Screen time and sleep in young adolescents before and across the first year of the COVID-19 pandemic

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INTRODUCTION

EARLY ADOLESCENCE (11-14 years) is a critical period for cognitive, physical, social, and emotional development[1], including changes in sleep behavior[2], which may convey vulnerability to the effects on emotional wellbeing of the pandemic, with the risk of long-term detrimental consequences.

Higher amounts of screen time are associated with poorer sleep quality[3], shorter sleep duration, and insomnia symptoms[4] during adolescence. During the COVID-19 pandemic, adolescents and families have turned to online activities and social platforms more than ever. Participants of the ABCD Study®, had a total daily non-school related screen time of 7.70 hours per day during the pandemic, which was higher than pre-pandemic estimates[5].

Although there is considerable concern over the negative effects of the pandemic on both sleep and screen time use, no work has examined the effects of screen time on sleep in the context of the pandemic.

OBJECTIVES: We aimed to understand (1) the effect of the COVID-19 pandemic on early adolescents' sleep and screen time, and (2) to evaluate the associations between recreational screen time and sleep habits in the context of the pandemic.

PARTICIPANTS

Data were obtained from the US-based Adolescent Brain Cognitive Development (ABCD) Study® (2), a multisite (21 research sites from 17 states) longitudinal study. Here, we used self-report data from 5,027 adolescents (48.2% female) who had completed both the ABCD protocol at pre-pandemic regular visits (baseline, Year 1, Year 2) and online surveys at six time points during the pandemic (May 2020 - March 2021).

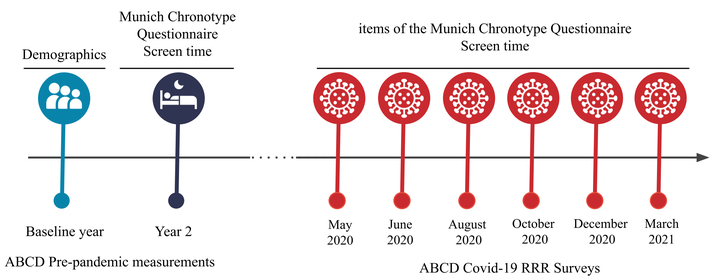
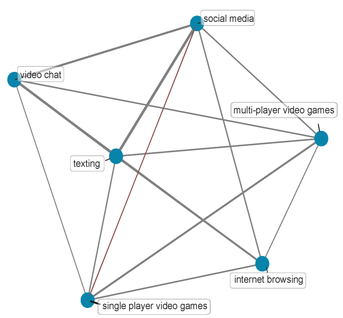


Figure 1. Timeline of the pre-pandemic data collection and start-dates for the distribution of each COVID-19 survey are shown.

METHODS

The main analyses focused on examining changes in sleep measures (time in bed, bed time, sleep onset latency in minutes) as well as the relationship between sleep and screen time before and during the pandemic, using linear mixed models.

To avoid multicollinearity of the predictors, we reduced the screen time variables to the items that had the lowest correlation (Spearman's rho = 0.13): time spent with social media use and single player video game time, as representatives for screen time.



All the models included assessment date (COVID-19 Surveys from 1 to 6), pre-pandemic age (in months, at Year 2 assessment), school (no school/school), time spent on social media platforms (in minutes), time spent on single player video games (in minutes), sex (male/female), adjusting for race, ethnicity, and highest level of parental education.

RESULTS

CHANGES IN SLEEP MEASURES DURING THE PANDEMIC

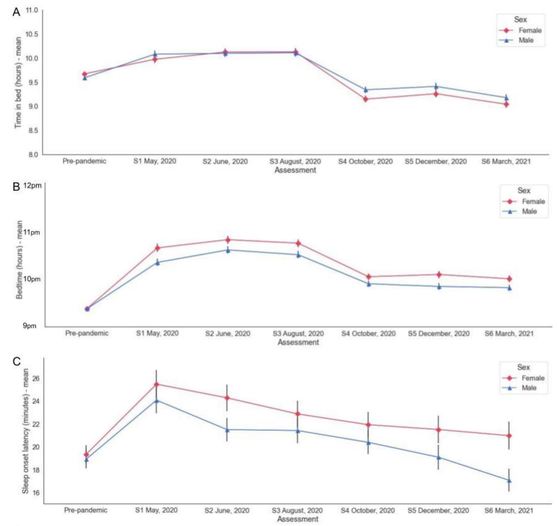


Figure 2. The interaction effect of sex and assessment on (A) adolescent's time in bed (markers: mean ± CI), (B) bedtime (markers: mean+CI), and (C) sleep onset latency (markers: mean+CI), shown separately for boys (blue) and girls (red).

