Texting behind the Wheel and Beyond: A Look at Problematic Habits

Bradford L. Schroeder and Valerie K. Sims
University of Central Florida, Psychology Department

Texting while driving is a dangerous behavior that is heavily researched. However, there are other problematic texting habits that are less well-researched. A study was performed to examine other potentially problematic texting behaviors in addition to texting while driving. Furthermore, individual differences in cognition and feelings of control were examined in relation to these texting habits. Participants completed several self-report surveys assessing texting habits, cognitive wisdom, and locus of control. It was found that those who text while driving also tend to text more during a movie, while in class, and while stopped in the car at a red light or traffic jam. It was also found that a somewhat high proportion of participants endorsed potentially problematic texting behaviors such as texting while stopped in the car and texting while about to fall asleep. It was concluded that one of the major issues with problematic texting relates to reductions in situation awareness. Additional human factors implications are discussed.

INTRODUCTION

Ever since the first message was sent in 1992, text messaging has exploded in popularity as a means of communication; however, its surge in popularity does not appear to come without cost. Texting can be addictive, especially to teens and young adults who may feel compelled to look at or answer a text message immediately once received. This compulsion is notorious for being a factor in over 1.5 million car accidents that are caused each year by drivers dividing their attention between the road and their mobile phones (NSC, 2010). Although the impact and risks of texting while driving are becoming more widely researched, there is a dearth of literature examining the frequency and endorsement of other texting behaviors along with their implications for safety and human factors.

Texting at the Wheel

In the state of Florida, texting while driving was recently made illegal (Florida Ban of Texting While Driving Law, 2013); however, it still remains legal for drivers to text while their car is running but not in motion. Researchers have suggested that switching one's attention from phone to road causes delays in reaction time (Sawyer & Clegg, 2008), which may also lead to a delay in regaining one's full situation awareness on the road. In cases of texting at a red light or in standstill traffic, other drivers may become frustrated with the texting driver and express their anger by honking their horn. This could startle the texting driver who then hastily resumes driving, potentially putting this driver or other drivers at risk. Some have proposed that so-called "red light texting" be made illegal to better reduce driver distraction (Friedman, 2013); however, there are gaps in the literature investigating the safety implications, traffic congestion consequences, or public endorsement of this behavior.

Less-Studied Texting Habits

Some texting habits, such as texting while walking (Lamburg & Muratori, 2012; Schabrun, van den Hoorn, Moorcroft, Greenland, & Hodges, 2014; Schwebel et al., 2012), and texting while about to fall asleep or sleeping (Thomée, Härenstam, & Hagberg, 2011; White, Buboltz, & Igou, 2011) have been researched but are not as prominent as the texting while driving literature. Texting while walking has a multitude of safety implications for pedestrians, as it restricts their awareness of their surroundings and disturbs their sense of balance (Schabrun et al., 2014). Some researchers have found that pedestrians who text while walking have an increased likelihood of being struck by a vehicle (Schwebel et al. 2012), and others have indicated that it has negative effects on gait and can even cause people to deviate from their path (Lamburg & Muratori, 2012). In essence, distraction caused by texting significantly decreases pedestrian safety.

Regarding texting while about to fall asleep, or waking up in the middle of the night to respond to texts, some have suggested that texting or responding to texts in these situations adversely affects one's sleep quality (Thomée et al., 2011). Thomée et al. (2011) indicated that the loss of sleep due to such texting habits lead to increased levels of stress and even depressive symptoms. Generally, the people that are more susceptible to this are those who use their mobile phones very frequently (White et al. 2011). Understandably, the intermittent sounds coming from one's cell phone and the brightness of the screen can become disruptive if one is trying to sleep. The resulting sleep quality decrements could contribute to sleep deprivation. Aware of these effects, some researchers have suggested that healthcare providers inquire about their patient's mobile phone habits during wellness visits (Frank, Santurri, & Knight, 2010).

