Who's Texting in Class? A Look at Behavioral and Psychological Predictors

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ABSTRACT. Today, most college students own cell phones, and texting has become a preferred form of communication. Texting behavior has become so ubiquitous that it has carried over into the classroom, which has become a major concern among both students and instructors. Although some research has suggested that cell phones can be incorporated into lesson plans and therefore promote learning in the classroom, most cell phone use during class is unrelated to the class content and serves as a potential disruption to learning. The present study sought to explore the use of cell phones in the classroom among a large sample of undergraduate students to (a) describe general patterns of text messaging among college students, (b) compare texting behavior in different contexts, and (c) examine behavioral and psychological predictors of texting during class. The vast majority of participants reported having sent or read text messages in class (97.5%), and students reported doing so more frequently than texting while driving, but less frequently than texting while studying. A multiple regression analysis indicated that several factors uniquely predicted texting in class including the size of one's social network ($\beta = .18$), one's frequency of texting in other contexts such as while studying ($\beta = .24$) or driving ($\beta = .14$), and the experience of intrusive thoughts when cell phone access is limited ($\beta = .25$). The findings suggested that regulating texting behavior, as well as intrusive thoughts about accessing one's phone, may be important for improving the quality of the classroom experience for college students who text regularly.

Today's students multitask more than any other generation (Carrier, Cheever, Rosen, Benitez, & Chang, 2009). Often referred to as *digital natives* (Bennet, Maton, & Kervin, 2008), the high prevalence of multitasking with technology among members of today's youth culture has been attributed to the fact that they have grown up immersed in technology. However, some researchers (Carrier et al., 2009) and technology advocates (Prensky, 2005) have suggested that it is the cell phone, not the computer, that is the most important piece of technology for young multitaskers. In fact, many young adults often express that they cannot imagine life without their cell phones, and researchers have argued that the cell phone has become an integral part of who people are as a human race, fostering "a blurring of human and machine" (Thompson & Cupples, 2008, p. 104). Jenaro, Flores, Gómez-Vela, González-Gil, and Caballo (2007) argued that there appears to be a sense of emotional dependence reflected in the thoughts of heavy cell phone users, a factor that may motivate students to use their cell phone while engaged in another task including while they are in the classroom.

The number of young adults who own a cell

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phone is exceptionally high and no doubt on the rise. A recent national study found that 95% of 18- to 34-year-olds own a cell phone (Zickuhr, 2011). Studies have also found that young adults more commonly use their phones to text rather than talk (Lenhart, Ling, Campbell, & Purcell, 2010). Not only is texting sometimes viewed as being more efficient, largely because of the common 160 character limit, but some researchers have argued that students prefer to use text messaging because it gives them a sense of control over their interactions and it allows them to easily maintain their friendships (Madell & Muncer, 2007; Wei, Wang, & Klausner, 2012). An ongoing national survey of over 60,000 cell phone bills by Nielsen (2011) found that, in the beginning of 2007, teenagers were sending and receiving, on average, 435 text messages per month. By 2010, this number had soared to 3,075 text messages per month (Nielsen, 2011). This dramatic increase in monthly text messaging rates has clearly illustrated the heavy use of texting among today's adolescents and has also indicated how quickly technology can alter the communication landscape.

Although current texting rates have indicated the pervasive nature of texting, Hanson, Drumheller, Mallard, McKee, and Schlegel (2011) have claimed that today's students also seek to be more connected to their social interactions at a cost to their time spent on academics. By examining student time diaries, Hanson and colleagues found that students spent much less time on their academic-related work in comparison to time spent using technology for leisure or social purposes, averaging 14.35 hr per week on texting. Therefore, it comes as no surprise that many students carry their texting behavior over into the classroom.

In a survey conducted by Tindell and Bohlander (2012), students reported on their own, as well as other students' use of cell phones in the classroom. They found that 95% of students bring their cell phones to class every day and a majority set their phone to vibrate while in class (91%) rather than turning it off (9%). Of those 95%, 92% have used their phone to text message at least once or twice during a class period with 30% admitting to doing this every day. Ten percent of students also admitted to having texted during an exam at least once (Tindell & Bohlander, 2012).

