

## Introduction

Purpose of the study.

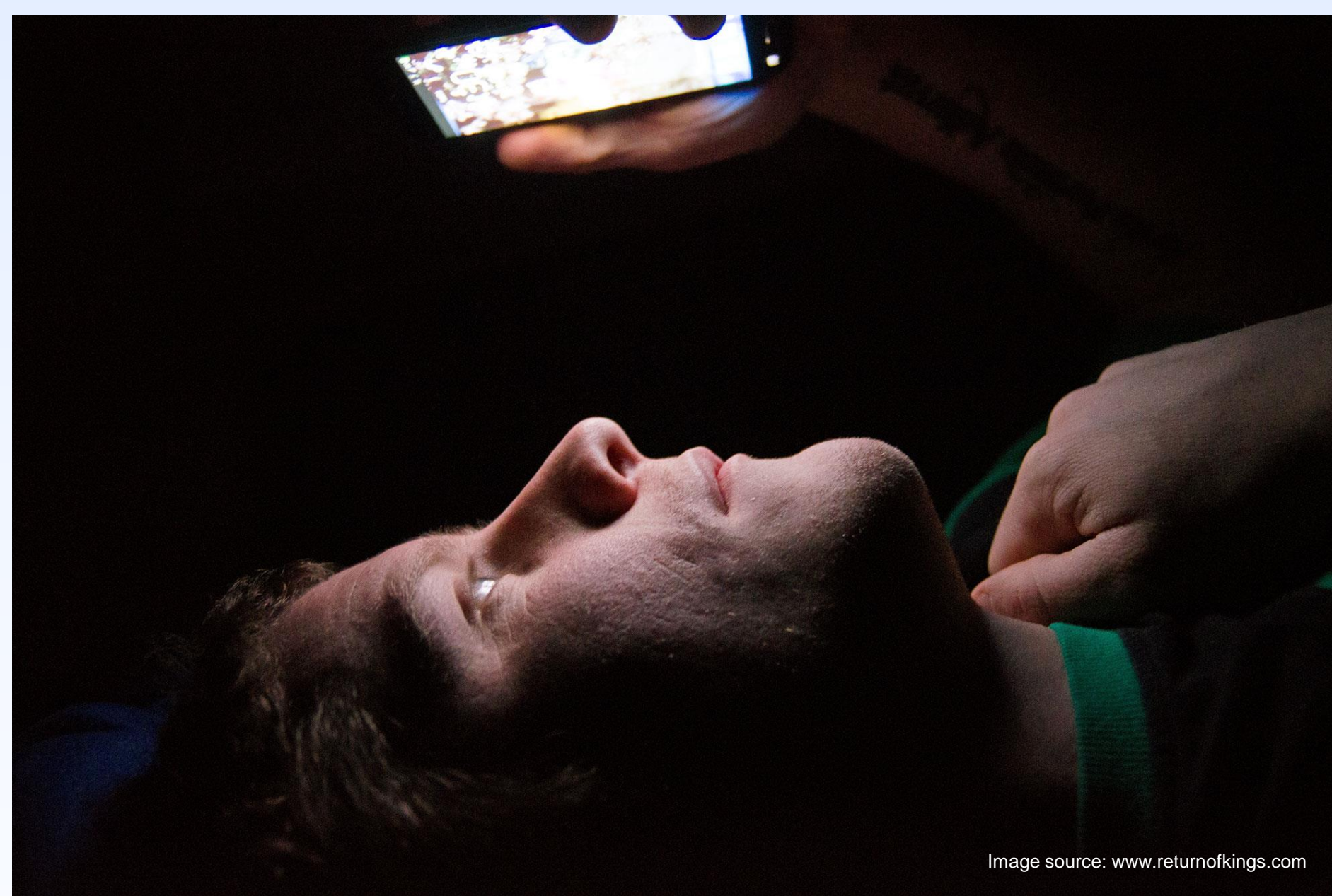
- Insomnia is prevalent in college students, with recent reports showing rates as high as 19% (Jiang et al., 2015) and 39% (Benham, 2015). Research also suggests that the prevalence rate of insomnia may have increased over the last 10 years (Pallesen, Sivertsen, Nordhus, & Bjorvatn, 2014). Given these troubling numbers, a number of researchers are investigating the factors that might contribute to insomnia. One of the potential factors that has been identified is the use of technology (such as television, computer, or smartphone) in the bedroom prior to sleep. The purpose of the current study was to explore the prevalence of various types of electronic media use before sleep and to examine whether such use is associated with insomnia.