Potentially Problematic Texting

Very little has been reported on other texting behaviors, such as texting in the bathroom (Truong, Julie, & Eun, 2013) or texting at the movie theater (Godley, 2012). Truong et al. (2013) suggested that as many as 65% of young adults text while using the bathroom, but at least 25% of people believe that under no circumstances is texting in the bathroom acceptable. There are health and sanitation concerns for texting in the bathroom, but most of the participants in Truong et al.'s (2013) study believed texting in public restrooms to be acceptable as long as it was done quietly.

Patrons of movie theaters are typically instructed to silence their phones and refrain from texting during the show as a courtesy to other viewers, but in one high profile case, texting during a movie was blamed as a cause for a movie theater shooting (Almasy, 2014). More generally, texting at the movie theater is considered irritating; however, in a recent study, 55% of participants reported that they text during movies (Godley, 2012). Nevertheless, there is a lack of scientific research on this topic which we aim to redress.

THE CURRENT RESEARCH

The Current Study

This research is significant for teens and young adults (who tend to text more frequently than others), and anyone who could be affected by distraction caused by texting, such as drivers or pedestrians. The results should prove particularly interesting to anyone who texts, and may help to better understand the relationships between different forms of problematic texting. In addition, endorsement percentages of problematic texting behaviors may be indicative of new potential problem areas that have human factors implications.

We believe that some texting habits may be related to some aspects of cognition, and included the cognitive dimension of the 3D-WS (Ardelt, 2003) as an exploratory measure. In essence, this dimension assesses cognitive and analytical ability and traits like need for cognition. This may be related to texting habits that could provide cognitive stimulation, like texting to alleviate boredom.

We also think that some texting behaviors may be related to feelings of control, and we have included Rotter's (1966) Locus of Control scale as an additional exploratory measure. For example, it is possible that some may text as a means of controlling their situation. Domoff (2010) suggested that some text to satisfy escapism motivations, like texting to withdraw oneself from uncomfortable circumstances.

Purpose Statement

The objective of this study is to better understand the more commonly researched texting behaviors, such as texting while driving, but also to examine the less well-studied texting behaviors. We also aim to explore how texting relates to individual differences in cognitive wisdom and perceived locus of control. Additionally, we will provide human factors considerations for these less-researched texting behaviors and investigate the other texting behaviors associated with high-problematic texting.

METHOD

The data used in this study was part of a larger online study at the University of Central Florida. This study analyzes data from the first 124 complete collected responses. Eighty-five other participants' data were excluded due to a failure to follow instructions, haphazard responding, or a complete failure to respond.

Participants

Data were collected from 124 participants who volunteered to complete several surveys online. The participants were comprised of 92 females, 30 males, and 2 who preferred not to disclose their gender, with ages ranging from 18 to 25 years (M = 20.35, SD = 2.21). Seventy-nine percent of the participants were undergraduate students at the University of Central Florida. Seventy-six percent of the participants described their ethnicity as White (Non-Hispanic), fifteen percent described their ethnicity as Hispanic, eight percent described their ethnicity as African-American, four percent described their ethnicity as Asian, and six percent described their ethnicity as "Other" (participants were permitted to select multiple options to more accurately describe their ethnic background). Ninety percent of the participants reported that their cell phone plan featured unlimited texting, and only one participant reported that they did not text. All participants were treated ethically according to American Psychological Association guidelines for empirical research.

Materials

Texting behaviors were measured using a self-report texting survey designed specifically for this study. The survey had 18 items that assessed various texting behaviors (e.g., "how often do you text while class is in session?", "…while driving?" "…while bored?"). Each item was rated on a six-point Likert-type scale, ranging from 1 (*not applicable*) to 6 (*very often*).

Locus of Control was measured using Rotter's (1966) Internal vs. External Control of Reinforcement scale. This questionnaire consists of 29 items where participants must choose one statement or another (e.g., "what happens to me is my own doing, vs. Sometimes I feel that I don't have enough control over the direction my life is taking").

Cognitive Wisdom was measured using the cognitive dimension of the Three-Dimensional Wisdom Scale (3D-WS, Ardelt, 2003). This was a 14-item questionnaire that assessed participants' attitudes toward certain statements relating to cognition (e.g., "A problem has little attraction for me if I don't think it has a solution", "Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me"). Each item was rated on a five-point Likert-type scale, ranging from 1 (*strongly agree,* or *definitely true of myself*) to 5 (*strongly disagree,* or *not true of myself*).