One reason these percentages are so high may be because a majority of the students surveyed in Tindell and Bohlander's (2012) study believed that their instructors were mostly unaware of the degree to which students engage in texting while in the classroom and other cell phone activities (e.g., browsing the Internet, perusing social networking sites). The students believed their instructors would be shocked to learn how much cell phone use goes on in their classes. Nearly half of the students surveyed stated that they thought it was easy to text in class without the instructor noticing, and another third said that it really depends on the class and the particular instructor. As expected, students consistently reported that it was easier to send a text message than to receive one during class. Tindell and Bohlander (2012) found that one of the biggest factors contributing to the ease of sending and receiving text messages during class was the size of the classroom. The bigger the classroom, students reported, the easier it is to text without the instructor noticing. Although the degree to which instructors noticed cell phone use in their classes is unclear, it is apparent that 97% of the students have noticed the texting behavior of their peers in class at least once or twice (Tindell & Bohlander, 2012).

The results of a study by Wei and Wang (2010) suggested that, even if an instructor does notice texting or engages in more immediacy behaviors including verbal and nonverbal techniques for increasing perceived closeness to the instructor, students are still likely to text in class. Their research has shown that a student's level of daily cell phone use is a better predictor of texting in class than factors such as teacher immediacy (Wei & Wang, 2010). These findings suggested that texting becomes an automatic habitual behavior, which then carries over into the classroom. By contrast, research into the notion of mindfulness has suggested that individuals who are more practiced at focusing their awareness on the present moment in a nonjudgmental manner may be less likely to engage in habitual behaviors or ruminate on past experiences by more capably activating executive control resources (Teper, Segal, & Inzlicht, 2013). However, the relation of mindfulness to specific behaviors such as texting during class has not yet been examined.

Of course, not everyone feels that the heavy use of cell phones and text messaging in the classroom is a negative thing. In fact, many proponents of cell phone use in the classroom are instructors. Some proponents think incorporating text messaging into the classroom could be used as a tool to encourage interactivity (Markett, Sánchez, Weber, & Tangney, 2006). Bradley, Weiss, Davies,

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and Holley (2010) found that using a blended learning model, which incorporated texting in the classroom, received very positive responses from students and engaged more students in the lectures. Cheung (2008) found that cell phones could be used as a way to collect data for demonstrations and experiments during class. Although these are certainly benefits of incorporating cell phones into the classroom in a structured way, important questions inevitably remain. In particular, what are the consequences of unmonitored cell phone use in the classroom, and how is learning impacted?

One of the biggest and arguably most important concerns related to texting in the classroom involves the level of distraction it may cause. Naturally, one would assume that, if students are texting during class, they are not listening to the lecture and in turn are missing crucial information because they are constantly switching their attention. As the *illusion of attention* suggests, our ability to attend to multiple stimuli is not as good as people may think it is (Chabris & Simons, 2010). Research on switch costs between tasks has suggested that one's cognitive readiness and processing ability may be negatively affected (Butler, Arrington, & Weywadt, 2011). Similarly, the cost of switching between texting, listening to a lecture, and taking notes may adversely affect a students' ability to actively engage in all of the necessary classroom tasks that promote learning.

To study the relationship between learning and texting during class, Wei et al. (2012) looked at students' levels of self-regulation. Zimmerman (2001) defined self-regulation as "the self-directive process through which learners transform their mental abilities into task-related academic skills" (p. 1). Self-regulation is important in the classroom because it supports sustained attention, better enabling students to focus on learning. Wei et al. (2012) found that students who were better at self-regulation were less likely to text in class because they were able to actively engage themselves in the learning environment and avoid potential distractions such as their cell phone. They also found that frequent texting in class not only reduced students' ability to sustain their attention, but also decreased their perceived cognitive learning. Ultimately, students who are able to sustain their attention in class due to having high self-regulation are more likely to believe that they have learned more during class (Wei et al., 2012).