Pre-sleep media use

- Results from the 2011 the National Sleep Foundation "Sleep in America Poll" indicate that 90% of Americans (and 96% of Americans under 30 years of age) use technology in the bedroom (such as television, computer or cell phone) in the hour before trying to sleep (Gradisar, 2013). In a recent study of adolescents, 63% of them reported taking their mobile phone to bed and more than a third texted after going to bed (Adachi-Mejia, Edwards, Gilbert-Diamond, Greenough, & Olson, 2014).
- A number of recent studies have demonstrated associations between the use of technology and poor sleep. Melton, Bigham, Bland, Bird, and Fairman (2014) found that individuals who slept less than 6 hours per night spent significantly more time using technology, including social networking, Twitter, and internet surfing. In a large sample of Norwegians, those who frequently used a cellphone in the bedroom at night had later bedtimes (Brunborg et al., 2011). In a Japanese study, use of electronic media before bed was associated with shorter weekday sleep duration (Saganuma et al., 2007). Additionally, individuals who report using technology as a sleep aid have poorer sleep quality (Exelmans & Van den Bulck, 2014).
- In relation to insomnia, Fossum, Nordnes, Storemark, Bjorvatn, and Pallesen (2014) found that playing, surfing, or texting on one's mobile phone in bed before going to sleep was associated with greater insomnia.

Main Hypothesis

- Individuals who use electronics in bed within the two hours before trying to fall asleep will experience greater insomnia.



