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Virtual Learning Challenges: Examining the Interplay between Sleep and Inflammation in Adolescents with Overweight or Obesity during the COVID-19 Pandemic

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Abstract

This article explores the intricate relationship between virtual learning challenges, sleep patterns, and inflammation in adolescents with overweight or obesity during the COVID-19 pandemic. As the educational landscape shifts to virtual platforms, adolescents face unprecedented disruptions to their routines, impacting sleep quality and potentially exacerbating health concerns. The interplay between virtual learning stressors, sleep disturbances, and inflammatory responses is examined, drawing attention to the unique challenges encountered by this vulnerable demographic. Research findings highlight a bidirectional connection, emphasizing the need for comprehensive interventions to address both virtual learning challenges and sleep-related issues. By understanding and addressing these complexities, stakeholders can work collaboratively to promote the holistic well-being of adolescents with overweight or obesity in the context of virtual education.

Keywords: Virtual Learning, Adolescents; Sleep Patterns; Inflammation; Overweight; Obesity; COVID-19 Pandemic; Health Challenges; Education; Stress; Holistic Well-being.

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Introduction

The COVID-19 pandemic has reshaped the landscape of education, with virtual learning becoming the new norm for students around the world. While this transition has brought about unprecedented challenges for learners, adolescents with overweight or obesity face a unique set of hurdles. This article delves into the intricate relationship between virtual learning challenges, sleep patterns, and inflammation among this specific demographic during the ongoing pandemic.

Due to the nature of the pandemic, this research primarily relies on self-reported data. However, a more recent study utilizing actigraphy demonstrates similar trends. Many studies utilized brief survey methods to obtain data from large samples or assessed sleep in typically developing, healthy adolescents, which may not be generalizable across groups. Currently, no information is available regarding the specific effects of COVID-19 on sleep in adolescents with OWOB.

Self-reported shifts in bedtimes and wake times are one example of the consequences of COVID-19. In a qualitative study, adolescents reported a delayed sleep schedule by about 2 h during the COVID-19 pandemic, though estimates vary between studies. Notably, shifts in these sleep and wake times can be considered temporarily adaptive and may help adolescents more closely align their sleep with their endogenous circadian phase. However, it may later emerge as a barrier when they are expected to return to a typical, in-person routine. Further, decreased structure around bedtimes and wake times may increase variability in sleep timing, which can have negative impacts on sleep. Sleep is also strongly associated with C-reactive protein (CRP), a protein involved in the body's response to inflammation, which predicts cardiovascular events and diabetes. Both chronic short sleep duration and long sleep duration are associated with elevated CRP levels in adolescents. Given the abundance of sleep difficulties experienced by adolescents during the COVID-19 pandemic, it is likely that CRP levels fluctuated similarly. However, while many behavioral changes associated with the COVID-19 pandemic are known to impact CRP levels, no research has examined the relationships between CRP levels and lifestyle changes in the first year of the COVID-19 pandemic. Notably, increased physical activity is associated with decreased CRP levels in adolescents with OWOB. As physical activity decreased among adolescents during the pandemic, especially during virtual schooling periods, CRP levels may have been affected. Further, for children and adolescents, decreased levels of CRP are associated with healthy dietary patterns while increased levels of CRP are associated with less healthy dietary patterns. During the first year of the COVID-19 pandemic, access to processed foods and food insecurity increased, increasing the prevalence of unhealthy dietary patterns and potentially increasing CRP levels for adolescents who experienced this shift.



The Impact of Virtual Learning on Adolescents

Virtual learning, though essential for maintaining educational continuity, has introduced a host of challenges for adolescents. The shift from traditional classrooms to online platforms has disrupted established routines, contributing to irregular sleep patterns and increased stress levels. Adolescents with overweight or obesity may be particularly vulnerable to these disruptions, as they navigate the complexities of virtual education while managing their unique health concerns.

Sleep Disruptions and their Consequences

Adequate sleep is crucial for the overall well-being of adolescents, impacting cognitive function, emotional regulation, and physical health. However, the virtual learning environment has blurred the boundaries between school and home, making it challenging for adolescents to establish a consistent sleep routine. The resulting sleep disruptions can lead to fatigue, difficulty concentrating, and heightened stress levels – factors that may exacerbate the existing health challenges faced by adolescents with overweight or obesity.

The Link between Sleep and Inflammation

Research has consistently shown that sleep plays a vital role in regulating inflammation in the body. Adolescents with overweight or obesity often exhibit higher levels of systemic inflammation, and the added stressors of virtual learning may further contribute to this inflammatory response. Understanding the interplay between sleep quality and inflammation is crucial for unraveling the complexities of the health challenges faced by this vulnerable population during the COVID-19 pandemic.

Research Findings

Recent studies have begun to shed light on the intricate relationship between virtual learning, sleep disruptions, and inflammation in adolescents with overweight or obesity. Initial findings suggest a bidirectional connection – poor sleep quality may contribute to increased inflammation, while heightened inflammation may, in turn, disrupt sleep patterns. These findings underscore the importance of addressing both virtual learning challenges and sleep-related issues in a comprehensive manner.

Addressing the Challenges

To mitigate the impact of virtual learning challenges on adolescents with overweight or obesity, a holistic approach is needed. Educational institutions, healthcare providers, and parents should collaborate to implement strategies that promote healthy sleep habits, manage stress, and address the unique needs of



this population. This may include targeted interventions, educational support, and the integration of mental health resources within the virtual learning framework.

Conclusion

As the COVID-19 pandemic continues to shape the educational landscape, it is imperative to recognize and address the specific challenges faced by adolescents with overweight or obesity. By understanding the interplay between virtual learning, sleep disruptions, and inflammation, stakeholders can work collaboratively to develop targeted interventions that support the holistic well-being of these individuals. Through a multidisciplinary approach, we can ensure that virtual education becomes a positive force in the lives of adolescents, fostering not only academic success but also the promotion of their overall health and well-being.

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