Some of the most interesting findings surrounding cell phone use in the classroom relate to students' perception of the distraction caused by text messaging. Opinions are inconsistent, but surprisingly, many students admit that they find it distracting even if they engage in the behavior themselves. In their sample, Rosen, Lim, Carrier, and Cheever (2011) found that 75% of students felt text messaging during class was disruptive, but 40% thought it was acceptable. Sixty-two percent of the participants in Tindell and Bohlander's (2012) study felt that there was nothing wrong with texting in class if it did not disturb anyone. Despite having a relatively limited sample of business majors, Braguglia (2008) found that the vast majority of students did not feel that using a cell phone during class interfered with learning. After surveying faculty and students in the health sciences, Burns and Lohenry (2010) found that roughly 40% of students admitted to using their phones during class and that this was distracting for approximately 85% of students. Over 70% of students in Williams et al.'s (2011) study found any form of texting while in class to not only interfere with learning, but to also be unprofessional and rude to both the teacher and the other students in the class, yet many of them still engaged in the behavior.

In the present study, we sought to add to the current literature on cell phone use in the classroom, specifically with regard to texting behavior. There were three aims to this study: (a) to describe general patterns of text messaging among college students, (b) to compare texting behavior in different contexts, and (c) to examine behavioral and psychological predictors of texting during class. We focused on several unique factors that might help explain why students are likely to text in class including their texting behavior in other contexts, their general preference for multitasking, the experience of intrusive thoughts related to one's cell phone, and students' self-reported levels of mindfulness, a trait often characterized by the ability to focus one's attention on the present moment in a nonjudgmental way (Brown & Ryan, 2003). We hypothesized that more frequent texting in other contexts, a penchant for multitasking, and the experience of intrusive thoughts would be related to more texting in class, but that those scoring higher on a measure of mindfulness—a disposition sometimes associated with self-regulated behavior—would be less likely to text in class.

Method

Participants

Participants were 470 students, 18 years or older

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(M_{age} = 19.0, *SD* = 1.2). Sixty-eight percent of the participants were first-year college students; 21.1% were sophomores; 7.2% were juniors; and 3.4% were seniors. Fifty-one percent of the participants were men. Sixty-two percent of the participants were European American; 11.5% were Asian American; 11.1% were African American; 7.9% were Latino/a or Hispanic; and 7.4% of participants indicated another race or ethnicity.

Materials

Multitasking Preference Inventory (MPI). As part of the survey, participants completed the MPI (Poposki & Oswald, 2010). The MPI is a 14-item measure that assesses respondents' general preference for multitasking, often referred to as *polychronicity*. Items are rated on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Scores range from 14 to 70, with a higher score indicating a greater degree of polychronicity. The MPI has been shown to have good internal consistency as a unidimensional measure, and evidence has been published supporting the convergent, discriminant, and criterion-related validity of the measure as an assessment of one's preference for multitasking (Poposki & Oswald, 2010). A reliability analysis indicated good internal consistency for the MPI with the present sample (α = .90).

Five Facet Mindfulness Questionnaire (FFMQ). Participants also completed the FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The FFMQ is a 39-item multidimensional measure that assesses five distinct but related facets of mindfulness, labeled *Observing, Describing, Acting With Awareness, Nonjudging of Inner Experience*, and *Nonreactivity to Inner Experience*. Items are rated on a 5-point Likert-type scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*) with higher scores indicating a greater degree of mindfulness within each domain. The FFMQ was created by pooling items from five previously published measures of mindfulness to create a reliable multidimensional measure with good concurrent and discriminant validity (Baer et al., 2006). Subsequent research has also supported the construct validity of the measure and its underlying facets (Baer et al., 2008). A reliability analysis with the present sample indicated adequate to good internal consistency for all five subscales of the FFMQ (α = .71–.87).

Cell Phone Intrusive Thoughts Scale (CPITS). In addition, participants responded to four statements designed to assess their experience of intrusive thoughts related to accessing their cell phone. These included (a) "When I receive a new text message or phone call, I feel the need to interrupt what I'm doing in order to read the message or take the call;" (b) "When I'm busy doing other things, it bothers me if I'm unable to access my cell phone;" (c) "When I can't access my phone, I find myself thinking about whether I've missed any text messages or phone calls;" and (d) "I would find it extremely difficult to spend a weekend without my cell phone." All items were rated on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Responses to these items were moderately correlated (*r* = .35–.59) and they demonstrated adequate internal consistency (α = .77). Therefore, responses to these four items were combined into a single measure with scores ranging from 4 to 20. Higher scores were regarded to indicate more intrusive thoughts about one's cell phone when access to one's phone might be limited or restricted.