Procedure

Participants were recruited online through social networking and the University of Central Florida's research participation system for undergraduate students. An informed consent form was displayed after accessing the survey link, and participants who provided their consent proceeded to complete surveys assessing demographic information, texting habits, perceived locus of control, and cognitive wisdom. These surveys were administered completely online, but

participants had the option to complete the survey in a quiet lab with minimal distractions if they preferred. Participants were eligible to receive research participation credit if they accessed the survey through the University's research participation system; otherwise, no compensation was awarded for participation.

RESULTS

To determine the endorsement of texting behaviors, we examined the proportions of our sample that reported that they "sometimes", "often", or "very often" engage in each texting behavior (see Figure 1).

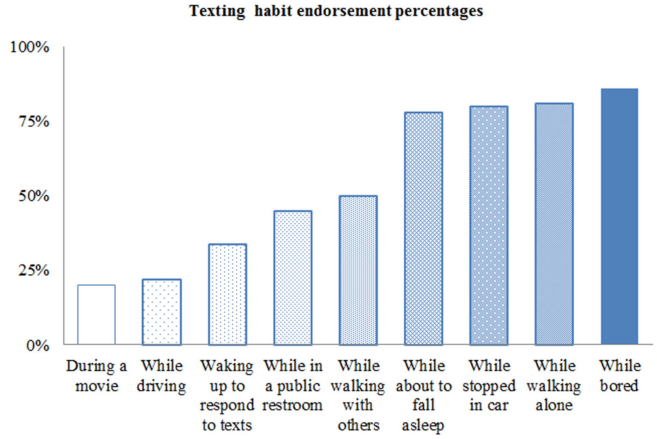

Figure 1. Percentages of participant endorsement of texting habits

To examine individual differences in cognitive wisdom and perceived locus of control, bivariate correlation analyses were performed. Analyses indicated significant negative correlations between the cognitive dimension of the 3D-WS and a number of texting habits (see Table 1). However, this dimension is reverse-scaled, meaning that these texting habits are positively related to the construct of cognitive wisdom.

	Cognitive Wisdom
Texting while…	*r*
… watching a movie at the theater	-.198*
… in a new place with unfamiliar people	-.266**
… in the waiting room	-.210*
… bored	-.235*
… riding in the car with others	-.255**
… lying in bed and about to fall asleep	-.270**

*$p < .05$. **$p < .01$

Table 1. Correlations between the cognitive dimension of the 3D-WS (Cognitive Wisdom) and texting behaviors

Additionally, there were significant positive correlations between perceived locus of control and "texting while bored" ($r = .225$, $p = .021$), and "texting while having a face-to-face conversation with others" ($r = .253$, $p = .009$), such that increases in these texting behaviors are positively related to an external perceived locus of control.

To investigate the prevalence of endorsed texting behaviors in high problematic texters, we performed *t*-tests comparing those who endorsed problematic texting behaviors (who reported "sometimes", "often", or "very often" for these behaviors) against those who did not endorse problematic texting behaviors (who reported "not applicable", "never", or "rarely" for these behaviors). In the following analyses, we investigated what we consider to be two of the most dangerous texting habits: Texting while driving and texting while stopped in the car. To correct for performing multiple *t*-tests, a more conservative alpha of .01 was used unless otherwise noted. All reported significance values are two-tailed.

Those who endorsed "texting while driving" tended to also text at the movies significantly more often, text in class significantly more often, and text while stopped in the car significantly more often compared to those who did not endorse texting while driving. A similar pattern of differences with similar magnitudes was seen for "texting while stopped in the car" (see Table 2).

