on a *driver's self-reported texting*.	YRD -> TWD	Supported
H8c:	The *total number of text messages sent per day* will have no significant impact on a *driver's self-reported texting*.	MSG -> TWD	Not Supported
H8d:	The *number of miles driven per year* will have no significant impact on a *driver's self-reported texting*.	MIL -> TWD	Not Supported

The first hypothesis for this study was: The discomfort from *boredom* will significantly increase a *driver's self-reported texting*. The Multidimensional State Boredom Scale (MSBS) developed by Fahlman et al. (2013) was included in this study's survey instrument. Additionally, items from the National Highway Traffic Safety Administration's survey on distracted driving behavior were included in this study's survey instrument and used to measure a driver's texting behavior (Tison et al., 2011). These items from the MSBA and National Highway Traffic Safety Administration (NHSTA) were used to address the first hypothesis. H1a, H1b, and H1e, representing the disengagement, high arousal, and time perception factors of boredom and their impact on the dependent variable TWD, were not supported. H1c, the impact of the inattention factor of boredom on TWD, was partially supported. The path coefficient of this hypothesis was significant to $p < 0.01$, but neither the predictive accuracy nor the predictive relevancies were significant. Similarly, the impact of the low arousal factor of boredom on TWD, H1d, was also partially supported. The path coefficient of H1d was significant to $p < 0.001$, but neither the predictive accuracy nor the predictive relevance were significant.

The second hypothesis of this study was: Drivers who maintain *social relationships* while driving will significantly decrease their *social anxiety*. To address social relationship maintenance, the five relationship maintenance items from the Self-perception of Text-message Dependency Questionnaire were included in this study's survey instrument (Igarashi et al., 2008). The Brief Version of the Fear of Negative Evaluation Scale (BV-FNE) was included in this study's survey instrument to assess one's social anxiety (Leary, 1983). This second hypothesis was not supported. While the

path coefficient for this hypothesis was significant to $p < 0.001$, it indicated that drivers who maintain their social relationships will increase, rather than decrease, their social anxiety.

The third hypothesis of this study was: Drivers who maintain *social relationships* while driving will significantly increase their *social gratification*. As used for the second hypothesis, the same five relationship maintenance items from the Self-perception of Text-message Dependency Questionnaire were used to measure social relationship maintenance (Igarashi et al., 2008). After an extensive review of the literature, the study utilized the items used to measure social gratification from Hwang and Lombard (2006). Their study provided a list of items used to measure gratifications sought from instant messaging. This hypothesis was supported. The path coefficient related to this hypothesis was 0.6732 and significant to $p < 0.001$.

The fourth hypothesis for this study was: The discomfort from *social anxiety* will significantly increase a *driver's self-reported texting*. Items from the BV-FNE and the NHTSA were used to measure social anxiety and self-reported texting (Leary, 1983; Tison et al., 2011). This fourth hypothesis was not supported. While the path coefficient was significant to $p < 0.001$, the value of the coefficient was -0.1571, which indicated that social anxiety will decrease TWD instead of increasing it. Additionally, the f^2 effect size was small, indicating some predictive accuracy. However, the q^2 effect size was not significant, which indicates that there is no predictive relevance for this hypothesis.

The fifth hypothesis for this survey was: The pleasure from *social gratification* will significantly increase a *driver's self-reported texting*. The social gratification items from Hwang and Lombard (2006) were used to measure social gratification. NHTSA

items were used to measure self-reported texting (Tison et al., 2011). H5 was fully supported. The path coefficient related to this hypothesis was significant to $p < 0.001$. Additionally, both the f^2 and q^2 effects sizes were large, indicating good predictive accuracy and relevance.

The sixth hypothesis in this study investigated the moderating effects of the presence of a passenger on a driver's self-reported texting. The moderator variable passenger was applied to the paths that led to TWD from boredom's five components, plus social anxiety and social gratification. The moderator variable was applied to each of these paths independently. The sub-hypotheses are:

H6a-e: The *presence of a passenger* will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H6f: The *presence of a passenger* will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H6g: The presence of a *passenger* will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

The sub-hypotheses H6a, H6b, and H6f were supported. The moderation effects of a passenger did not significantly affect the impact that boredom's disengagement and high arousal factors had on TWD. Additionally, the presence of a passenger did not significantly moderate the relationship between social anxiety and TWD.