Cell phone use. Participants also answered a series of questions about their typical daily cell phone use. Participants were first asked whether they generally used their cell phone more for texting or talking. Then, participants were asked to estimate the total number of text messages sent and received, and the total number of phone calls made and received, during a typical day in the past week. Participants were also asked to estimate the number of different individuals with whom they corresponded in the course of a week via text messaging and phone calls. These reports were used to estimate the size of one's texting and calling networks, respectively. Furthermore, participants were asked to estimate their frequency of texting in various contexts including while studying, while attending class, and while driving a car. These frequency estimates were based on a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*very often*).

Procedure

All students were recruited from the introductory psychology subject pool at a large Northeastern university during the second semester of the academic year. The study involved completing an online survey previously approved by the institutional review board that asked various questions about multitasking preferences and behaviors including the use of a cell phone while engaged in other tasks. The survey took approximately 30 min to complete, and all participants received extra credit for their participation in the study.

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Results

General Cell Phone Use

The first aim of this study was to examine general cell phone use among college students. Nearly all students surveyed (98.9%) indicated that they had a cell phone that they used at least occasionally; only five students noted that they did not own a cell phone. Of those who had their own cell phone ($n = 465$), the majority (68.2%) reported that they used it more for texting than talking, and a quarter (24.7%) indicated that they used their phone about equally for talking and texting. Only 4.3% and 1.5% of participants, respectively, reported using their phone mostly or exclusively for talking (1.3% reported to only text).

Participants were asked to estimate their frequency of texting and talking on their cell phone during a typical day in the past week, as well as the number of different individuals with whom they communicated in the past week via texting or talking on the phone. For each of these four questions, the distribution of responses was positively skewed and visual inspection of the data for each question led to the elimination of 21 outliers. Participants who indicated sending and receiving more than 1,000 text messages in a day, or who texted with more than 60 people in the course of a week, were eliminated from further analyses. Similarly, participants who reported making and receiving more than 50 phone calls in a day, or calling more than 30 different individuals in a week, were also eliminated from the data set. Altogether, this led to the elimination of less than 5% of cases from the data set. All subsequent analyses were conducted with the reduced sample of 444 participants.

Despite the elimination of outliers, reports regarding frequency of cell phone use and social network size remained positively skewed. The median number of text messages sent and received in a day was 70 ($M = 137.53$, $SD = 194.21$, *skewness* = 2.86, $SE_{skew} = .12$); the median number of phone calls made and received in a day was five ($M = 7.38$, $SD = 8.20$, *skewness* = 2.85, $SE_{skew} = .12$). With regard to social contacts, the median size of one's texting network was 12 individuals ($M = 13.88$, $SD = 8.39$, *skewness* = 1.03, $SE_{skew} = .12$); the median size of one's calling network was five individuals ($M = 6.92$, $SD = 5.43$, *skewness* = 2.05, $SE_{skew} = .12$).

Texting in Context

The second aim of the study was to compare texting behavior in different contexts (see Figure 1). The vast majority of students reported that they have read or sent text messages in two common academic contexts: while studying (99.1%) and during class (97.5%). However, participants' ratings of their frequency of texting within each of these contexts indicated that they were more likely to text while studying ($M = 3.87$, $SD = 0.91$) than while attending class ($M = 3.42$, $SD = 1.03$), $t(443) = 9.30$, $p < .001$. Furthermore, among students who reported having a driver's license ($n = 368$), 82.1% of them admitted to having read or sent text messages while driving. Among this reduced sample of licensed drivers, students were significantly less likely to text while driving ($M = 2.53$, $SD = 1.04$) than while studying ($M = 3.90$, $SD = 0.86$), $t(348) = -22.53$, $p < .001$, or while attending class ($M = 3.44$, $SD = 1.00$), $t(348) = -14.53$, $p < .001$.

