

Review Article

The interplay of digital fatigue and sleep deprivation in adolescent mental health: a post-pandemic imperative for school nursing

Hoshiar Singh, Ayushi Rana*, Kanchan Sharma

Department of Hospital Administration, AIIMS, Rishikesh, Uttarakhand, India

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*Correspondence:

Ayushi Rana,

E-mail: rana01ayushi@gmail.com

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ABSTRACT

The risk of high pre-sleep screen use, delayed sleep onset time, and increased insomnia among adolescents has increased significantly following and during the COVID-19 pandemic, which has also significantly increased their digital technology use. Sleep loss also exacerbates mental health concerns including depression, anxiety, emotional dysregulation and suicidality, disproportionately affecting female adolescents, youth with attention-deficit/hyperactivity disorder (ADHD) and/or autism spectrum disorders, and socioeconomically disadvantaged groups. This is a narrative review of peer-reviewed literature (2020-2024) that reviews the relationships among digital fatigue, sleep deprivation and adolescent mental health, and the role of school nurses in multi-tiered systems of support (MTSS) to address the interlinked risks. Peer-reviewed articles, systematic reviews, and meta-analyses were identified through PubMed, Scopus, and Google Scholar using a combination of the following terms: adolescents, digital fatigue, sleep deprivation, screen time, mental health, school nursing, and COVID-19. Studies were included if they included adolescents aged 10–19 years, and addressed digital screen use and sleep or psychological outcomes, and were published in or after 2020. Evidence was integrated within and across domains. Screen time, especially in the hours leading up to sleep, was consistently linked to a reduced sleep onset, poor sleep quality, and an increase in insomnia, through the suppression of melatonin and stimulation of cognitive activity. Disruption of sleep was associated with depression, anxiety, and suicidality, with a bidirectional relationship exacerbated by pandemic-related stress and less physical activity. School nurses became the front-line MTSS moderators in screening, education and policy advocacy. Culturally responsive, longitudinal studies, and more robust implementation of school nursing programs are needed to safeguard adolescent mental health and combat adolescent digital fatigue and sleep loss.

Keywords: Digital fatigue, Sleep deprivation, Adolescent mental health, School nursing, COVID-19

INTRODUCTION

Adolescents have been increasingly using digital technologies, and the COVID-19 pandemic further increased their use of these technologies as the shift to remote learning and virtual socialization and telehealth quickly became a reality.¹ In times of lockdown, digital media has kept education going and social interaction alive, but too much and too much of the wrong kind of screen time, or digital fatigue, has become a public health problem.² Pre-pandemic, excessive screen time was already linked to psychosomatic symptoms like headaches, low mood and irritability and bedtime resistance and

shorter overall sleep duration.³ These impacts have worsened in the post-pandemic era, with recent research showing that over 97% of adolescents access electronic devices prior to sleep and 76.5% of high school students reported getting insufficient sleep, increasing the risk for emotional dysregulation, anxiety and depression.^{4,5}

Adolescent sleep loss disrupts executive functioning and the top-down control of emotional circuits, further contributing to poor emotional regulation and risk for suicidality.⁵ There is converging evidence that blue-light from screens delay the onset of melatonin, and that engaging in online community participation can contribute

to mental health risk, as it can normalize harmful social comparisons and self-harm.^{6,7} Adolescents with pre-existing mental health issues, like eating disorders and attention-deficit/hyperactivity disorder (ADHD), seem especially vulnerable to two-way pressures of digital fatigue and sleep disturbance, because digital affordances may exacerbate perfectionistic and impulsive behavior patterns.

School nurses are key stakeholders in multi-tiered systems of support (MTSS) to identify and address these complex problems. They are often the first line of encounter with students having health issues and have an important role to play in delivering evidence-based interventions to students in the areas of sleep hygiene, digital literacy and mental health resilience.⁶ This narrative review aimed to introduce literature published in peer-reviewed journals in 2020–2024 to contribute to the understanding of the mechanisms of digital fatigue, sleep deprivation and adolescent mental health and further emphasize the role of school nursing in the post-pandemic recovery process. This review will inform proactive health promotion, family and staff education and policy advocacy actions to protect adolescent health within a digitalizing world placing school nursing within MTSS structures.