In contrast, the sub-hypotheses H6c, H6d, H6e, and H6g were not supported. The moderation effects of a passenger significantly affected the impact of boredom's inattention, low arousal, and time perception factors on texting while driving. The path

coefficients for H6c and H6d were significant to $p < 0.001$, while the path coefficient for H6e was significant to $p < 0.05$. The f^2 and q^2 effects sizes for H6c, H6d, and H6e were large, indicating all three had good predictive accuracy and relevance. Additionally, the path coefficient for H6g was significant to $p < 0.001$ and the f^2 and q^2 effects sizes for this sub-hypothesis were large. This indicates that the presence of a passenger does significantly affect the relationship between social gratification and TWD.

The seventh hypothesis in this study investigated the moderating effects of a driver's perceived severity of the consequences of TWD on a driver's self-reported texting. Similar to how the moderating effects of a passenger were tested, the moderator variable, consequences, was applied to the paths that led to TWD from boredom's five components, plus social anxiety and social gratification. The moderator variable was applied to each of these paths independently. The sub-hypotheses are:

H7a-e: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H7f: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H7g: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

All of the H7 sub-hypotheses were supported. None of the path coefficients relating to these sub-hypotheses were significant. This indicates that the perceived severity of consequences of TWD did not significantly impact the relationship that boredom's five factors, social anxiety, and social gratification have with TWD.

The eighth and final hypothesis in this study investigated whether any of the collected demographic information would help explain why a driver would text. To perform these tests, each demographic latent variable was added individually to the BRAG model, and the path coefficients were then calculated for each. The sub-hypothesis for H8 are:

H8a: A driver's *gender* will have no significant impact on a *driver's self-reported texting*.

H8b: The *number of years of driving experience* will have no significant impact on a *driver's self-reported texting*.

H8c: The *total number of text messages sent per day* will have no significant impact on a *driver's self-reported texting*.

H8d: The *number of miles driven per year* will have no significant impact on a *driver's self-reported texting*.

The sub-hypotheses H8a and H8b were supported. Neither of the patch coefficients for these sub-hypotheses was significant. This indicates that a neither driver's gender nor the number of years the driver has been driving impacted a driver's self-reported texting.

On the other hand, both H8c and H8d were not supported. The path coefficients for these hypotheses were significant to $p < 0.001$ and the f^2 and q^2 effects sizes were

small for each sub-hypothesis. This indicated that the annual mileage one drives, as well as the number of text messages that one sends in a day, significantly impacted a driver's self-reported texting.

Implications

This study makes several important contributions to the information system's body of knowledge. First, this study contributes to the body of knowledge regarding the relationship between social gratification and TWD. Results from this study indicate that social gratification is a significant predictor of TWD. Additionally, as Nelson et al. (2009) reported about drivers and their use of cell phones for calling, this study found that drivers will also send text messages regardless of the perceived consequences. This study demonstrated that the perceived gratification the driver receives from sending a text message is greater than the perceived severity of the known consequences. As laws banning texting seem to be ineffective at preventing TWD, this study implies that public health officials and lawmakers need to investigate other ways to prevent this often fatal activity.

This study also contributes to the body of knowledge by extending prior research (F. J. M. Reid & Reid, 2010; Rutland et al., 2007) to the texting driver. Although F. J. M. Reid and Reid (2010) reported that non-driving individuals use texting to maintain social relationships and reduce anxiety, this study did not extend those findings to drivers. In fact, the data in this study indicated that a driver's anxiety will increase when attempting to maintain social relationships. While Rutland et al. (2007) found that non-drivers frequently used texting to relieve their anxiety, this study did not confirm those finding

for drivers. These results imply that further research is necessary to investigate the relationship between driving and anxiousness.

Another significant contribution of this study was the development of the BRAG model that treated TWD as an addiction. Goodman (1990) stated that individuals repeat behavior that either produces pleasure or helps one escape unpleasantness, regardless of possible consequences. This study found that, even when drivers are aware of the consequences related to TWD, the pleasure received from social gratification is a very significant predictor of TWD.