	High texters		Low texters				
Texting while…	*M*	*SD*	*M*	*SD*	*N*	*df*	*t*
Texting while driving							
…at the movies	3.22	1.25	2.52	0.90	117	115	3.22**
…during class	4.07	1.17	3.30	1.11	118	116	3.15**
…stopped in car	4.96	0.71	3.14	1.25	118	78[a]	9.63**
Texting while stopped in the car							
…at the movies	2.92	1.12	2.43	0.87	117	115	2.63*
…during class	3.84	1.18	3.07	1.02	118	116	3.76**
…driving	3.24	1.04	1.96	.66	118	105[a]	8.07**

*$p < .05$. **$p < .01$
[a]Levene's test indicated a violation of equality of variances assumption; adjusted *df* are shown.

Table 2. Mean differences between those who endorse texting while driving and those who do not (top section) and mean differences between those who endorse texting while stopped in the car and those who do not (bottom section)

Although the pattern of results for texting while driving and texting while stopped in the car was similar, there was a significant difference between endorsements of these two behaviors. Participants reported texting more frequently while stopped in their car ($M = 3.56$, $SD = 1.38$) than while driving ($M = 2.64$, $SD = 1.08$; $t(117) = 10.73$, $p < .0001$).

DISCUSSION

The results indicated low endorsements among our participants for texting during a movie (20%), while driving (22%), waking up to respond to texts (34%), and while in a public restroom (45%). A majority of our participants endorsed texting while walking with others (50%), while about to fall asleep (78%), while stopped in the car at a red light or traffic jam (80%), while walking alone (81%), and while bored (86%). Interestingly, there is a stark difference of almost 60 percentage points in endorsement between two of the most dangerous texting behaviors: Texting while driving and texting while stopped in the car. It is no surprise that those who do one also do the other more often (as they would occur in the same setting), but it is probable that those who are still finishing typing a text message as the light turns green may continue texting as they resume acceleration. We urge future research to investigate the effects of texting when the car is running but not in motion. At present, texting while driving is illegal in 41 states (Governors Highway Safety Association, 2014), but the laws are ambiguous concerning texting while the car is stopped; specifically, whether being in a stopped but still running car is legally considered "driving". Our results suggest that those who text while stopped at a red light or traffic jam also text while driving more frequently. Illegalizing this behavior could likely also reduce the frequency of texting while driving.

Another interesting endorsement is that of texting while walking with others (50%) and while walking alone (81%). Although this is not as dangerous as texting while driving, people who text while walking are more likely to bump into other people or objects. In the most extreme cases, texting while walking increases the likelihood of being struck by a vehicle when crossing the street (Schwebel et al., 2012). Aside from indicating how prevalent this habit is, such a high rate of endorsement for texting while walking alone might suggest that many young adults do not see this behavior as problematic or particularly risky. However, it is possible that the endorsement of this behavior would be different when considering different settings (e.g., while walking in a busy intersection, while walking in a parking garage, or while walking in a traffic-free area). For future research, it may be worth investigating the costs to situation awareness for texting while walking in different environments. Furthermore, texting while walking alone at night could be particularly dangerous, as reduced levels of situation awareness might impair one's ability to detect other people or objects. It could also make oneself an obvious target for crime.

Regarding texting and sleeping, it would appear that there are many who text while lying in bed about to fall asleep (78%), but not quite as many who endorse waking up in the middle of the night to respond to text messages (34%). This suggests that many young adults may lose some amount of sleep due to texting. Some have proposed that limiting texting before bedtime is essential for maintaining sufficient sleep quality among young adults (White, et al. 2011). The reason this is such an issue for sleep quality may relate to users feeling a compulsion to read and respond to texts, but more simply, an individual who is receiving texts at night is likely to be disrupted by buzzing, beeping, and bright screens. Those who are involved in the design of cell phones and cell phone operating systems should consider designing with this issue in mind. An application that can detect when the user is sleeping could silence alerts and notifications and could also dim screens to prevent the user's sleep from being disrupted as much from texting.

A large proportion of our sample reported endorsing texting while bored, and 48% of our sample reported texting while bored "very often" (the maximum level of response). In essence, texting while bored isn't problematic, but we believe that it could become problematic if an individual gets bored and decides to text while on the job, operating machinery, or in a meeting. We believe it possible that boredom could be a primary underlying factor for some problematic texting habits, such as while driving. Future research should consider the influence of boredom in situations where texting can be dangerous.