Aim

This is a narrative review of peer-reviewed literature (2020–2024) that reviews the relationships among digital fatigue, sleep deprivation and adolescent mental health, and the role of school nurses in MTSS to address the interlinked risks.

METHODS

Research design

A narrative review methodology was used to synthesize and critically appraise literature reviewed. How this approach enables an in-depth exploration into complex and multifaceted relationships and implications for school nursing practice is discussed.

Literature selection

Peer-reviewed articles, systematic reviews and meta-analyses were searched on PubMed, Scopus and Google Scholar databases. Studies in English language were given preference and some seminal studies were included, largely for historical purposes, particularly from the time of the onset of the COVID-19 pandemic. The combination of terms that were searched for were adolescents, digital fatigue, sleep deprivation, screen time, mental health, school nursing and COVID-19. Studies were included when they involved adolescents aged 10–19 years, included information on the digital screen use of adolescents and on sleep or psychological outcome, and were conducted during or after the onset of the pandemic in 2020.

Data synthesis

Evidence was shared in 5 domains: digital media effects, sleep-disruption mechanisms, mental health correlates, pandemic related impacts, and school nursing interventions. Results were analysed to bring out patterns, relationships and implications for practice.

LITERATURE REVIEW AND SYNTHESIS

The rise of digital fatigue in adolescents

Smartphones, social media and online games have become ubiquitous and have been a persistent worry about mental health in young people. Digital media can provide social interaction and entertainment, but it's also been linked to sleep problems and emotional disturbances as well as depression and behavioral problems. The use of digital technologies has grown even more due to the shift of education, communication and recreation to digital environments since the beginning of the COVID-19 pandemic.¹ Technology helped to keep society going throughout this time, but for many adolescents, much of the time was characterized as “bad screen time” in which they felt tired and less motivated to use technology. This double-edged sword was explained by Gregersen et al who said that digital media could be used as a means of connecting and also as a source of emotional stress.¹

The dichotomy of internet usage and problematic internet use (PIU) was similarly evident in the study conducted that showed that the use of the internet during the pandemic was correlated with loneliness, depression and anxiety, indicating that PIU is a health problem.⁸ Likewise, George et al noted that increased digital use was related to an increase in ADHD and conduct-disorder symptoms, but there was a partial compensatory effect as same-day decreases in anxiety and depression were observed. Digital media has also been referred to as a “triple-edged sword” both acting as a learning tool, a support resource and a risk exposure.² Adolescents are thus presented with a paradox; while digital technologies help them connect, they also create an increase to emotional distress, problematic use, and behavioral difficulty, highlighting the need to intervene in order to foster healthy digital use and to identify problematic use early in their lives.

Media multitasking has a negative effect on attention, memory, and social cognition, and digital distraction is especially harmful for adolescents, given the continued development of their brain regions that support attention and memory.⁹ Excessive screen time has been associated with ADHD-like symptoms and worse symptoms for children with ASD.¹⁰ Overuse of social media has been linked to depression and anxiety, especially in girls, while exposure to social media has been linked to increased stress levels in highly vulnerable adolescents.¹¹ A negative impact on self-esteem is seen even when unrealistic body imagery and social comparison are experienced online.⁷ Headaches, low mood and irritability and academic and

behavioural issues have also been linked to high screen use.^{3,12} One of the major impacts of poor sleep is that screen time, especially before bed, shortens sleep duration and delays sleep onset. While digital forums can provide important peer support for young people with conditions like eating disorders and/or ADHD, harmful behaviours may be reinforced and image-based content and fitness applications can worsen issues with perfectionism and body-image concerns.⁶