Study Limitations

The results of this study need to be interpreted within the context of the study's limitations. The first limitation was the population used for this study, the students of a mid-sized regional university in the Pacific Northwest. Another limitation of the study is the disproportionate number of females who responded. Both of these limitations affect the generalizability of the study. Further research with a broader and more diverse population will be required to determine whether the results of this study can be generalized. Another limitation of this study was the self-reporting of an individual's frequency of TWD. Without some type of direct observation, it is uncertain if this data is accurate.

Recommendations

The results of this study indicate that further research is necessary to help explain why an individual continues to text and drive. While this study showed that social gratification is a strong predictor of TWD, no other pleasures were investigated.

Additionally, boredom and social anxiety were the only two discomforts that were investigated, with neither showing significant correlation to TWD. Other discomforts should be investigated to see if escaping those discomforts will cause a driver to text.

Additionally, public health officials, as well as state and local lawmakers, should investigate other means to prevent TWD. The current laws have proved to be ineffective and counterproductive. Viewing TWD as an addiction may provide some insight into more effective ways to prevent TWD. Further research in this area is needed to determine what means will prove to be effective.

Summary

The research problem that this study addressed was the increase in automobile accidents attributed to the driver's manipulation of hand-held devices for texting (USDOT, 2010; Wilson & Stimpson, 2010). Previous research has shown that, despite the increasing number of laws banning texting while driving, the number of fatal crashes associated with texting drivers has been increasing (USDOT, 2010; Wilson & Stimpson, 2010). Unfortunately, this research has been unable to reach a consensus on why a driver continues to text, even if the consequences are known to the driver (Drews et al., 2009; Ginsburg et al., 2008; Kircher et al., 2011; Nemme & White, 2010), hence the need for this study.

The main goal of this study was formulated after a thorough review of the relevant literature. This goal was to validate empirically the influence of boredom, social anxiety, social relationships, and social gratification on an individual's decision to text while driving, as illustrated by the (BRAG) model. This study also investigated the moderating influence that a passenger has upon a driver's texting behavior. Additionally,

the BRAG model was used to investigate whether drivers' knowledge of the consequences of texting while driving would influence their texting behavior. To address these goals, the following hypotheses were formulated and tested:

H1a-e: The discomfort from *boredom* will significantly increase a *driver's self-reported texting*.

H2: Drivers who maintain *social relationships* while driving will significantly decrease their *social anxiety*.

H3: Drivers who maintain *social relationships* while driving will significantly increase their *social gratification*.

H4: The discomfort from *social anxiety* will significantly increase a *driver's self-reported texting*.

H5: The pleasure from *social gratification* will significantly increase a *driver's self-reported texting*.

H6a-e: The *presence of a passenger* will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H6f: The *presence of a passenger* will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H6g: The presence of a *passenger* will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H7a-e: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *boredom* and a *driver's self-reported texting*.

H7f: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social anxiety* and a *driver's self-reported texting*.

H7g: The *perceived severity of the consequences of texting* while driving will have no significant impact on the relationship between *social gratification* and a *driver's self-reported texting*.

H8a: A driver's *gender* will have no significant impact on a *driver's self-reported texting*.

H8b: The *number of years of driving experience* will have no significant impact on a *driver's self-reported texting*.

H8c: The *total number of text messages sent per day* will have no significant impact on a *driver's self-reported texting*.

H8d: The *number of miles driven per year* will have no significant impact on a *driver's self-reported texting*.

A quantitative methodology was chosen to address these hypotheses. Data was gathered through an online survey instrument that was developed from previously validated measures. Boredom was measured with the 29-item Multidimensional State Boredom Scale (BOR_1 to BOR_29; Fahlman et al., 2013). The five relationship items from the Text-message Dependency Questionnaire (SRM_1 to SRM_5) were used to measure social relationship maintenance (Igarashi et al., 2008). To measure social anxiety, the Brief Version of the Fear of Negative Evaluation Scale (BV-FNE) was selected (SA_1 to SA_12; Leary, 1983). Social gratification was measured with the seven items (SG_1 to SG_7) developed by Hwang and Lombard (2006) to measure the social

utility of instant messaging. Finally, all questions related to demographics (DEMO_1, DEMO_4, DEMO_5, and DEMO_6), passengers (PASS_2), consequences (CON_1), and texting while driving (TWD_2) were taken from Tison et al. (2011). With the exception of the demographics, all items were measured with a seven-point Likert scale. On the advice of the expert panel, small wording changes were made to some of the questions. These changes related the questions better to driving and updated some terminology to fit today's environment better.