Almost half of our participants endorsed texting while in a public restroom (45%). This is lower than Truong et al.'s (2013) finding that 65% of young adults text while in the bathroom, but this still equates to a notable amount of texting in public restrooms. When considering the spread of germs, this behavior is clearly problematic. In one study, as many as 1 in 6 mobile phones were found to have fecal matter on them (Song, 2011), which contribute to the spread of infectious diseases such as E. coli. In some cases, multiple people share the same phone, and they could become exposed to germs that cause illness.

We also found significant negative relationships between the cognitive dimension of the 3D-WS and a number of texting habits. This scale measures cognitive traits such as a need for cognition and analytical ability, providing a glimpse at an individual's "cognitive wisdom". We found that high cognitive wisdom was associated with higher frequency texting while watching a movie at the theater, while in a new place with unfamiliar people, while in the waiting room, while bored, while riding in the car with others, and while lying in bed about to fall asleep. These relationships indicate that there are a number of texting habits that relate to cognition, and a number of relationships are with low-stimulating situations (such as boredom, about to fall asleep, or in waiting rooms). We suggest that these high cognitive wisdom individuals are more likely to seek stimulation in these situations to satisfy their cognitive needs. Fortunately, there were not relationships with texting while driving or while stopped in the car, but this is not entirely surprising. Cognitive ability has been shown to be related to mindfulness (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010) which has been suggested as a predictor of lower levels of texting while driving among young adults (Feldman, Greeson, Renna, & Robbins-Monteith, 2011). For future research, it might be interesting to investigate the relationship among cognitive wisdom, mindfulness, and driving behaviors.

There were only two significant correlations with texting habits and locus of control, which were both positive. High scores on the locus of control scale indicate an external locus of control. As Rotter (1966) suggested, these individuals believe that many things in their life are out of their control –

they tend to be more stressed and more prone to clinical depression. These results suggest that people who have an external locus of control are more likely to text while bored or while having a face-to-face conversation with someone else. Fortunately, there weren't any significant associations with this and any dangerous texting behaviors. Our 18-item texting scale generally focused on texting habits that were potentially problematic, but future research should investigate other texting habits that might elicit feelings of a need for control in an individual.

Our results also suggest that some problematic texting habits are related to each other. Specifically, those who endorse texting while driving text more while watching a movie at the theater, during class, and while stopped in the car. Similarly, those who text while stopped in the car also text more while watching a movie at the theater, during class, and while driving. It is not surprising that these patterns are similar, but it is interesting that these people also endorse other problematic texting habits. Texting at the movie theater is disruptive to the other people in the theater, and texting in class is disruptive to the other people in the class, along with the instructor. Future research should investigate other characteristics of these problematic texters. It is possible that there is some common underlying characteristic that is related to why people who endorse problematic texting in some situations endorse other problematic texting habits.

The sample we collected contained university students and was roughly three-quarters female. As such, our conclusions are somewhat limited to these populations. However, since young adults are some of the highest-frequency users of texting, we believe these findings are still meaningful for the general population. Though the general population may not necessarily show similar patterns of texting behavior, they could still experience the potential effects of young adults' texting behaviors.

In general, our results provide evidence that other problematic texting behaviors aside from distracted driving-related behaviors are worthy of research, and that they could be inter-related. Additionally, many of the problematic texting habits that we have discussed suggest that texting reduces situation awareness when it is needed. Future research should take this into consideration, especially when considering the factors we have discussed that relate to texting while driving. Furthermore, we suggest that future research examine other texting habits, as there are many that our 18-item questionnaire did not include that could relate to the most problematic of texting habits. It might also be interesting to inquire about people's attitudes toward texting, and examine how their attitudes relate to problematic texting.