## Methods

Participants

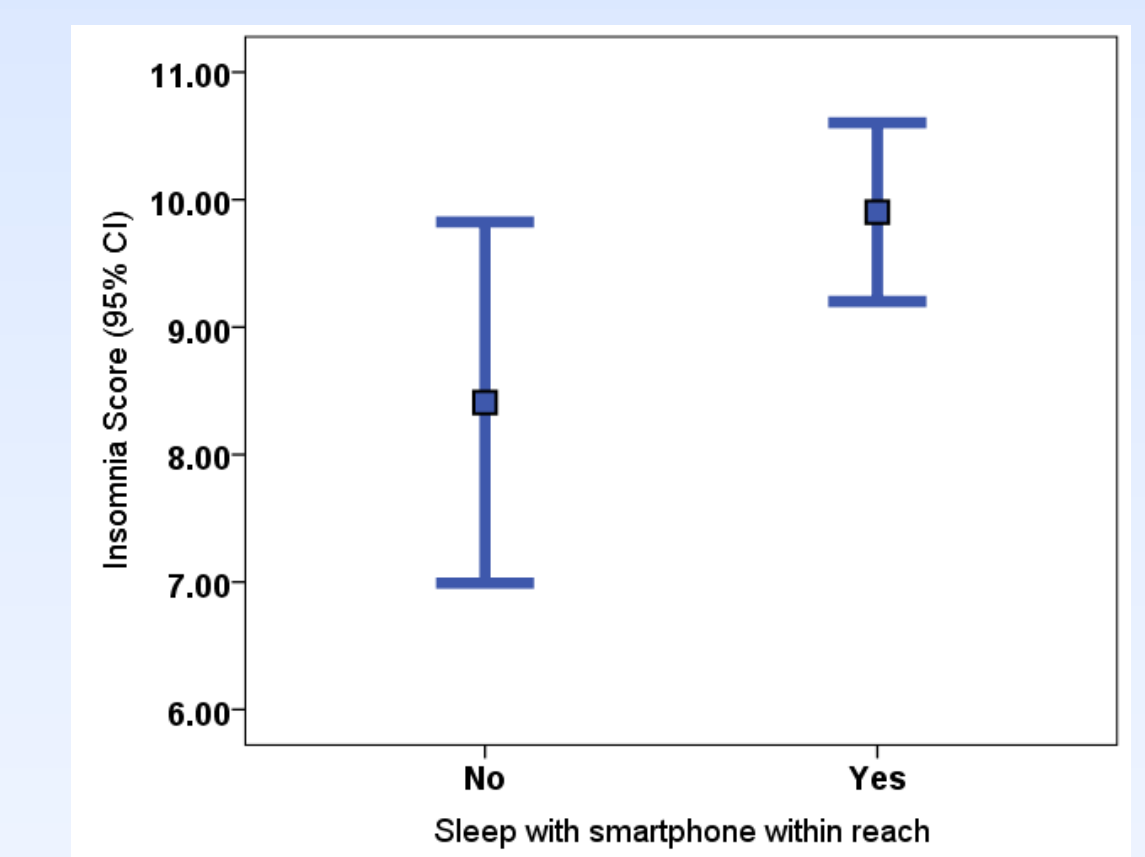
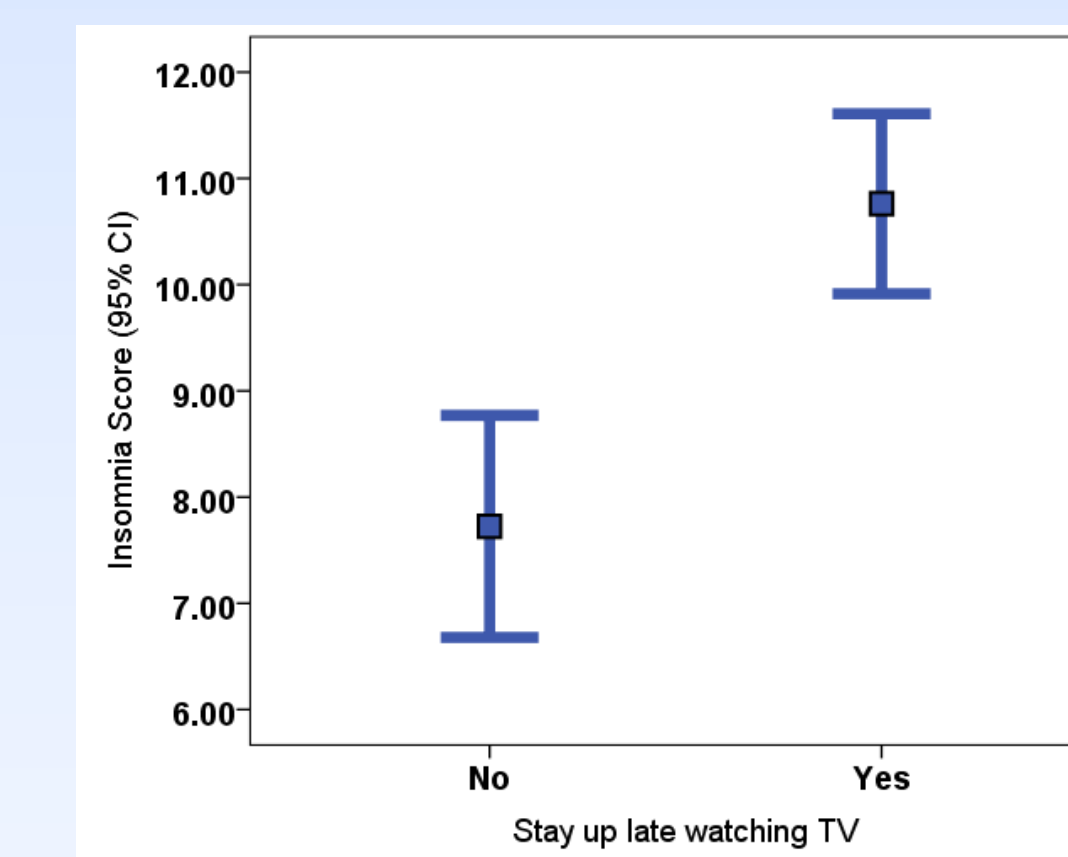
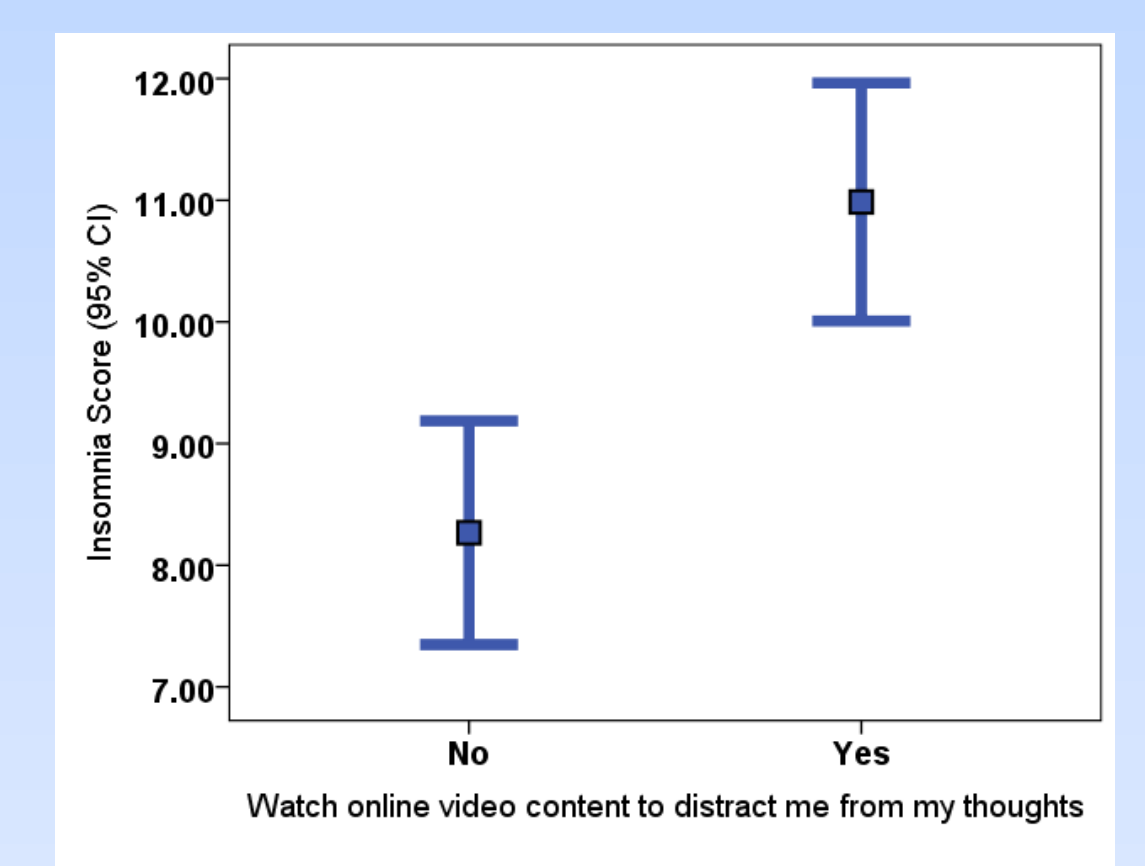
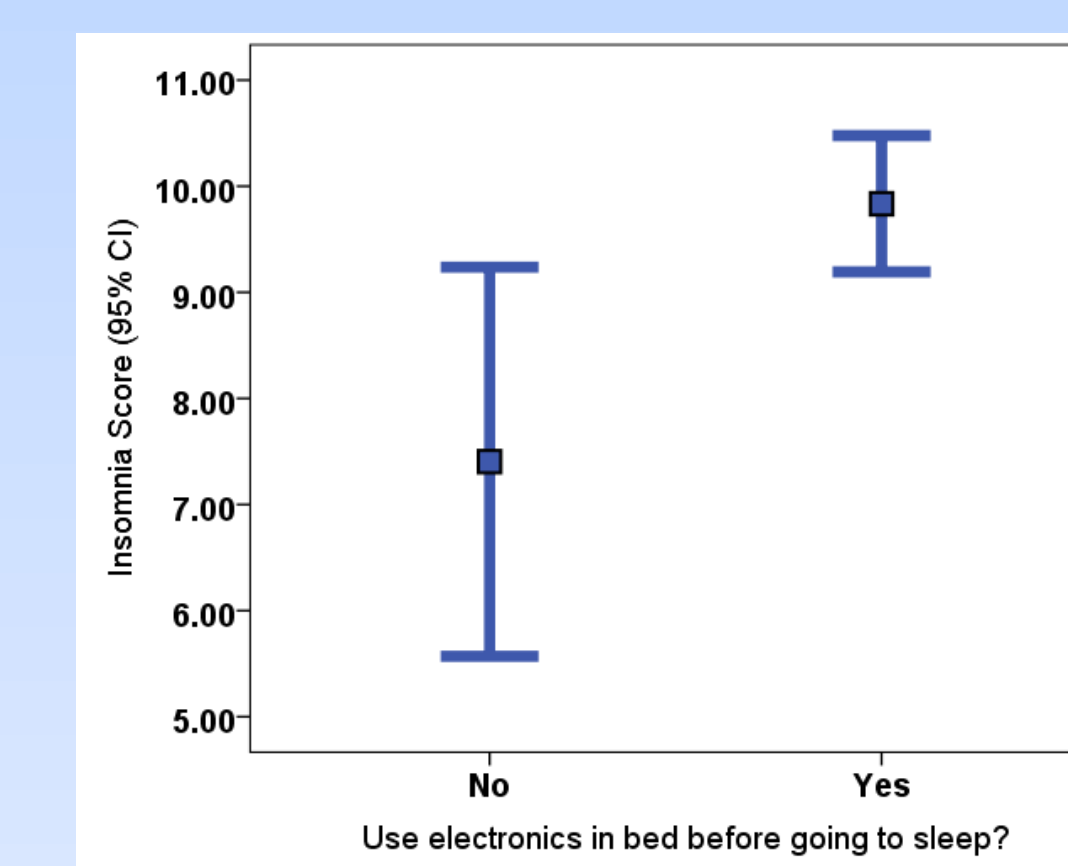
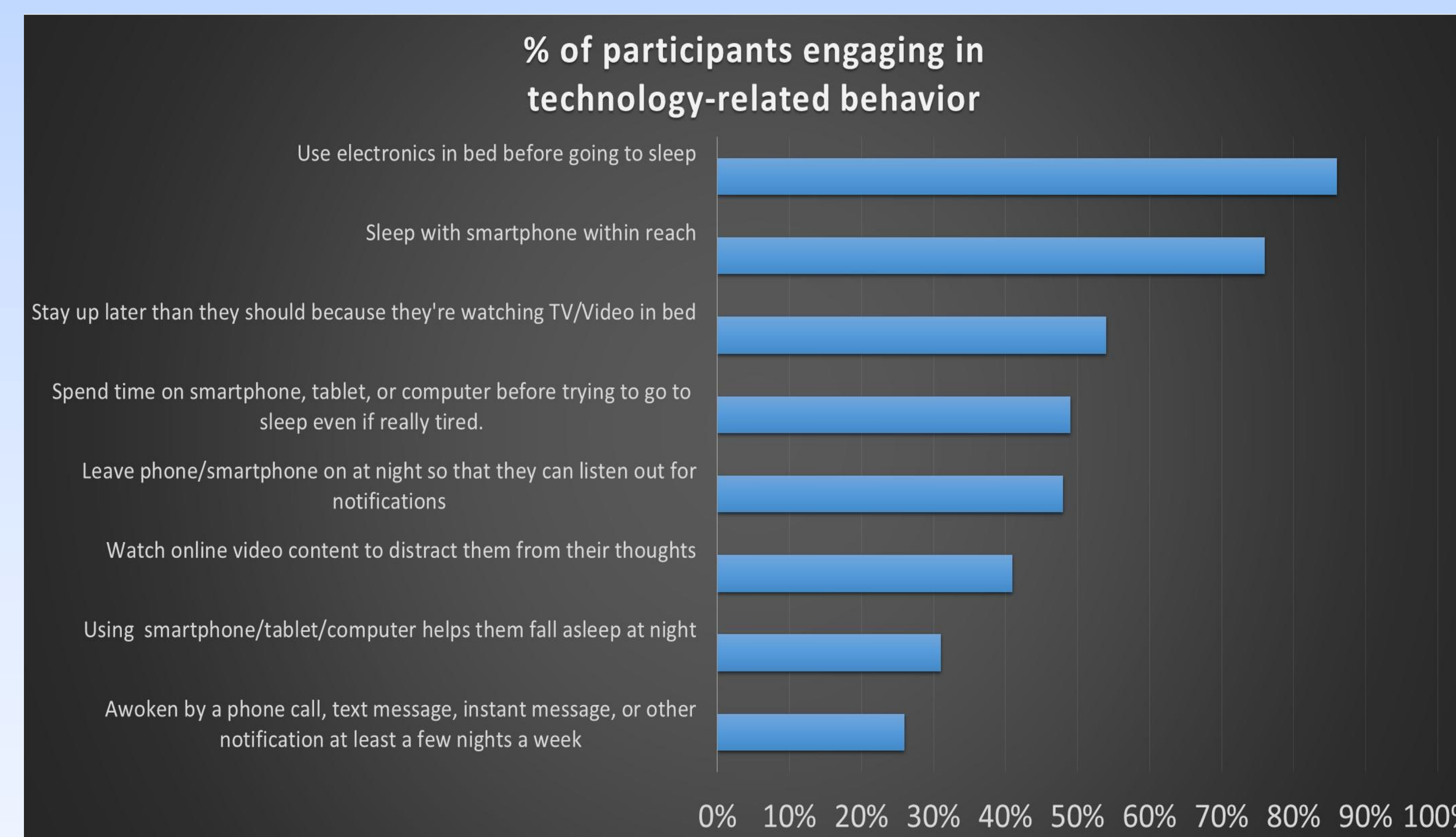
- Participants included 367 adults who self-reported through an online survey, which included measures of pre-sleep behavior and insomnia. They indicated to which extent they engaged with different technology and media during the two hours before trying to sleep. (e.g. texting with friends, watching video, using video game consoles, sleeping with the phone within reach etc.). The mean age of the sample was 23.0 years (SD=5.2). 79% of the sample was female and the large majority (92%) of participants were Hispanic.

