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Texting/iPod dependence, executive function and sleep quality in college students

F.R. Ferraro [a,*], B. Holfeld [b], S. Frankl [a], N. Frye [a], N. Halvorson [a]

[a] University of North Dakota, United States
[b] University of Victoria, Canada

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ABSTRACT

Participants were classified as "good" sleepers ($n = 70$) or "poor" sleepers ($n = 66$) based on the Pittsburgh Sleep Quality Index (PSQI; Buysee, Reynolds, Monk, Berman, & Kupfer, 1989). Differences between good and poor sleepers were examined on executive function, texting and iPod dependence, depression, and anxiety. Poor sleepers reported higher levels of depression, higher levels of state and trait anxiety, greater texting dependence and iPod dependence, and poorer executive function performance, as compared to good sleepers. Poor sleep quality among college students may contribute to a range of negative psychological, neuropsychological, and social consequences.

1. Texting/iPod dependence, executive function and sleep quality in college students

Poor sleep quality is a common problem among college students (Byrd et al., 2014; Gellis, Park, Stotsky & Taylot, 2015; Shochat, Cohen-Zion, & Tzischinsky, 2014; White, Buboltz, & Igou, 2011) and has been linked to a host of negative outcomes including poor psychological health (e.g., anxiety, depression) and decreased academic performance (Do, Shin, Bautista, & Foo, 2013; Lund, Reider, Whiting, & Prichard, 2010; Telzer, Fuligni, Lieberman, & Galvan, 2013). However, the impact of sleep quality on technology use among college students is not completely understood and is necessary as technology continues to develop and become a larger part of our society. For example, text messaging is one of the most popular methods for college students to stay connected with their friends at any time of the day or night (Derbyshire et al., 2013). As the average number of text messages that are sent and received increases, along with increases in cell phone usage, concern from medical and psychological professionals is also growing (Sansone & Sansone, 2013). Accumulating research suggests that greater dependence on texting and other forms of technology (e.g., iPod usage) can negatively impact college students' behavior and psychological functioning (Ferraro, Wunderlich, Wyrobek, & Weivoda, 2014; Ferraro et al., 2012; Sansone & Sansone, 2013).

1.1. Texting and iPod dependence

A shortened version of the self-perception of text messaging dependency scale (SPTMDS; Igarashi, Motoyoshi, Takai, & Yoshida, 2008) has been used frequently to assess individual's texting dependency. The instrument includes four subscales that assess sensitive responses to text messages, self-perception about compulsive usage of text messaging, fear of disrupting relationships without text messaging, and psychological/behavioral symptoms concerning the heavy usage of text messaging. Using this scale with a sample of Japanese high school students, Igarashi et al. (2008) found that texting self-perception and texting dependence was associated with compulsive use of texting, inability to control texting behavior, and neglect and isolation from friends who do not immediately respond to their text messages. In turn, this may lead to increases in anxiety about being ostracized. More recently, Ferraro et al. (2012) found that higher scores on each of the four subscales of the SPTMDS were associated with higher levels of anxiety (e.g., state and trait) and depression among 204 college students. These researchers also found a negative association between SPTMDS scores and a global measure of executive function, the Executive Function Index (EFI; Spinella, 2005). Ferraro and colleagues concluded that the increased dependence on texting appeared to disrupt basic emotional, behavioral, and psychological processes. However, the impact of this dependency on sleep quality is unclear and may shed further light on the negative consequences associated with texting dependency. It is also possible that increases in texting and the need to stay connected with friends may also contribute to sleep deficiencies.

* Corresponding author at: Dept. Psychology, Univ. North Dakota, Grand Forks, ND 58202, United States. Tel.: +1 701 777 2414 (O); fax: +1 701 777 3454.
E-mail address: f.richard.ferraro@email.und.edu (F.R. Ferraro).

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The usage of iPods have also grown dramatically over the past decade such that college students now listen to their iPod more than traditional radio (Ferguson, Greer, & Reardon, 2007). Like texting, it is believed that iPod usage can result in a similar form of dependence and may relate to problems in hearing (Danhauer et al., 2009). However, little attention has been given to examine the potential negative effects associated with iPod dependence. One exception is a study by Ferraro et al. (2014) who used a modified version of the SPTMDS (i.e., iPod usage substituted for text messaging) and found that iPod dependence was not only common in college students but was positively associated with texting dependence. Moreover, the researchers found that higher levels of texting and iPod dependence were related to higher levels of anxiety and depression. Since texting and iPod dependence are related, it may also be the case that some aspects of executive function may be negatively impacted by increases in iPod dependence.