The survey instrument was administered online using the Qualtrics Research Suite. Prior to respondents completing the survey, their consent was obtained and they were screened to ensure that they both drove on a regular basis and owned a cell phone capable of texting. Prior to full distribution of the survey, a small pilot test was conducted to ensure the reliability of the survey instrument (Krosnick & Presser, 2009; Sekaran, 2003; Zikmund, 1988). The results from this pilot study determined that one boredom indicator did not have acceptable reliability, and it was removed from the survey instrument.

There were 297 respondents who fully completed the survey instrument. Prior to analyzing the data obtained from these respondents, pre-analysis data screening was performed to detect irregularities or other problems with the data (Mertler & Vannatta, 2010). Following the process laid out by Hair et al. (2014), checks were made for missing data, response sets, and outliers. Missing data was found in 35 of the responses to the open-ended demographic questions. These responses were replaced with the mean of the respective indicator (Hair et al., 2014). There were no response sets or outliers identified in the data.

After the pre-analysis screening, the structural model was assessed following the process recommended by Hair et al. (2014). Initially, the reflective indicators for each construct within the BRAG model were assessed for internal consistency reliability, convergent validity, and discriminant validity. Each of the constructs demonstrated good internal consistency and discriminant validity. However, two boredom indicators and one social relationship indicator were determined to not have convergent validity, and were removed from the data.

Next, the structural model as a whole was assessed by evaluating path coefficients, R^2 for the endogenous variables, the f^2 effect size, and the q^2 effect size. From this analysis, it was determined that the gratification one receives from maintaining one's social relationships is a significant predictor of texting while driving. Additionally, the analysis showed that a driver will text regardless of the consequences.

Heat maps were also used to visualize the relationships between the endogenous variables within the BRAG model and their predictor latent variables. This analysis did not provide any new insights into the data. However, the data visualization did show the significant relationship between social gratification and TWD.

This research study concluded by discussing its implications and limitations. The results were compared with prior research, and recommendations for further studies were proposed. An argument was made for public health officials and lawmakers to investigate other means to prevent TWD, as the current laws have not curtailed this behavior. Limitations that may restrict the generalizability of this study were also presented.

Appendix A

Survey Instrument

Consent Form for Participation in the Research Study Entitled
An Empirical Investigation into the Role that Boredom, Relationships, Anxiety, and Gratification (BRAG) Play in a Driver's Decision to Text

Funding Source: None.

IRB protocol #: wang05151402

Principal investigator(s)
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For questions/concerns about your research rights, contact:
Human Research Oversight Board (Institutional Review Board or IRB)
Nova Southeastern University
(954) 262-5369/Toll Free: 866-499-0790
IRB@nsu.nova.edu

Human Subjects Review Council
Central Washington University
(509) 963-3115
hsrc@cwu.edu

What is the study about?
The main goal of this research study is to validate empirically the influence of boredom, social anxiety, social relationships, and social gratification on an individual's decision to text while driving.

Texting while driving is a growing problem that has serious, and sometimes fatal, consequences. Despite laws enacted to curb this behavior, the problem continues to grow. Discovering factors that can reduce such risky behavior can significantly contribute to research, as well as save lives and reduce property damage. My proposed model will evaluate the effects that boredom, social relationships, social anxiety, and social gratification have upon a driver's frequency of reading and typing text messages.

Why are you being asked to participate?
Approximately 200 students and faculty from Central Washington University are requested to participate in this research. You are being asked as you are either a student or a faculty member at Central Washington University.

What will you be doing if you agree to be in the study?
If you choose to participate in this study, you will complete a survey with questions about your texting activities. You will also be asked questions about how texting impacts your level of boredom and anxiety, how texting impacts your social relationships, and how texting provides you with any social gratification. It is estimated that it will take between 5 and 10 minutes to complete this survey. At no time will you be asked to provide any personally identifiable information. This is an anonymous survey.

What are the dangers to you?
The risks associated with this research are minimal. You may feel some discomfort or agitation when answering questions within the survey. If the discomfort or agitation is not tolerable, you may terminate the survey at any time.

