DraftDataScript

Heather Leonard, Abbie Sanders, and Rebecca Gordon

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Abstract

Introduction: Inadequate sleep has been linked to a host of negative outcomes in adolescents. One potential contributor to poor sleep in adolescents is the rise in cell phone access and use. This study explores the association of adolescent internet overuse and sleep outcomes. **Methods:** Data were collected from 345 middle school students (ages 12-14, 47% female) in the Pacific Northwest. Correlations were run on self-reported sleep measures (total sleep time per night and daytime sleepiness) and internet overuse. **Results:** **Conclusion:**

Introduction

Inadequate sleep has been linked to a host of negative outcomes in adolescents, including depression, anxiety, substance use, obesity, chronic inflammation, attentional focus, learning, and academic performance (Shochat, Cohen-Zion, and Tzischinsky 2014). The American Academy of Sleep Medicine recommends that adolescents get 8-10 hours of sleep per 24 hour period (Paruthi et al. 2016), yet most adolescents don't meet that recommendation. One potential contributor to poor sleep in adolescents is the rise in cell phone access and use. According to a recent Pew Research Center survey, 95 percent of U.S. adolescents (ages 13-17) either own or have exclusive access to a smartphone (Anderson, Jiang, et al. 2018). Additionally, nearly half of adolescents' waking time (7.5 hours per day) is spent on screen media devices, not including time spent in school or doing homework (Rideout 2015). According to a 2021 systematic review, internet overuse by adolescents contributes to both less total sleep and poor sleep quality (Kokka et al. 2021).

Given this information, the present study aims to explore the association of adolescent bedtime media use, internet overuse and sleep outcomes, including exploratory visuals and statistical summary of the data. Our research questions ask: 1) Is bedtime media use associated with internet overuse? 2) Is internet overuse associated with sleep outcomes(total sleep, daytime sleepiness) in adolescents?

Methods

Data were collected from 345 middle school students in the Pacific Northwest. Parents were notified by mail and given the option to opt their student out of the survey. Student assent was collected by research assistants in the classroom prior to administering the survey. Students were compensated for their participation in the study. All procedures were approved by the institutional and school district review boards.

Demographic data collected included age, sex, race/ethnicity, and free/reduced lunch status (used as a stand-in for socioeconomic status). Students were ages 12-14, 53% male and 47% female, and 57% were receiving free/reduced lunch. Ethnicity included 26% identifying as Hispanic or Latino, and race included 33% reporting more than one race, 32% white, 16% unknown, 5% American Indian/native Alaskan, and 3% black/African American.

Total sleep was measured by asking for both weeknights and weekend nights, "what time do you usually go to bed?" and "what time do you usually wake up?" Responses were recorded on a 24-hour scale (range=0-24)

and the final variable was created by rounding the difference in reported bedtimes and wake times. Values at the extreme ends were collapsed, and results were summarized into the following categories: 6 hours or less, 6-8 hours, 8-10 hours, and more than 10 hours.

Daytime sleepiness was measured by asking 8 questions (e.g., "how often do you fall asleep or get drowsy during class periods") with response options ranging from (0) never to (4) always. Participants' responses were added together to create a composite score (0-32).

Bedtime media use was measured by asking for both weeknights and weekend nights, "in the hour before you go to sleep, how frequently do you use any type of screen media?" Response options ranged from (0) never to (3) often.

Internet overuse was measured by asking 4 questions regarding internet use (e.g., "how often do you have trouble trying to cut down on the amount of time you spend online?" and "how often do your grades or schoolwork have suffered because of the amount of time you spend online?"). Response options ranged from (1) never to (4) often. Responses were added together to create a composite score (0-16; mean = , SD =).

