

The Impact of Digital Technology on Sleep in Adolescents During the COVID-19 Pandemic

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The COVID-19 pandemic has resulted in a large technological shift in the processes of daily life. School and work, if possible, are now virtual along with most social interactions. While it is fortunate that this digital technology allows adolescents to overcome academic and social limitations, it is crucial to recognize that it may also have side effects. Adolescence is a sensitive developmental period accompanied with a number of difficult transitions, which the increased reliance on digital technology during this pandemic might exacerbate.

The majority of US teenagers spent more than 4 hours a day on screen media¹ prior to the pandemic. Since its start, this number has increased drastically as schools shift to an online format and safety protocols force adolescents to rely more heavily on social media to interact with the world. This maintains some of the benefits of social interactions in a physically distanced world; however, the possible overuse of digital technology can come with repercussions as the youth's reliance on technology continues to increase in trying to navigate sudden changes in daily routine and they seek to build peer relations, maneuver emerging relationships, and develop self-identity. Research has demonstrated a bidirectional link between greater digital technology use and shorter sleep time in adolescents;² thus, it is paramount to focus on this relationship since sleep impacts adolescent mental health.

Due to limited physical contact, a phenomenon of “fear of missing out” (FOMO) may be more prevalent during the pandemic, as adolescents harbor preoccupation regarding others having more rewarding experiences than oneself, and feel the need to belong through constant engagement on social media platforms.³ The more time an adolescent spends on social media, the more active this thought of “What am I missing out

on?” becomes, eventually manifesting as overwhelming stress and anxiety. As we shift to a virtual world, the FOMO also shifts from what a person is missing out on by not physically being there to what they can miss by not being on the phone. This exacerbates sleep difficulties as it becomes much harder to disengage from the virtual world at the end of the day. Also, when one does disengage, the FOMO can increase and this is linked to increased sleep issues.⁴

Juggling between online school, leisure activities such as videogaming or watching television, and social media for extended periods of the day exposes adolescents to effects of blue light emitted by the technological devices. This is linked to suppression of melatonin production and delay of sleep onset.⁴ To counteract the effects of stress, the hypothalamic pituitary axis produces cortisol, a stress hormone, which may contribute to possible homeostatic imbalances and appear as sleep difficulties. Blue light has been shown to elevate cortisol levels, suggesting an increased fight or flight response while lying in bed for those engaging in device usage,⁴ causing fragmentation of sleep and shortened sleep time. Since screen time influences brain circadian rhythm, causing sleep out-of-phase, it is theorized that increased digital technology usage during the day and night can be used to predict increased sleep difficulties.

Sleep is a physiological process that has been shown to have restorative and regulatory properties. Interestingly, even normal biological, psychological, and social changes that occur during adolescence predispose them to insufficient sleep and tiredness.⁶ Research has demonstrated that when adolescents and children sleep for the same number of hours per night, adolescents report higher rates of sleepiness during the day, supporting the idea that adolescents may have a greater sleep need.⁶ Symptoms of sleep difficulties affect

approximately one fourth of adolescents as exhibited in several large epidemiological studies.⁷

The ongoing pandemic-related overuse of digital technology has resulted in increases in sleep difficulty,⁸ leading to surges of cortisol levels over extended periods of time, potentially impairing innate immune function and making adolescents susceptible to infections such as the COVID-19 virus.⁹ The increased vulnerability to the virus is intriguing, as different Coronavirus strains have been linked to mental health disorders.¹⁰ This may contribute to more mental health problems in adolescents even though the physical severity of COVID-19 illness manifestations may be relatively mild.

Partial sleep loss on a chronic basis accumulates into a sleep debt, which can produce significant neurobehavioral impairment.¹¹ In addition, sleep problems predict development of emotional and behavioral issues in later life.¹² It is well acknowledged that during adolescence, an individual acquires the physical, cognitive, emotional, social, and economic resources that build a critical foundation for later life, health, and well-being. Over a year (and counting) of physical distancing represents a large portion of an adolescents' life during a sensitive period of development, so it is possible that the effects of sleep difficulties will be more long-term. This is especially true since adolescence is a period of heightened vulnerability to mental health problems. According to the World Health Organization (WHO), half of all mental illnesses begin before the age of 14.¹³

It can be speculated that the sleep difficulties experienced by adolescents may be a consequence of overuse of digital technology during the pandemic, as available research on the topic is limited. A possible explanation is that they are overusing digital media to overcome the varied psychosocial stressors related to COVID-19 safety protocols. It will be challenging to restrict overuse of digital technology especially during the pandemic, as it has become one of the few effective ways to remain engaged in education and socialization, while allowing adolescents to practice autonomy from

parental figures. Considering that sleep and mental health are two inseparably linked aspects of health,¹⁴ adolescents need support in balancing their online interactions with an appropriate and consistent sleep schedule in the present crisis.

Since sleep is often overlooked in public health messages and education interventions,¹⁵ the pandemic provides a great opportunity to structure our mental health system towards recognizing sleep-related issues, followed by increasing awareness and education about sleep hygiene as a preventative measure in this vulnerable population.

Sleep hygiene is understood as the degree of individual adoption of specific behaviors that promote sleep, in concurrence with avoidance of habits that inhibit sleep.¹⁶ Therefore, establishing appropriate times to disengage from the screen, setting up a calming and structured bedtime routine, having a regular sleep/ wake routine, and using the bed only for sleeping is a reasonable approach to sleep improvement efforts. Studies have demonstrated that self-reported sleep issues in adolescents can be improved through practicing better sleep hygiene.¹⁷

As a relatively inexpensive lifestyle intervention, sleep hygiene education could serve as a first line of defense for adolescents in the present crisis and beyond. The utility of sleep hygiene education could be enormous since it can be disseminated easily and readily, even by non-clinicians. Thus, the role of educating and empowering parents and caregivers is also crucial. In one study, adherence to sleep hygiene was relatively high and increased over time compared to other treatments, providing support that once educated, people are likely to continue practicing good sleep hygiene.¹⁸ Furthermore, sleep hygiene recommendations can be delivered through digital media resulting in increased accessibility. As a highly relevant issue for pediatric practice, future research is needed to explore, inform and update the relationships among digital overuse-related stress, sleep, and COVID-19 to better understand the complex nature of its impact on mental health.

Take Home Summary

With increasing use of social media and digital technology during the pandemic, it is interesting to examine the effects this could have on mental health and sleep, particularly in vulnerable populations such as adolescents, as well as potential treatments.

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