REFERENCES

Almasy, S. (2014, January 13). Dad's texting to daughter sparks argument, fatal shooting in movie theater. *CNN*. Retrieved February 13, 2014, from http://www.cnn.com/2014/01/13/justice/florida-movie-theater-shooting/

Ardelt, M. (2003). Empirical assessment of a three-dimensional wisdom scale. *Research on Aging, 25*(3), 275-324. doi: 10.1177/0164027503251764

Domoff, S. E. (2010). *The role of texting motivations in moderating the relation between compulsive texting and adolescents' adjustment* (Master's thesis). Retrieved from http://etd.ohiolink.edu/view.cgi/Domoff%20Sarah%20E.pdf?bgsu12701 57782

Feldman, G., Greeson, J., Renna, M., & Robbins-Monteith, K. (2011). Mindfulness predicts less texting while driving among young adults: Examining attention- and emotion-regulation motives as potential mediators. *Personality and Individual Differences, 51*(7), 856-861. doi: 10.1016/j.paid.2011.07.020

Florida Ban of Texting While Driving Law, Fla. Stat. § 316.305 (2013).

Frank, S., Santurri, L., Knight, K. (2010, November). *Hyper-texting and hyper-networking: A new health risk category for teens?* Poster session presented at the 138th meeting and exposition of the American Public Health Association, Denver, Colorado.

Friedman, M. (2013, November 12). Texting at a stoplight? NJ bill would ban it. *NJ.com*. Retrieved February 11, 2014, from http://www.nj.com/politics

Godley, C. (2012). *THR's social media poll: How Facebook and Twitter impact the entertainment industry.* Retrieved from The Hollywood Reporter website: http://www.hollywoodreporter.com/gallery/facebook-twitter-social-media-study-302273#1-social-media-as-entertainment

Governors Highway Safety Association. (2014, February). *Distracted Driving Laws*. Retrieved from http://www.ghsa.org/html/stateinfo/laws/cellphone_laws.html

Lamburg, E. M. & Muratori, L. M. (2012). Cell phones change the way we walk. *Gait & Posture, 35*(4), 688-690.

National Safety Council (2010). National safety council estimates that at least 1.6 million crashes each year involve drivers using cell phones and texting. [Press release]. Retrieved from http://www.nsc.org/Pages/NSCestimates16millioncrashescausedbydriver susingcellphonesandtexting.aspx

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*(1), 1-28.

Sawyer, B. D. & Clegg, B. A. (2008, November). *Cognitive versus motor components of text messaging impairment of driving.* Poster session presented at the 79th annual convention of the Rocky Mountain Psychological Association, Albuquerque, NM.

Schabrun, S. M., van den Hoorn, W., Moorcroft, A., Greenland, C., & Hodges, P. W. (2014). Texting and walking: Strategies for postural control and implications for safety. *PLoS ONE, 9*(1), 1-8. doi:10.1371/journal.pone.0084312

Schwebel, D. C., Stavrinos, D., Byington, K. W., Davis, T., O'Neal, E. E., & de Jong, D. (2012). Distraction and pedestrian safety: How talking on the phone, texting, and listening to music impact crossing the street. *Accident Analysis & Prevention, 45*(1), 266-271. doi:10.1016/j.aap.2011.07.011

Song, S. (2011, October 17). Study: 1 in 6 cell phones contaminated with fecal matter. Retrieved from http://healthland.time.com/2011/10/17/study-1-in-6-cell-phones-contaminated-with-fecal-matter/

Thomée, S., Härenstam, A., & Hagberg, M. (2011). Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults – a prospective cohort study. *BMC Public Health, 11*(66), 1-11. doi: 10.1186/1471-2458-11-66

Truong, K., Julie, K., & Eun, K. C. (2013). *Texting from the toilet: Mobile computing and acceptance in private and public restrooms* (KMD-2013-1). Toronto, ON: University of Toronto, Knowledge Media Design Institute. Retrieved from http://hdl.handle.net/1807/35207

White, A. G., Buboltz, W., Igou, F. (2011). Mobile phone use and sleep quality and length in college students. *International Journal of Humanities and Social Science, 1*(18), 51-58.

Zeidan, F., Johnson, S.K., Diamond, B. J., David, Z. & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition, 19*(2), 597-605. doi: 10.1016/j.concog.2010.03.014