Predictors of Texting in Class

The third aim of the study was to examine behavioral and psychological predictors of texting in class (see Table 1). Students' reports of the frequency with which they text in class were positively correlated with several other self-reported behaviors including texting while studying, $r(444) = .45$, $p < .001$, texting while driving, $r(444) = .27$, $p < .001$[1], and total text messages sent and received during a typical day, $r(444) = .15$, $p = .002$. Next to texting while studying, the strongest predictor of texting in class was the size of one's texting network, $r(444) = .30$, $p < .001$. Age was negatively correlated with texting in class, $r(444) = -.11$, $p = .024$, such that younger students claimed to text in class more often. However, there were no sex differences with regard to how often students reported texting in class, $t(442) = -1.08$, $p = .282$.

Several psychological variables were also correlated with texting in class. Participants' total scores on the MPI ($M = 38.56$, $SD = 8.92$), FFMQ ($M = 123.76$, $SD = 14.15$), and CPITS ($M = 13.72$, $SD = 3.50$) were all within the expected ranges and appeared normally distributed. The strongest association with texting during class was with students' scores on the CPITS, $r(444) = .40$, $p < .001$, which was an exploratory measure designed to assess cell phone related intrusive thoughts for the purposes of this study. Participants' general preference for multitasking, as indicated by scores on the MPI, was not associated with texting in class, $r(444) = -.01$, $p = .839$. The correlation between texting during class and total score on the FFMQ was not

[1]The correlation between texting in class and texting while driving increased marginally when nondrivers were excluded from the sample, $r(368) = .31$, $p < .001$.

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significant, $r(444) = -.09$, $p = .052$. However, two subscales of the FFMQ were negatively correlated with texting in class: observing, $r(444) = -.10$, $p = .034$, and nonreactivity to inner experience, $r(444) = -.12$, $p = .015$. These associations suggested that students who were less observant of their surroundings or more reactive to their own thoughts were more likely to text in class. The other three facets of mindfulness (i.e., describing, acting with awareness, and nonjudging of inner experience) were not associated with texting during class (in all cases $p > .05$).

After exploring these bivariate correlations, multiple regression was used to identify factors that accounted for unique variance in predicting frequency of texting during class (see Table 2). The following predictor variables were included in a simultaneous multiple regression analysis: sex, age, texts per day, size of texting network, frequency of texting while studying, frequency of texting while driving, cell phone related intrusive thoughts (CPITS scores), polychronicity (MPI scores), and the five facets of mindfulness as classified by the FFMQ[2].

The multiple regression analysis produced a significant model that accounted for approximately 33% of the variance in self-reported frequency of texting in the classroom, $R^2 = .33$, $R^2_{adj} = .30$, $F(13, 427) = 15.78$, $p < .001$. Four variables contributed significantly to the regression model including the size of one's texting network, $\beta = .18$, $t = 4.05$, $p < .001$, the frequency with which one texts while studying, $\beta = .24$, $t = 5.17$, $p < .001$, the frequency with which one texts while driving, $\beta = .14$, $t = 3.24$, $p < .001$, and the degree to which one experiences intrusive thoughts related to cell phone (as measured by the CPITS), $\beta = .25$, $t = 5.50$, $p < .001$. All other predictor variables included in the model were not significant ($p > .05$).

Discussion

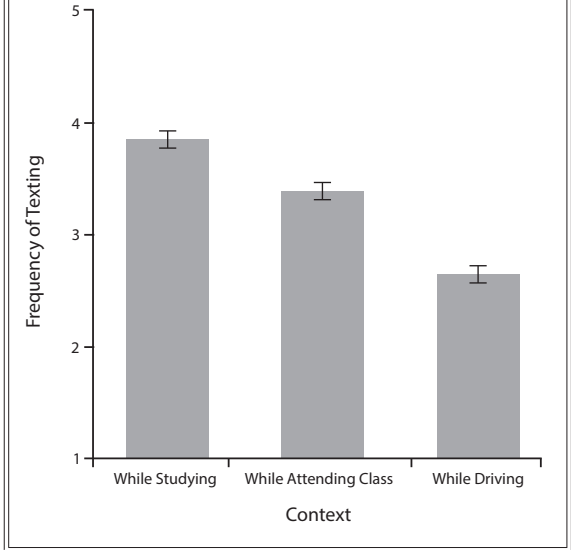
Our findings further support the claim that texting has become a highly pervasive behavior that has carried over into the classroom. Similar to other research findings (Braguglia, 2008), we found that the vast majority of participants (97.5%) reported at least occasional use of a cell phone to text while in class. Texting was also commonly reported in other contexts including while studying (99.1%) and while driving (82.1% of licensed drivers). Perhaps due to a desire to always be connected to one's social network, we found that four factors accounted for unique variance in predicting frequency of texting during class: size of texting network, frequency of texting while studying, frequency of texting while driving, and the experience of cell phone-related intrusive thoughts when access to one's phone was limited or prohibited.