Measures

- We included a questionnaire that incorporated a number of questions about technology use, such as "In the two hours before you try to fall asleep, how often and where do you: text with friends for at least 10 minutes" with answer choices including a 7-point Likert-type scale ranging from "Never" to "Every night" (for the "how often" question) and three answer choices ("In bed", "In bedroom, but not in bed", and "Outside of bedroom") for the "where" question.
- Insomnia was measured using the Insomnia Severity Index (ISI; Morin, 1993). The ISI is a self-report measure that assesses participants' perceptions of their insomnia. It includes seven items related to the extent of difficulties with sleep onset and sleep maintenance during the previous two weeks. The total scale score ranges from 0-28.

## Results

- 64% of students reported having a television in the bedroom and 76% reported sleeping with a smartphone within reach while sleeping. 86% of students reporting using electronics IN BED before going to sleep and 49% reported being likely to spend time on their smartphone, tablet, or computer before trying to go to sleep even if they were really tired. 41% of students reported staying watching online video content to distract them from their thoughts. 31% indicated that using their smartphone/tablet/computer helps them fall asleep at night, however, 54% reported staying up later than they should because they are watching TV/Video in bed.
- Almost half (48%) the sample reported leaving their phone/smartphone on at night so that they can listen out for notifications (calls/texts/tweets, etc.) and 26% of the students reported being awoken from sleep by a phone call, text message, instant message or other notification at least a few nights a week.
- Students who used electronics in bed before going to sleep had significantly greater insomnia than those who did not,  $t(365)=2.75$ ,  $p=0.003$ . Insomnia was also greater in students who stayed up in bed to watch TV/Video,  $t(312)=4.39$ ,  $p<0.001$ , those who watched online video content to distract them from their thoughts,  $t(298)=4.00$ , and those who slept with a smartphone within reach,  $t(346)=1.89$ ,  $p=0.03$ .



## Discussion

- We replicated previous findings showing high prevalence of pre-sleep media use among young adults, with a variety of technological devices and different media types, such as TV, smartphone, tablet, online video content, social media, etc. Results demonstrate that those who use technology and media within the two hours before going to sleep experience greater insomnia.
- Although a third of the students reported that using technology helped them fall asleep at night, the use of technology as a distraction from pre-sleep cognitions was associated with higher insomnia scores, and the mere presence of a smartphone within reach was also predictive of greater insomnia. Having a phone within reach was also a factor for interrupted sleep due to incoming notifications (i.e. text messages).
- Our results were specific to the use of technology in bed within two hours before trying to fall asleep. The timing and location of technology use may be a critical factor in exploring the relationship with sleep. Recently reported results by Orzech, Grandner, Roane, and Carskadon (2016) were consistent with our own findings, in that greater use of digital media during the two hours before bedtime was associated with a later bedtime and a reduced total sleep time.
- Given the correlational nature of this study, it remains unclear whether those who experience insomnia simply use technology as a means to wind down, or whether "shutting down" technology use prior to bedtime would reduce the likelihood of insomnia. Hence our study didn't establish a causal relationship between media use and insomnia. Additionally, a recent 3-year longitudinal study showed that sleep problems predicted longer time spent watching television or engaging in online social networking, but found no negative impact of media use on sleep (Tavernier & Willoughby, 2014).
- Future research would benefit from experimental manipulations in media use to more fully demonstrate any cause-and-effect relationships. It would also be instructive to more closely examine the pre-sleep use of specific media devices, the time spent on them, and a broader range of relevant sleep variables (e.g. total sleep time, time in bed, bedtime, sleep onset latency, and sleep quality).

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