The relationship between COVID-19 and smartphone sleep technology. Prolonged screen use and emotional and physical strain became more prevalent during the pandemic.¹³ Sleep applications have been suggested as a means to encourage sleep hygiene; however, the majority of applications are not clinically validated and should be taken with caution¹⁴. Psychosocial and educational interventions have been found to yield small reductions in adolescent screen time, but smaller mental health benefit, such as with switch-off 4 healthy minds and moderate benefit, including self-efficacy training and involving parents in interventions.^{15,16} Moderation seems to be a better strategy than abstinence: showed that heavy social media use is linked to a decrease in happiness, whereas moderate use has a minimal effect, highlighting the need to focus on content and context rather than time.⁷

Lack of sleep and adolescent mental health

Adolescence is a time of significant social and biological transition (ages 10-19) that has a unique circadian rhythm, which increases susceptibility to sleep disturbances.⁵ The COVID-19 pandemic disrupted daily life and altered adolescent sleep patterns, with both short- and long-term consequences. In times of lockdown, sleep duration was found to be positively associated with later school start times, a finding reported in several studies in Brazil, United Kingdom, Switzerland and South Korea.⁴ Kaditis et al reported that 90% of adolescents went to bed after 10:00 p.m., and a review of 133 studies also showed that sleep patterns became more irregular, and more similar to a vacation-like schedule.^{17,18} In spite of increased sleep hours, quality of sleep has decreased as a result of more stress and social isolation, for example, the Pittsburgh sleep quality index (PSQI) and the sleep disturbance scale for children (SDSC) recorded higher levels of insomnia, night-time awakenings and anxiety.^{4,18} Poor sleep after return to school was reported by 63.4% of adolescents in Lithuania and in southern part of India bruxism (33.3%) and sleep apnea (22.2%) were common in adolescents.^{19,20}

School reopening did not lead to an increase in sleep benefits. There were no long-term improvements in sleep following the initial lockdown period, and Austrian adolescents reported poorer sleep overall.^{4,21} Decreased socioeconomic status, increased screen time, poor mental health and physical inactivity were each found to have a negative impact on sleep outcomes with girls consistently demonstrating greater impact than boys.^{4,18,22-24} Adolescents with ADHD or ASD had disproportionate

disruption, with ADHD having to do with irregular sleep patterns and ASD having to do with persistent sleep disturbance.¹⁸ Students at university also reported initial sleep benefits but later, with feelings of isolation and stress, they reported poorer sleep.^{4,25} Neurological pathways involved in reward processing and emotional regulation are affected by chronic sleep deprivation, which is linked to lower academic achievement, emotional instability and risk-taking behaviour.^{5,26} In addition to the neuroendocrine changes that occur during adolescence including delayed melatonin secretion, behavioral factors including screen overuse, and academic stress combine to create a shift towards eveningness and a disruption in sleep architecture.⁵

During the pandemic, CDC surveillance data showed that 76.5% of high school students slept for less than 8 hours a night, and less than seven hours was linked to academic and mental health struggles.²⁷ Short sleep duration has been linked to deficits in executive function, emotional reactivity and suicidality.⁵ While extended sleep time at home at first, overall sleep quality did suffer due to increased screen time and psychological stress, with poor sleep and poor mental health showing a bidirectional relationship.^{5,27} Adolescent insomnia is associated with subsequent mood and behavioural disorders, particularly for female and low socioeconomic status (SES) youth, lowers functioning of the reward-circuit and prefrontal regions, and poses a heightened risk for suicide risk and should be addressed early.⁵ Better sleep hygiene and treatment of insomnia can significantly improve adolescent mental health outcomes: CBT-I is effective for alleviating sleep disturbance and psychiatric symptoms while chrono therapeutic treatments such as light therapy and melatonin therapy are beneficial, especially in those with circadian rhythm disorders.⁵