1.2. Technology and sleep quality

These are important issues because technological advances are occurring more rapidly in our society and are having more negative impacts in the social lives of individuals, especially as it relates to individual's everyday functioning including their sleep quality. For instance, shorter overall sleep duration and excessive Internet usage has been shown to dramatically (and negatively) impact measures of health (e.g., depression, suicidal ideation, obesity), suggesting a link between poor sleep quality and psychological functioning (Do et al., 2013). Furthermore, shorter sleep duration has been referred to as a form of social jet lag, resulting in poor sleep quality, fatigue, poor academic achievement and many behavioral and social problems (Touitou, 2013). It is also important to realize that while technology (in the form of social media, texting, etc.) can hinder behavior, it can also be used to reduce sleepiness and improve performance (Teixeira et al., 2013).

1.3. The current study

The current study extends past research with a more comprehensive examination of the impact of poor sleep quality on college students' behavior and psychological functioning. We know that texting and iPod usage is high among college students and is negatively related to psychological (e.g., anxiety and depression) and executive functioning. How texting and iPod dependence are impacted by sleep quality has not been empirically examined, although specific predictions can be made based on past research. Specifically, if texting and/or iPod dependence is high, and that continues to negatively tax executive function, one would expect a difference between "good" and "poor" sleepers (as defined by scores on the PSQI), such that good sleepers would outperform poor sleepers across a number of psychological domains. That is, good sleepers were expected to reported lower levels of depression and state/trait anxiety, higher levels of executive function, and report lower dependence on texting and iPod usage compared with poor sleepers.

2. Method

2.1. Participants and procedure

Participants included 136 college students (M_{age} = 19.0 years of age, SD = 1.08, range = 18–21; n = 55 males) from a Midwestern University who participated in the study in exchange for extra credit in their psychology classes. All participants first read and signed an informed consent form. Next, participants were given a background information questionnaire that asked general demographic information (e.g., education level, self-rated health, medications taken, etc.) followed by a packet of questionnaires that included the measures described below. The entire experiment lasted 60 min and all participants were thoroughly debriefed as to the purpose of the experiment upon completion. The study was approved by the University's Institutional Review Board (IRB).

2.2. Measures

2.2.1. Sleep quality

Participants' self-reported quality and patterns of sleep was assessed using the Pittsburgh Sleep Quality Index (PSQI; Buysee, Reynolds, Monk, Berman, & Kupfer, 1989). Consistent with past research (Carney, Edinger, Meyer, Lindman, & Istre, 2006; Clegg-Kraynok et al., 2011) participants were classified as either "good" or "poor" sleepers based on their responses to seven domains of sleep behaviors including sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime sleep over the past month. Scores in each domain ranged from 0 (*not during the past month*) to 3 (*three or more times per week*) with higher scores reflecting greater disturbances in sleep quality (α = .83). Responses to each item were summed with scores of 0–5 representing "good" sleepers (n = 70) and scores of 6 or more representing "poor" sleepers (n = 66).

2.2.2. Texting dependence

Participants' self-reported perceptions of their text messaging behavior were assessed using the self-report Self-Perceptions of Text Messaging Dependency Scale (SPTMDS; Igarashi et al., 2008). The SPTMDS includes four subscales with five-items each that assessed particular aspects of text messaging behavior. Emotional Reaction (e.g., "I feel disappointed if I don't get a reply to my text message immediately"), Excessive Use (e.g., "I spend many hours on text messages"), and Disruption of Relationships (e.g., "I can't form any new relationships without using text messages") that were rated on a Likert-type scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). The final subscale, Psychological/Behavior Symptoms was related to heavy texting usage (e.g., "I sometimes worry that life would be boring and empty without text messages") and was rated on a Likert-type scale that ranged from 1 (*not true at all*) to 5 (*extremely true*). Higher scores on each subscale represented higher levels of texting dependency (α range .70 to .85).

2.2.3. iPod dependence

A modified self-report iPod version of the SPTMDS (Igarashi et al. (2008) was used to assess participants' level of iPod usage. The same four subscales of the SPTMDS with five-items each and equivalent response options were used. The only difference was that the "iPod" was substituted with "text messages" for each item. Higher scores on each subscale reflected greater iPod dependency (α = .79)

2.2.4. Depression

Similar to past research among college students, participants' overall level of depression was examined using the self-report Geriatric Depression Scale-Short Form (Holfeld, Cicha, & Ferraro, 2014). The GDS-SF contains 15 dichotomous items that asked participants about their feelings over the past week (e.g., "Are you in good spirits most of the time?"). "*Yes*" responses were summed to create an overall level of mood for each participant in which higher scores represented higher levels of depressive symptoms. Score of 5 of higher were indicative of probable depression.