If you have any questions about this research or your research rights, please contact Nathan White at (905) 963-1904 or whiten1@cwu.edu. Alternatively, you may contact the Human Subjects Research Council at (509) 963-3115 or hsrc@cwu.edu

Are there any benefits for taking part in this research study?
There are no direct benefits.

Will you be compensated for being in the study? Will it cost you anything?
There are no costs to you or payments made for participating in this study.

How will your information be kept private?
At no time will you be requested or required to provide any personally identifiable information in order to participate in this study. In addition, there will be no collection of IP addresses or other electronic codes that could be used to identify you.

The data collected for this study will be securely maintained for at least 36 months after the conclusion of this study. Reasonable and appropriate safeguards have been used in the creation of the web-based survey to maximize the confidentiality and security of your responses; however, when using information technology, it is never possible to guarantee complete privacy. In order to safeguard the data, it will be securely stored on Central Washington University's version of Qualtrics. Password protection as well as the https protocol will be required to access or update this information.

All information obtained in this study is strictly confidential unless disclosure is required by law. The Human Subjects Review Council of Central Washington University and the Human Research Oversight Board of Nova Southeastern University may review the research records generated during this study. In addition, Dr. Yair Levy, the dissertation chair for this study, may also review the research records generated during this study.

What if you do not want to participate or you want to leave the study?
You have the right to leave this study at any time or refuse to participate. If you do decide to leave or you decide not to participate, you will not experience any penalty or loss of services you have a right to receive.

Other Considerations:
If significant new information relating to the study becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by the investigators.

Voluntary Consent by Participant:
By clicking the Agree button below, you indicate that

- this study has been explained to you
- you have read this form or it has been read to you
- your questions about this research study have been answered
- you have been told that you may ask the researchers any study-related questions in the future
- you have been told that you may ask Human Subjects Research Council personal questions about your study rights
- you are entitled to a copy of this form after you have read and signed it
- you voluntarily agree to participate in the study entitled "An Empirical Investigation into the Role that Boredom, Relationships, Anxiety, and Gratification (BRAG) Play in a Driver's Decision to Text"

Additionally, by clicking the Agree button, you attest that you:

- Are 18 years of age or older
- Own a cell phone that is capable of sending and receiving text messages
- Drive an automobile at least once a week

The following questions concern your use of texting to maintain your social relationships. Please respond to each of the questions.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I find it difficult to maintain new friendships without text messages. (1)	❍	❍	❍	❍	❍	❍	❍
Forming new relationships without using text messages is difficult. (2)	❍	❍	❍	❍	❍	❍	❍
I think my relationships would fall apart without text messages. (3)	❍	❍	❍	❍	❍	❍	❍
Without text messages, I would not be able to contact friends whom I cannot meet on a daily basis. (4)	❍	❍	❍	❍	❍	❍	❍
Without using text messages, I find it difficult to say what is on my mind. (5)	❍	❍	❍	❍	❍	❍	❍

The following questions concern the pleasure that you may receive while texting and driving. Please respond to all of the questions.

	Strongly Disagree(1)	Disagree(2)	Somewhat Disagree(3)	Neither Agree nor Disagree(4)	Somewhat Agree(5)	Agree(6)	Strongly Agree(7)
When I am driving, texting helps me to keep in touch with friends or family members. (1)	❍	❍	❍	❍	❍	❍	❍
While driving, texting helps me to keep in touch with friends or relatives who live far away. (2)	❍	❍	❍	❍	❍	❍	❍
Texting while driving helps me to exchange information with people I know. (3)	❍	❍	❍	❍	❍	❍	❍
Texting helps me see what others are up to when I am driving. (4)	❍	❍	❍	❍	❍	❍	❍
Even though I am driving, texting helps me to feel involved with what's going on with other people. (5)	❍	❍	❍	❍	❍	❍	❍
When driving, texting helps me pass information on to other people. (6)	❍	❍	❍	❍	❍	❍	❍
Even though I am driving, texting helps me let others know I am concerned about them. (7)	❍	❍	❍	❍	❍	❍	❍

The following questions concern any anxiousness that you may feel while driving. Please respond to all of the questions.