Digital fatigue, sleep displacement, and adolescent sleep quality

Adolescent sleep is crucial for their health and wellbeing, but is often disrupted by delayed circadian rhythms and excessive time spent using digital media.^{28,29} More than 6 hours of daily digital use was shown to be statistically associated with increased risk of digital eye strain as well as poor sleep quality in regression modeling; 63.7% of children reported digital eye strain and 51.2% poor sleep quality, with older adolescents and girls having higher rates. Late night use, especially social media, also negatively impacts sleep 31, especially for adolescents with the evening chronotype. Sleep loss, in turn, leads to cognitive and emotional dysfunction and an increased vulnerability to mood disorders. The disruption of melatonin production by screen exposure before sleep, and increased cognitive arousal due to this exposure, further hinders sleep onset and sleep displacement, cognitive overload, and the exposure to addictive content reduces sleep quality and academic performance.^{32,33}

Electronic media, especially mobile phone use, has been consistently linked to later bedtimes and reduced amounts of sleep time reported. In line with this, adolescents who keep phones with them late at night, as measured by Brunet et al report more frequent awakenings and less refreshing sleep, and Burnell et al confirmed this with data from ecological momentary assessment and fitbit sensors, which indicated that night-time use of phones was associated with poor sleep onset and sleep quality.³⁴ Excessive social media usage has been associated with depression, anxiety and self-harm, especially among females.³⁵

The impact of screen media on sleep operates via three major pathways: displacement, physiological arousal, and suppression of the melatonin and circadian rhythm by blue light outline a vicious circle between screen time, insomnia, and mental health problems.³⁶ Use of mobile phone in the evenings contributes to reduced sleep and increased arousal and almost all adolescents use some form of device before going to sleep, most commonly a mobile phone.²⁹ In addition to phones, television and computer use also disrupt sleep and late night use has a negative effect overall, with affected adolescents experiencing insomnia, daytime sleepiness, and reduced sleep duration.²⁸ Then poor sleep impacts behaviour, emotion and academic outcomes: night-time device usage has been associated with emotional problems, reduced self-esteem and depression.²⁸ Mental health and sleep are interdependent, and sleep restriction (both chronic and acute) is linked to an increase in substance use and violence.

Screen time reduction and sleep hygiene should be a priority for adolescents. Preventative counselling, such as activities that discourage use of devices before sleep, is encouraged and school nurses are well-positioned to offer such services.^{28,29} Implementing screen filters, notification suppression and enforcing device bedtimes have a meaningful impact on sleep outcomes, as does parental involvement.³⁷ But previous research does not consider the influence that different types of content and interaction have on content outcomes, and platforms such as TikTok and YouTube Shorts build on features that encourage high engagement compared to passive viewing (e.g., watching TV), and could thus warrant its own analysis.³⁸ Preadolescent years are a time during which interventions should be conducted to address sleep routines and media use, for example by deleting electronic devices after 9:00 pm, using a media-literacy approach as part of school curricula.

The role of school nurses in supporting mental and behavioral health in schools

Pupil wellbeing was greatly challenged by the COVID-19 pandemic. Study noted that when schools are closed, school nurses are the first point of contact for students and help to bridge the gap in the continuity of care and to community resources.³⁹ School nurses are key to detecting mental health issues and referring students to mental health services, especially as up to 20% of youth have mental

health issues globally and the pandemic has disrupted their routines and reduced their access to mental health services.^{40,41}

CDC data indicate that youth have had an increase in both depressive symptoms and suicidal ideation during the pandemic, and this includes an increase for LGBTQ+ students, female students, and Black students.⁴² While traditionally the role of school nurses has been physical health, school nurses now use validated tools like PHQ-9 and SCARED to screen for mental health issues, then referring students to the appropriate care and/or coordinating care with teachers and families.^{42,43} Nevertheless, not every nurse is trained in mental health, and there is a range of readiness in institutions for embedding mental health in the school environment. The National Association of School Nurses (NASN) provided resources to nurses through telehealth and virtual care models, reopening guidance, and others to help adapt to the needs of providing care during the crisis while closing gaps in access to care. In school-based mental health systems, nurses are found at all three tiers of the MTSS (universal wellness promotion, tier 1; early intervention, tier 2; and individual support, tier 3) and nations like the United States, Rwanda, and S. Korea have similar systems in place to support detection and care.^{40,41}