We found that participants' scores on a measure of cell phone-related intrusive thoughts accounted for the largest amount of variance in classroom texting behavior even after controlling for age, texting frequency, size of texting network, and texting in other contexts. This finding was in line with claims made by Jenaro et al. (2007) that there appears to be an emotional dependence to one's phone that can result in negative affect when the phone is inaccessible. The experience of negative affect may prompt intrusive or worrisome thoughts about wanting to access one's phone even if such access would pose an interruption to a primary task such as listening to a lecture, taking notes, studying for an exam, or driving a car.

Previous research showing that self-regulation is related to texting in class (Wei et al., 2012) has

FIGURE 1

Student Texting Behavior



Note. Mean frequency estimates for texting under three contexts: while studying, while attending class, and while driving. Estimates were made on a 5-point Likert-type scale from 1 (*never*) to 5 (*very often*). Error bars represent one standard error of the mean.

[2]Prior to running the regression analysis, two variables (i.e. texts per day and size of texting network) were log transformed in order to reduce the influence of positive skew. The log transformation reduced the skewness value to -.20 for texts per day and -.56 for size of texting network. Also, results were comparable when the same regression analysis was conducted using only those participants who reported having a driver's license ($n = 368$). Therefore, only results from the regression analysis conducted with the full sample are reported.

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also supported the present finding that thoughts about one's phone may prompt students to access their phone in class. It may be the case that those who are less effective at regulating their thoughts and feelings are more susceptible to intrusive thoughts about staying connected with their social contacts while otherwise trying to stay focused in class. Interestingly, Wijekumar and Medinger (2005) found that students with better metacogntive skills were less likely to let themselves be interrupted by an incoming message. We might also expect that those students with better metacognitive skills would be less susceptible to intrusive thoughts about text messaging.

In further support of this link, we found that two facets of mindfulness (i.e., observing and nonreactivity to inner experience) were negatively correlated with texting in class. However, these factors did not uniquely predict texting in class when scores from the CPITS, which measured more specific thoughts related to accessing one's cell phone, were included in a regression model. Future research examining each of these psychological constructs would be beneficial for developing a stronger theoretical model to account for the apparent relationship between certain aspects of cognitive control and one's penchant for engaging in distracting behaviors such as texting during class.

Surprisingly, general preference for multitasking (as measured by the MPI) did not correlate with texting in class. This result suggests that texting behavior in a specific setting such as during class may be better predicted by habitual texting behaviors in other contexts than by students' general preference for being engaged in multiple overlapping tasks. Consequently, texting during class may reflect a desire to stay constantly connected to one's social network, rather than a desire to constantly multitask. This interpretation is in line with other studies that have identified habitual texting as a predictor of texting during class (Wei & Wang, 2010).

This notion is further supported by the fact that the size of one's texting network was the next strongest predictor of texting during class (next to cell phone-related thoughts), and emerged as a unique predictor beyond one's general frequency of texting, and one's frequency of texting while studying or driving. It may be that the sheer number of individuals with whom one regularly corresponds via texting contributes strongly to the desire to stay connected with others. In fact, the very nature of text messaging, which emphasizes the ability to converse asynchronously with multiple people through the exchange of brief typed messages, may support a greater expectation of social connectedness. We found that the majority of students (68.2%) primarily used their phone for texting rather than talking, and that students' texting networks (*Mdn* = 12) were substantially larger than their calling networks (*Mdn* = 5).