We used the following packages on this assignment. Wickham et al. (2019), Chan et al. (2021), Sjoberg et al. (2021), and Müller (2020).

```
## # A tibble: 1,380 x 8
##    grade dm_childage_bl dm_sex_bl dm_ethnic_bl  dm_race_bl dm_lunch_bl variables
##    <int> <chr>          <chr>     <chr>         <chr>      <chr>       <chr>
##  1     7 12 years       male      non-hispanic~ white or ~ no          io1_RC
##  2     7 12 years       male      non-hispanic~ white or ~ no          io2_RC
##  3     7 12 years       male      non-hispanic~ white or ~ no          io3_RC
##  4     7 12 years       male      non-hispanic~ white or ~ no          io4_RC
##  5     7 12 years       female    non-hispanic~ white or ~ yes         io1_RC
##  6     7 12 years       female    non-hispanic~ white or ~ yes         io2_RC
##  7     7 12 years       female    non-hispanic~ white or ~ yes         io3_RC
##  8     7 12 years       female    non-hispanic~ white or ~ yes         io4_RC
##  9     7 12 years       male      hispanic or ~ more than~ yes         io1_RC
## 10     7 12 years       male      hispanic or ~ more than~ yes         io2_RC
## # ... with 1,370 more rows, and 1 more variable: answers <dbl>
```

```
## # A tibble: 1 x 3
##   'i don't know'    no   yes
##            <dbl> <dbl> <dbl>
## 1           9.65  9.64  10.1
```

Table 1: **Table 1. Participant Characteristics**

Characteristic	**N = 345**
Grade	
7	163 (47%)
8	182 (53%)
Age	
11 years	2 (0.6%)
12 years	121 (35%)
13 years	186 (54%)
14 years	35 (10%)
i don't know	1 (0.3%)
Sex	
female	161 (47%)

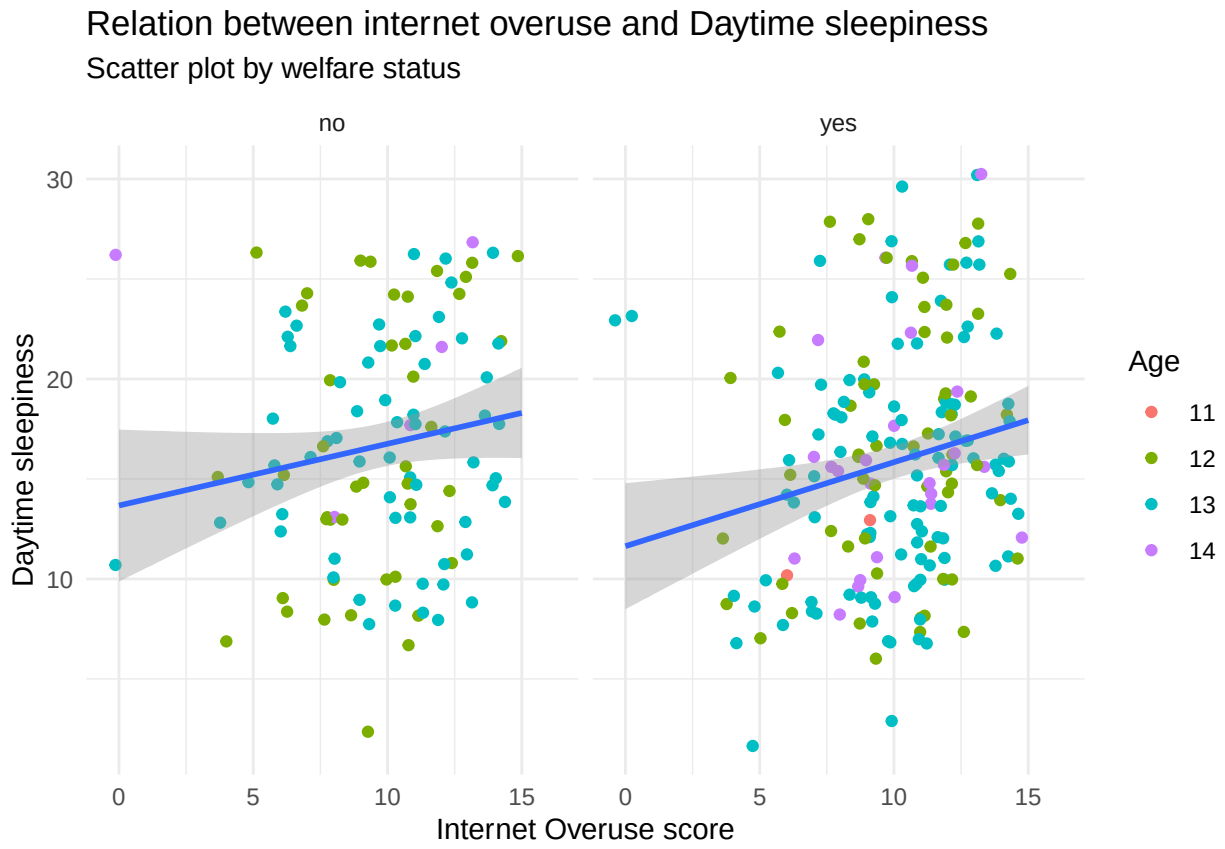
Characteristic	**N = 345**
male	183 (53%)
other	1 (0.3%)
Ethnicity	
hispanic or latino	94 (27%)
non-hispanic or latino	159 (46%)
unknown/refused	92 (27%)
Free/reduced lunch	
i don't know	34 (9.9%)
no	114 (33%)
yes	197 (57%)
Race	
american indian/alaska native	19 (5.5%)
black or african american	15 (4.3%)
more than one race	123 (36%)
unknown	60 (17%)
white or european american	128 (37%)
Average daytime sleepiness	16 (6)
Unknown	8
Average weekly hours of sleep per night	
6 hrs or less	8 (2.4%)
6-8 hrs	64 (19%)
8-10 hrs	236 (70%)
More than 10 hrs	30 (8.9%)
Unknown	7
Average internet overuse	9.89 (3.04)