	Strongly Disagree(1)	Disagree(2)	Somewhat Disagree(3)	Neither Agree nor Disagree(4)	Somewhat Agree(5)	Agree(6)	Strongly Agree(7)
I worry about what other people will think of me even when I know it doesn't make any difference. (1)	❍	❍	❍	❍	❍	❍	❍
I am concerned if I know people are forming an unfavorable impression. (2)	❍	❍	❍	❍	❍	❍	❍
I am frequently afraid of other people noticing my shortcomings. (3)	❍	❍	❍	❍	❍	❍	❍
I worry about what kind of impression I am making on someone. (4)	❍	❍	❍	❍	❍	❍	❍
I am afraid that others will not approve of me. (5)	❍	❍	❍	❍	❍	❍	❍
I am afraid that people will find fault with me. (6)	❍	❍	❍	❍	❍	❍	❍
Other people's opinions of me bother me. (7)	❍	❍	❍	❍	❍	❍	❍
When I am talking to someone, I worry about what they may be thinking about me. (8)	❍	❍	❍	❍	❍	❍	❍
I am usually worried about what kind of impression I make. (9)	❍	❍	❍	❍	❍	❍	❍
If I know someone is judging me, it has an effect on me. (10)	❍	❍	❍	❍	❍	❍	❍
Sometimes I think I am too concerned with what other people think of me. (11)	❍	❍	❍	❍	❍	❍	❍
I often worry that I will say or do the wrong things. (12)	❍	❍	❍	❍	❍	❍	❍

The following questions concern the boredom that you may feel while driving. Please respond to all of the questions.

	Strongly Disagree(1)	Disagree(2)	Somewhat Disagree(3)	Neither Agree nor Disagree(4)	Somewhat Agree(5)	Agree(6)	Strongly Agree(7)
When driving, time passes by more slowly than usual. (1)	❍	❍	❍	❍	❍	❍	❍
When driving, I am stuck in a situation that I feel is irrelevant. (2)	❍	❍	❍	❍	❍	❍	❍
I am easily distracted when driving. (3)	❍	❍	❍	❍	❍	❍	❍
I am lonely when driving. (4)	❍	❍	❍	❍	❍	❍	❍
Everything seems to irritate me when I drive. (5)	❍	❍	❍	❍	❍	❍	❍
I wish time would go by faster while I'm driving. (6)	❍	❍	❍	❍	❍	❍	❍
When I drive, everything seems repetitive and routine to me. (7)	❍	❍	❍	❍	❍	❍	❍
I feel down when I am driving. (8)	❍	❍	❍	❍	❍	❍	❍
When I'm driving, I seem to be forced to do things that have no value to me. (9)	❍	❍	❍	❍	❍	❍	❍
I feel bored when I drive. (10)	❍	❍	❍	❍	❍	❍	❍
Time drags on when I drive. (11)	❍	❍	❍	❍	❍	❍	❍
When I am driving, I am more moody than usual. (12)	❍	❍	❍	❍	❍	❍	❍
I am indecisive or unsure of what to do next while driving. (13)	❍	❍	❍	❍	❍	❍	❍
I feel agitated when I drive. (14)	❍	❍	❍	❍	❍	❍	❍
I feel empty while driving. (15)	❍	❍	❍	❍	❍	❍	❍
It is difficult to focus my attention when I drive. (16)	❍	❍	❍	❍	❍	❍	❍
When I drive, I want to do something fun, but nothing appeals to me. (17)	❍	❍	❍	❍	❍	❍	❍
Time moves very slowly when I drive. (18)	❍	❍	❍	❍	❍	❍	❍
When I drive, I wish I was doing something more exciting. (19)	❍	❍	❍	❍	❍	❍	❍
When I drive, my attention span is shorter than usual. (20)	❍	❍	❍	❍	❍	❍	❍
I am impatient when I drive. (21)	❍	❍	❍	❍	❍	❍	❍

When I am driving, I feel I am wasting time that would be better spent on something else. (22)	❍	❍	❍	❍	❍	❍	❍
My mind wanders when I drive. (23)	❍	❍	❍	❍	❍	❍	❍
When I am driving, I want something to happen but I'm not sure what. (24)	❍	❍	❍	❍	❍	❍	❍
I feel cut off from the rest of the world when I am driving. (25)	❍	❍	❍	❍	❍	❍	❍
When I am driving, it seems like time is passing slowly. (26)	❍	❍	❍	❍	❍	❍	❍
When I drive, I am annoyed with the people around me. (27)	❍	❍	❍	❍	❍	❍	❍
I feel like I'm sitting around waiting for some- thing to happen when I am driving. (28)	❍	❍	❍	❍	❍	❍	❍
When I am driving, it seems like there's no one around for me to talk to. (29)	❍	❍	❍	❍	❍	❍	❍

The following questions concern texting and driving. Please respond to all of the questions.