Although we did not find a relationship between texting in class and general preference for multitasking—a trait often referred to as polychronicity—Williams et al. (2011) found that students who believed they were good at multitasking thought that they would not be distracted from learning while texting in class. Of course, the perception that one is multitasking effectively may not be in line with actual performance. As some research has shown using standard laboratory tests of task switching and attentional filtering, those who multitask more regularly may actually be less efficient at switching tasks and more susceptible to distractions during situations demanding selective attention (Ophir, Nass, & Wagner, 2009).

In this case, the distraction of texting during class may not only be a self-distraction, but a distraction to others. Williams et al. (2011) found that students reported that they were often distracted by other students texting during class and not simply their own texting behavior. Despite students' awareness of the possible distraction that texting poses to themselves and others, Williams et al. (2011) offered several reasons for students' texting behavior including the fact that (a) it may be difficult for students to separate themselves from their phone, (b) the class may not be engaging

TABLE 1

Correlations Among Study Variables

Measure	1	2	3	4	5	6	7	8
1. Text/Class	—							
2. Text/Study	.45***	—						
3. Text/Drive	.27***	.22***	—					
4. Text/Day	.15**	.14**	.01	—				
5. People/Text	.30***	.20***	.17***	.18***	—			
6. Age	-.11*	-.05	.01	-.09	-.07	—		
7. CPITS	.40***	.42***	.15**	.12*	.08	-.06	—	
8. MPI	-.01	.04	.07	.06	.04	.04	-.06	—
9. FFMQ	-.09	-.09	-.11*	.04	.01	.00	-.16***	-.07

Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. CPITS = Cell Phone Intrusive Thoughts Scale; MPI = Multitasking Preference Inventory; FFMQ = Five Facet Mindfulness Questionnaire.

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enough for students and so they turn to texting to relieve their boredom, and (c) the instructor does not enforce or perhaps does not have a cell phone policy.

By identifying both behavioral and psychological predictors of texting during class, the present study may be of use to psychologists and educators interested in developing effective strategies for helping students gain better control of their texting habits. For example, a study by Wijekumar and Medinger (2005) suggested that metacognitive control may play an important part in determining how students manage potential distractions in the classroom. In their study, students were allowed to use instant messaging (IM) on their desktop computers while doing work. They found that students who had more metacognitive skills typically turned off the IM alert sounds and only responded to the IMs when they took a break. Conversely, those students with lower metacognitive skills welcomed the interruptions of the IMs. Future studies should look more into the role that metacognition may play in regard to texting in the classroom with particular focus on the strategies that students may use to decide when and how often to access their phone in class and manage intrusive thoughts about accessing one's phone.

Limitations

Several limitations of the present study are worth noting. For instance, although the sample was equally representative of men and women (51% of participations were men), most of the participants were European American (62%) and the sample was disproportionately representative of first-year college students (68%). Although the sample was largely representative of the university at which students were recruited, the high rate of participation among first-year college students was likely a result of recruiting from the university's subject pool, which is associated with enrollment in introductory psychology. However, the survey was completed during the second semester of the academic year, which ensured that the vast majority of first-year students enrolled in the study had completed at least a full semester of college-level work. Among our sample, there was a significant negative correlation between age and frequency of texting in class, but this relationship was not significant when included in a multiple regression analysis that controlled for other predictors of texting in class. Further research with a more evenly distributed sample of students across academic years and tracking students' behavior over time through a longitudinal design might better determine whether texting behavior actually changes throughout one's time in college.

Several other limitations pertained to the measurement of certain behaviors and psychological constructs. First, some questions regarding texting frequency and size of texting network asked participants to estimate their behavior during the immediately preceding week. The use of this question format was based on previous research on self-report methodology, which suggests that retrospective frequency estimates can be highly influenced both by response anchors and episodic memory distortions (Schwarz, 1999). Therefore, for these particular questions, participants were only asked to provide short-term retrospective frequency estimates (i.e., during the past week or a typical day in the past week) and were not constrained by a response scale with frequency anchors (e.g., 1–25, 26–50). As a result, some participants provided extreme responses to these open-ended questions, resulting in their elimination from the data set as outliers (less than 5% of the complete sample). In this case, it may be that many students who are using their cell phones very frequently for texting and/or talking do not have