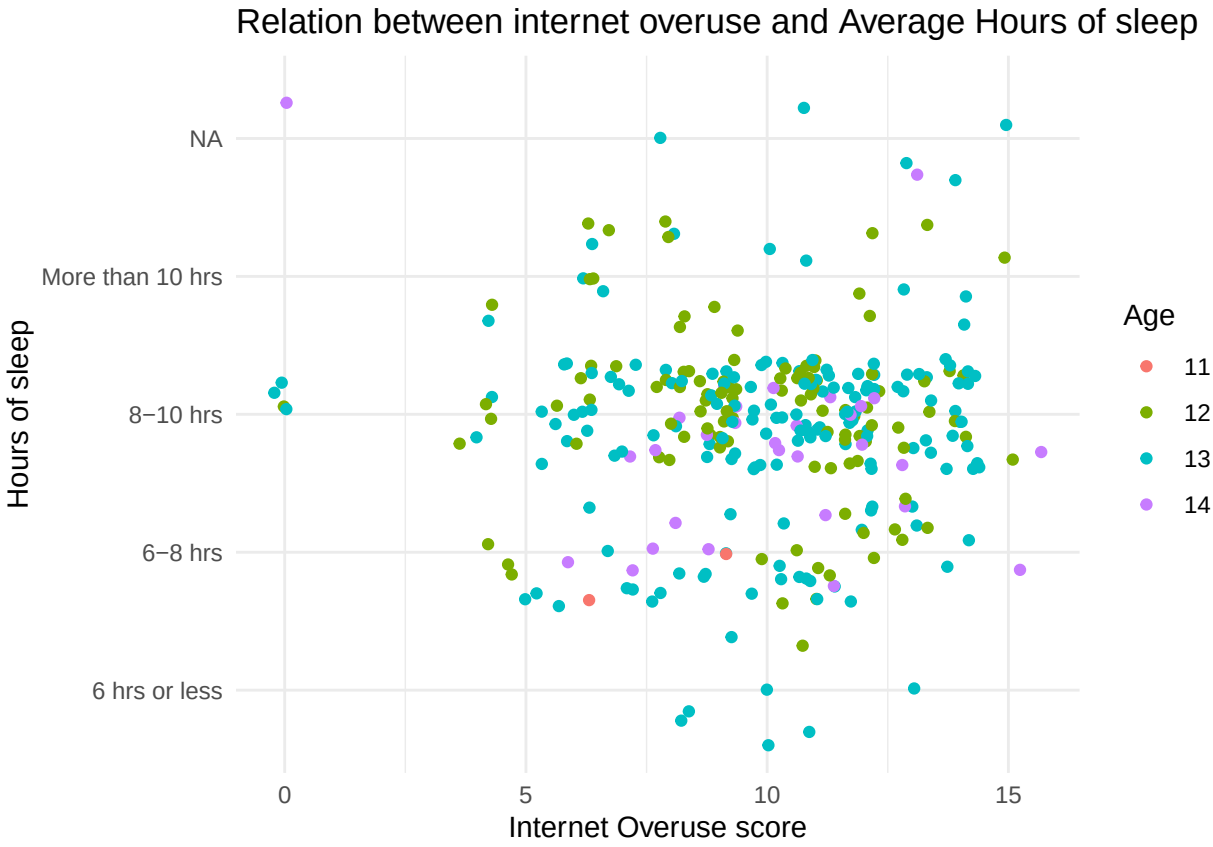
```
##
##  Pearson's product-moment correlation
##
## data:  synthdata$sl_bedmedia_bl and synthdata$io_comp
## t = 3.1186, df = 323, p-value = 0.001981
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.06335282 0.27465048
## sample estimates:
##       cor
## 0.1709667
```

```
##
##  Pearson's product-moment correlation
##
## data:  synthdata$io_comp and synthdata$sl_sleepschool_bl
## t = -0.74704, df = 337, p-value = 0.4556
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.14654445  0.06614568
## sample estimates:
##         cor
## -0.04065997
```

```
##
```

```
##  Pearson's product-moment correlation
##
## data:  synthdata$io_comp and synthdata$sl_sleepy_bl
## t = 3.3681, df = 335, p-value = 0.000845
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.07560747 0.28235657
## sample estimates:
##       cor
## 0.1809808
```