	Never(1)	Only Once or Twice Ever(2)	Once Per Month(3)	Once per Week(4)	At Least Once, but No More Than 4 Times per Trip(5)	At Least 5 Times, but No More Than 9 Times per Trip(6)	At least 10 times per trip(7)
How frequently do you send text messages while driving? (2)	❍	❍	❍	❍	❍	❍	❍
How frequently do you send text messages when a passenger is present? (4)	❍	❍	❍	❍	❍	❍	❍

The following questions concern demographic information. No personally-identifiable information will be gathered. Please respond to each of the questions.

	Male(1)	Female(2)
What is your gender? (1)	❍	❍

	Very Uncertain(1)	Uncertain(2)	Somewhat Uncertain(3)	Neither Certain nor Uncertain(4)	Somewhat Certain(5)	Certain(6)	Very Certain(7)
Does the state where you reside have a law banning texting while driving for all drivers? (1)	❍	❍	❍	❍	❍	❍	❍

Approximately how many miles do you drive in a year? _____

How many years have you been driving? _____

What is the average number of text messages that you send in a day? _____

Appendix B

Central Washington University HSRC Approval

CWU Central Washington University
LEARN. DO. LIVE.

January 9, 2015

Nathan White
ITAM
Mail Stop 7488

Dear Mr. White:

Thank you for submitting an exemption request for your study, *An Empirical Investigation into the Role that Boredom, Relationships, Anxiety and Gratification (BRAG) Play in a Driver's Decision to Text.* The application as submitted was screened for exemption status according to the policies of CWU and the provisions of the applicable federal regulations. Your research was found to be subject to CWU oversight but exempt from federal regulation because it involves collecting anonymous survey data from adult volunteers [see 45 CFR 46.101b(2)]. This certification is valid for one year (through January 8, 2016) so long as the approved procedures are followed.

Your responsibilities with respect to keeping this office apprised of your progress include the following:

1. File a Project Modification Request form for HSRC approval before modifying your study in any way except formatting of documents (e.g. any change in recruitment, subjects, co-investigators, consent forms, any procedures). If there is a major change in purpose or protocol, you may be asked to submit a new application. Please call if you have questions.
2. File a Termination Report form with this office upon completion of your study.
3. Immediately contact the HSRC for further guidance should you encounter unanticipated problems with your research. Follow up with an Unanticipated Problems report may be required.
4. Provide a current contact address and phone number if either should change prior to termination of the study.

All of the forms referred to above are available on our website. Please refer to your HSRC study number (H14177) in all related future correspondence with this office. If you have questions or concerns, feel free to contact me.

I have appreciated working with you; may you have a productive research experience.

Sincerely,

Sandra M. Martinez

Sandra M. Martinez, M.A.
Human Protections Administrator

c: HSRC File
Dr. Leo D'Acquisto, HSRC Chair

Human Subjects Review Council Office
400 East University Way . Ellensburg WA 98926-7401 . Office: 509-963-3115 . Black Hall 225-17 . Fax: 509-963-1064 . Web: www.cwu.edu/hsrc
EEO/AA/TITLE IX INSTITUTION • TDD 509-963-2143

Appendix C

Nova Southeastern University IRB Approval

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

NSU

MEMORANDUM

To: Nathan White

From: Ling Wang, Ph.D.
Institutional Review Board

Date: July 17, 2014

Re: *An Empirical Investigation into the Role that Boredom, Relationships, Anxiety, and Gratification (BRAG) Play in a Driver's Decision to Text*

IRB Approval Number: wang05151402

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

03301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: *inga@nsu.nova.edu* • Web site: www.nova.edu/cwis/ogc

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