TABLE 2

Summary of Multiple Regression Analysis Predicting Texting During Class

Variable	*B*	*SE* (*B*)	β	*t*	*p*
Sex	-.11	.09	-.06	-1.25	.21
Age	-.05	.04	-.06	-1.44	.15
Texts/Day (log)	.16	.08	.08	1.83	.07
People/Text (log)	**.28**	**.07**	**.18**	**.405**	**.00**
Text/Study	**.28**	**.05**	**.24**	**5.17**	**.00**
Text/Drive	**.13**	**.04**	**.14**	**3.24**	**.00**
CPITS	**.07**	**.01**	**.25**	**5.50**	**.00**
MPI	.00	.01	-.02	-0.59	.55
FFMQ subscales					
Observing	-.01	.01	-.03	-0.62	.54
Describing	.00	.01	-.01	-0.11	.92
Acting With Awareness	-.01	.01	-.02	-0.50	.62
Nonjudging	.00	.01	.00	-0.05	.96
Nonreactivity	.00	.01	.00	-0.10	.92

Note. The regression model was significant, $R^2 = .33$, $R^2_{adj} = .30$, $F(13,427) = 15.78$, $p < .001$. All variables in bold contributed significantly to the model at $p < .001$. CPITS = Cell Phone Intrustive Thoughts Scale; MPI = Multitasking Preference Inventory; FFMQ = Five Facet Mindfulness Questionnaire. *Log* indicates that a variable was log-transformed prior to the regression analysis in order to meet the assumption of normality.

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a clear sense of how many actual text messages or phone calls they engage in on a daily basis. Future research that incorporates additional measures of self-reported cell phone use, as well as access to actual cell phone records, may uncover potential discrepancies between perceived and actual rates of cell phone use.

Second, other variables not accounted for in the present study such as class size, academic status, and the nature of students' cell phone use may have an important influence on students' likelihood to text during class. For example, students in the present sample reported texting during class with relatively high frequency; however, all students were recruited from a large University where class sizes commonly range from 20 students up to several hundred when attending a large survey course held in a lecture hall. Students were not asked about their current schedule or to distinguish their behavior between large and small classes. Furthermore, students were not asked to distinguish between social communications (e.g., texting with friends and peers) and other uses of their phone such as responding to parents or employers, which could create a qualitatively different type of social pressure. Ironically, parents who frequently text their children to check in while they are attending college could be contributing to academic distraction.

Third, an interesting finding of the present study was that students' scores on the CPITS were significantly associated with their frequency of texting during class, even after controlling for other factors such as general texting rate, size of texting network, texting in other contexts, and scores on other psychological measures in this case the MPI and FFMQ. Although the four items comprising the CPITS demonstrated adequate internal consistency ($\alpha = .77$), this was an exploratory measure developed for the purposes of the present study and has not been previously published. Therefore, cautious interpretation of the construct validity of this measure is in order until future research is conducted. The authors labeled these items as measuring intrusive thoughts related to having limited or restricted access to one's cell phone. To this regard, the weak, but significant, negative correlation between the CPITS and total scores on the FFMQ supports the expectation that those scoring higher on measures of mindfulness should report better control over intrusive thoughts. However, these items may also capture aspects of the emotional attachment that some individuals feel toward their cell phone and the experience of separation anxiety that may result from being unable to access one's phone. Future research that further differentiates the cognitive and emotional aspects of cell phone ownership is certainly needed.

Conclusion

The present study was consistent with prior research showing that texting during class is a common and widespread behavior across college campuses, and added to the literature by identifying several behavioral and psychological variables that uniquely contributed to students' propensity for texting during class. In particular, texting while studying and while driving were both related to in-class text messaging, suggesting that texting in the context of doing some other primary task may be a habitual behavior that carries over across multiple situations. However, general preference for multitasking did not predict texting in any of these contexts, but the size of one's texting network did. This, combined with the finding that the best predictor of texting during class was the experience of cell phone-related intrusive thoughts, suggests that a desire to stay socially connected, but not a penchant for multitasking, may be a primary factor supporting the distracting behavior of texting in the college classroom.

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