In addition, throughout the pandemic, nurses were given expanded public health roles, such as quarantine, contact tracing, and safety measures, often in stressful circumstances.⁴⁴ They also played a key role as leaders within communities that were underserved.⁴⁵ There were a number of core wellness areas where school nurses helped; including advocating for emergency child care access, promoting physical activity via online resources such as GoNoodle, and addressing food insecurity by connecting families to services like the USDA National School Lunch Program and Feeding America.^{39,46} Nurses shared information about a service called Crisis Text Line and the CDC coping workbooks as well as encouraged good home organization practices with models created by Khan Academy and the Gasol Foundation.³⁹

Structural barriers to school nurses remain, such as limited mental health training, high caseloads, and role ambiguity as did structural barriers to school nurses in a UK-based review.^{43,47} Developing a mental health-resilient school nursing workforce will take a targeted approach to training, enhanced support for MTSS integration, and better data infrastructure and continued leadership and community support—school connectedness is one of the most powerful protective factors for youth mental health.^{42,43,45}

RESULTS

This is a narrative review to help clarify the multifaceted and complex relationship between digital fatigue, sleep deprivation and adolescent mental health in the setting of COVID-19, based on the current literature. Too much screen time, particularly late in the day, makes a significant

impact on sleep outcomes, such as sleep onset latency, sleep quality and the likelihood of sleep onset that can lead to insomnia. The reason for these disruptions is because of behavior (multitasking with media, using devices at night) and because of physiology (suppression of melatonin, due to exposure to blue light). Some of the emotional and psychological issues related to sleep deprivation include depression, anxiety and suicidality, which can also lead to a vicious cycle of excessive digital use and emotional imbalance.

During the pandemic, as children and young people have been using virtual learning and digital connections, these challenges have been exacerbated. Although there was an increase in sleep time because of flexible sleep schedules, sleep quality over time was negatively affected by the psychological stress, decreased physical activity, and increased evening screen time. The female adolescent, low-income and students with neurodevelopmental disorders were significantly impacted.

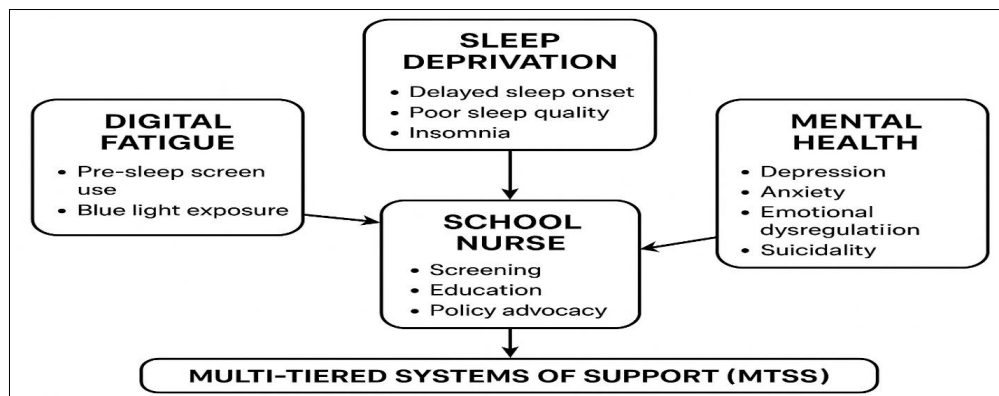


Figure 1: Conceptual framework linking digital fatigue, sleep deprivation, and adolescent mental health, and the moderating role of school nursing within MTSS.

Table 1: Summary of key findings by thematic domain.