CHANGES IN SCREEN TIME DURING THE PANDEMIC

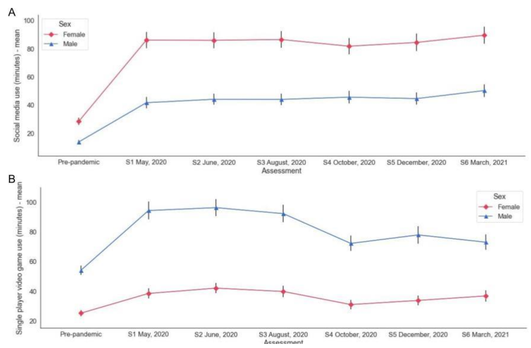
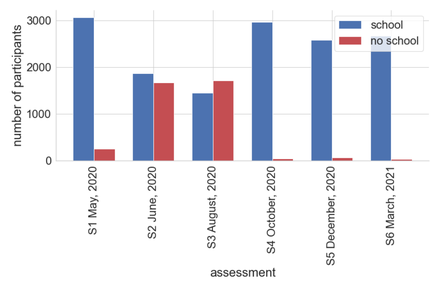


Figure 3. (A) Time spent on social media platforms (markers: mean ± CI) and (B) time spent on single player video games (markers: mean ± CI) at different assessments (one pre-pandemic assessment and 6 pandemic assessments), shown separately for boys (blue) and girls (red).

ATTENDING SCHOOL DURING THE PANDEMIC

Figure 4. The ratio of participants who reported that they have no school activities during the pandemic is higher in June (Survey 2) and August (Survey 3), likely coinciding with summer break.

We found a main effect of school and a significant interaction effect of the assessment x school, with participants having longer TIB during assessments when there were no school activities.



EFFECTS OF SCREEN TIME ON SLEEP MEASURES

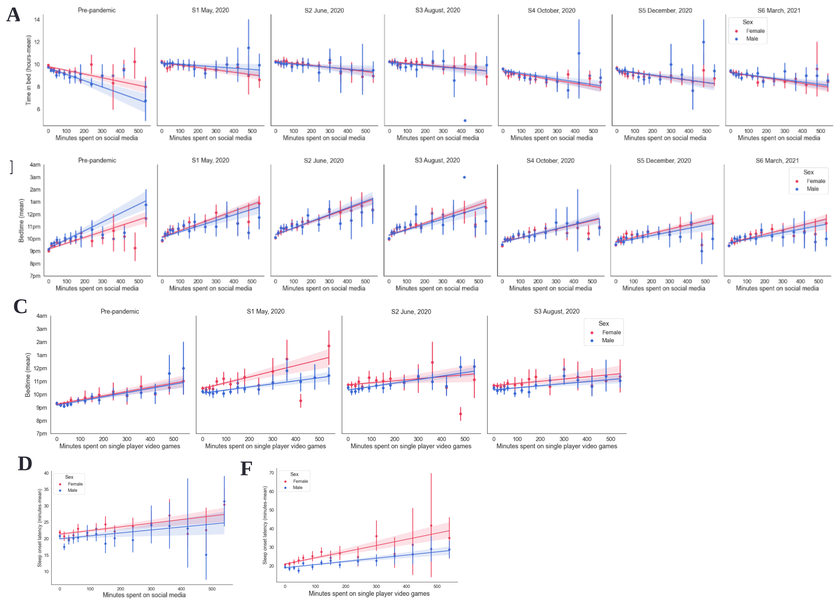


Figure 5. The relationship between (A): screen time and time in bed, (B-C) screen time and bedtime, and its interaction with assessment (significant pre-pandemic and pandemic assessments) in adolescents, (D-F): screen time and sleep onset latency, shown separately for boys (blue) and girls (red).

CONCLUSION

Sleep was dramatically different in May 2020 relative to pre-pandemic, likely due to the substantial changes in schedules during the early stages of the pandemic (e.g. online school).

Within the pandemic year of 2020, sleep behavior fluctuated, partially depending on school-breaks. Participants continued to maintain later bedtimes but woke up earlier after starting the new school year, which resulted in a shorter time in bed in the latter part of 2020 and early 2021.

Sleep behavior differed according to age, with later sleep timing, shorter time spent in bed, and faster sleep onset latency in older compared with younger adolescents, even across this relatively small age range of the ABCD study.

Participants increased screen usage during the pandemic. Girls were more likely to spend time on social media and less likely to play single-player video games, than boys.

Social media and single player video games were associated with later bedtime, delayed wake up time, shorter time in bed and longer sleep onset latency.

There is need to implement public policy that supports positive health behaviors, such as sleep, and promotes balanced screen usage, particularly in this cohort of adolescents.

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