Relation between internet overuse and Average Hours of sleep
Hours of sleep
NA
More than 10 hrs
8−10 hrs
6−8 hrs
6 hrs or less
0
5
10
15
Internet Overuse score
Age
11
12
13
14

References

Anderson, Monica, Jingjing Jiang, et al. 2018. "Teens, Social Media & Technology 2018." *Pew Research Center* 31 (2018): 1673–89.

Chan, Chung-hong, Geoffrey CH Chan, Thomas J. Leeper, and Jason Becker. 2021. *Rio: A Swiss-Army Knife for Data File i/o*.

Kokka, Ioulia, Iraklis Mourikis, Nicolas C Nicolaides, Christina Darviri, George P Chrousos, Christina Kanaka-Gantenbein, and Flora Bacopoulou. 2021. "Exploring the Effects of Problematic Internet Use on Adolescent Sleep: A Systematic Review." *International Journal of Environmental Research and Public Health* 18 (2): 760.

Müller, Kirill. 2020. *Here: A Simpler Way to Find Your Files*. https://CRAN.R-project.org/package=here.

Paruthi, Shalini, Lee J Brooks, Carolyn D'Ambrosio, Wendy A Hall, Suresh Kotagal, Robin M Lloyd, Beth A Malow, et al. 2016. "Recommended Amount of Sleep for Pediatric Populations: A Consensus Statement of the American Academy of Sleep Medicine." *Journal of Clinical Sleep Medicine* 12 (6): 785–86.

Rideout, Vicky. 2015. "The Common Sense Census: Media Use by Tweens and Teens."

Shochat, Tamar, Mairav Cohen-Zion, and Orna Tzischinsky. 2014. "Functional Consequences of Inadequate Sleep in Adolescents: A Systematic Review." *Sleep Medicine Reviews* 18 (1): 75–87.

Sjoberg, Daniel D., Karissa Whiting, Michael Curry, Jessica A. Lavery, and Joseph Larmarange. 2021. "Reproducible Summary Tables with the Gtsummary Package." *The R Journal* 13: 570–80. https://doi.org/10.32614/RJ-2021-053.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the Tidyverse." *Journal of Open Source Software* 4 (43): 1686.