Theme	Key findings	Supporting studies
Bedtime digital device use and sleep quality	Pre-bedtime screen use among adolescents (97%) leads to reduced sleep quality, delayed onset, and poor sleep hygiene. Blue light exposure and emotionally stimulating content contribute to circadian disruption.	30,32,34
Digital fatigue and sleep deprivation	Digital fatigue, marked by prolonged screen exposure and multitasking, leads to emotional exhaustion and physiological strain, heightening risks of insomnia and mental fatigue. Sleep loss exacerbates cognitive overload.	1,8
Bidirectional effects: sleep and mental health	Sleep deprivation contributes to anxiety, depression, suicidality, and emotional dysregulation; poor mental health, in turn, worsens sleep outcomes.	5,27,36
Mechanisms of sleep disruption	Blue light suppresses melatonin; interactive and emotionally charged content increases cognitive arousal; device use displaces rest.	31,32
Cognitive and behavioral impairment	Sleep loss linked with reduced concentration, impaired executive function, and increased digital stress. Night-time alerts worsen outcomes.	36
Mental health risks: depression and anxiety	High screen time (>4 hours/day) correlates with depressive symptoms, low mood, and anxiety—especially among female adolescents. Social media amplifies self-comparison and body dissatisfaction.	7,28,35
Circadian rhythm and chronotype conflicts	Late-night device use worsens sleep irregularity in adolescents with evening chronotypes; sleep misalignment leads to fatigue and irritability.	4,31
Insomnia and vulnerable populations	Adolescents with ADHD, ASD, and pre-existing disorders are more prone to insomnia and emotional dysregulation when exposed to excessive digital media.	6,18
School nurses as system-level moderators	School nurses can screen for digital fatigue and insomnia, promote digital hygiene, implement MTSS interventions, and advocate for delayed school start times.	28,40,42,43
COVID-19 and sleep disruption	Although lockdowns initially extended sleep duration, long-term effects included insomnia, sleep fragmentation, and psychological distress.	4,20,34

In this context, school nurses are key moderators at a system level. They have the ability to screen, educate and advocate for healthy digital behaviors and mental health and are essential partners in MTSS. There are indications that interventions supported by school nurses, such as digital literacy education workshops or screen hygiene education and policy advocacy, can help reduce the negative impact of digital fatigue and sleep loss.

DISCUSSION

In the wake of the COVID-19 pandemic, this narrative review aims to clarify the complex and interdependent interactions between digital fatigue, sleep deprivation, and adolescents' mental health. It incorporates current empirical findings and applies them to an integrative understanding of the behavioral, physiological and psychosocial mechanisms that underlie these associations, particularly in the context of the emerging role of school nurses in reducing the interlinked risks.

The ability to integrate the continuum of digital fatigue/sleep deprivation and mental health into an integrated biopsychosocial perspective is one of the most valuable contributions of this review. Past studies have looked at the effects of digital media use or sleep deprivation alone on the well-being of adolescents, but the present review indicates that both digital fatigue and sleep deprivation influence each other: they form a vicious cycle and can exacerbate the vulnerability of depression, anxiety, emotional dysregulation and suicidality.^{5,34} This is seen especially in the adolescent population with underlying psychiatric disorders or those with neurodevelopmental disorders.^{6,18}

The review also emphasizes the temporal dynamics that have arisen due to the pandemic. In the early phase of the extended sleep, this was compensated by a decrease in sleep quality, increased psychological stress and late night-time screen use during early lockdown periods.^{4,20} These findings suggest that in future studies sleep parameters other than quantitative (time) should also be investigated, namely qualitative (architecture, fragmentation).

School nurses play a critical role as frontline identifiers, educators, and policy advocates, an importance that is reiterated in this review. Within MTSS, nurses deliver tier 1 universal education, tier 2 screening, and tier 3 referrals and policy discussion, including delaying school start times, and digital hygiene protocols.^{28,42,43}

Although great strides have been made, there are still areas where research is lacking. First, causal pathways are still poorly understood, with little use of longitudinal or experimental designs that include objective measures of sleep, such as actigraphy or polysomnography, to validate sleep disruption.^{31,34} Second, existing studies rarely differentiate between content types or usage modalities, such as passive screen time (PST; e.g., watching videos) versus interactive screen time (IST; e.g., social media or

gaming). Interactive, emotionally engaging content appears more likely to increase arousal and cognitive load and to delay sleep onset than passive viewing.³² New apps like TikTok and YouTube shorts, which use a reward-based scrolling system, should also be examined because of their high addictiveness and potential to impact sleep habits.

Third, there is a need for greater analysis of the vulnerabilities of populations. While there are known differences between genders and between socioeconomic statuses, there is a need to explore the intersectional risk of adolescents from marginalised groups, particularly those who are LGBTQ+, reside in rural areas, and do not have stable access to the internet or to a private sleeping space.^{27,40} Fourth, school nurse interventions remain under-evaluated: although many theoretical models suggest that school nurses are effective in providing sleep hygiene or digital literacy education, the few empirical studies that evaluate the effects of school nursing interventions on mental health or sleep outcomes tend to be narrow in scope. The growing role and responsibilities of school nurses should be evaluated in a formal way, with the use of robust evaluative frameworks.^{42,43}

Prospective designs with wearable devices and ecological momentary assessment (EMA) can begin to elucidate the temporal sequence of screen use with sleep disturbance and mental health outcomes.³⁴ Breakdown of the screen time by media type, emotional-arousal level, and time of day will provide more insights into effects of various digital exposures on sleep and mood.³¹ Interventions should be culturally responsive and address family/community-level stressors and should be targeted to vulnerable subgroups such as adolescents with ADHD and ASD and low-income and minority populations.¹⁸ Examples of school nurse-led MTSS interventions could include screen hygiene curricula, parent workshops, or device-free policies, and these interventions could be the basis for scalable models to be implemented in school-based mental health systems.^{28,43} There is a continuing need for advocacy regarding delayed school start times, screen-free periods, and the inclusion of digital literacy in national education curricula, and school nurses can play a significant role in the policy process and pilot projects for school start times.^{5,42}

Limitations

This synthesis is a narrative rather than a systematic review and therefore selection bias may have been involved since it was not a formal systematic review. This synthesis also did not use a formal protocol for the quality appraisal of studies and was not a comprehensive search of the database; several sources were cited by secondary citation, rather than primary, and are therefore not included in this synthesis. The limitations must be kept in mind when interpreting the results of the conclusions presented here and should serve as impetus for the more rigorous, prospective research described above.

CONCLUSION

This narrative review emphasizes the varied and complicated nature of the link between digital fatigue, sleep loss, and mental health of adolescents in particular, especially in the context of the COVID-19 pandemic. The potential negative effects of late night screen time are ubiquitous and can be seen in the behavioral and physiological processes that occur in the evening when an individual is using a screen, including: using screens at bedtime, media multitasking, and the blue light effect. These sleep disturbances, in turn, lead to cognitive, emotional and psychosocial deficits that can result in a vicious cycle of mental health problems, including depression, anxiety and suicidality. While there had been some positive changes to sleep routines since the start of the pandemic, the situation had also led to an increase in psychological stress, a decrease in physical activity and more time spent on screens late at night which ultimately affected sleep quality over time. Female adolescents, students with neurodevelopmental disorders and students of socioeconomically disadvantaged families were more likely to be impacted than other vulnerable groups.

This review is important as it calls attention to the role of school nurses as system-level players in MTSS. They can lead screenings, education and advocacy for healthy digital and sleep habits, as they are at the nexus of healthcare and education. Their participation is a community-based and scalable initiative to combat digital fatigue and psychological impacts. Causal pathways, tailoring of interventions to various populations, and robust evaluations of school-based interventions with a focus on the protection of adolescent well-being in a digital society should be explored in the future. Importance of digital hygiene policies, later school starts and specific education. This nexus will need a holistic response to enhance adolescents' resilience, healthy sleep and mental health.

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