

Reduced Slow-Wave Sleep Replicated in Children to State Definitive Risk

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Abstract

Certain conditions, including asymmetrical sustained posture of the lower extremities and holding a posture for more than one minute, might be higher contributing factors to postural risks, as well as using a tablet versus a laptop which might result in more sustained neck flexion. More recent evidence also suggests increase in neck symptoms being related to television, phone and tablet use, and visual symptoms related to increased use of phones and tablets in particular. Furthermore, more generally in terms of mobile device use, parents, educators and young people should be aware of how to identify postural risks.

Keywords: Sustained posture; Postural risks; Physically changing; Elicit light; Sedentary behavior

Introduction

Identifying which postures pose risks such as extreme head or neck flexion, asymmetrical postures or lying in a prone position, propped up on forearms is important, as is establishing a suitable environment in which children can effectively and safely engage with Information and Communications Technology. In this sense, parents and educators should modify home and classroom environments, accounting for physical risk factors, and health practitioners share a responsibility in assisting education and prevention [1]. Physically changing where in the home or school environment children use devices can help vary which postures are used, and adults should help children understand that changes in posture and taking active breaks to include stretching and movement can be beneficial. Safe adoption of computers into the curriculum can also be considered in teacher training programs for pre-and in-service teachers [2]. It is also important to note that many of these mentioned risks are not exclusive to using technological devices and can be applicable to sustained/static postures in classrooms. With developments in technology, there has been a shift in video games from being sedentary, controller-based games to encompassing a range of games including active video games, which require players to engage in physical movements in order to interact with the screen-based game and can elicit light or even moderate activity in children. Augmented reality games, or those that involve geo-tracking or in the case of Pokémon, a game that uses both are also becoming increasingly popular and are argued to promote movement [3].

Discussion

However, the evidence is mixed. A systematic review of the literature on active video games as efficacious health interventions within schools found that the research was not of a high enough quality, and recommended that randomized controlled trials with larger sample sizes were necessary in order for these to be used as health interventions [4]. In contrast, a meta-analysis including articles on active video games concluded that these games can be a good alternative to sedentary behavior, although they are not replacements for more traditional sports and physical activity in children and adolescents. Studies in this meta-analysis however ranged in null to moderate effect sizes [5]. Technology might also be used for development of physical skills. For example, using applications that require motor skills on an iPad has been associated with improvements in motor co-ordination. These examples show the potential benefits associated with screen time [6]. With the emergence of skill training applications and active video games such as Wifi Sports, Dance Revolution or augmented reality

such as Pokémon, the ways in which the use of screens is recommended for children and adolescents may need to be re-evaluated. However, simply providing children with access to active video games is unlikely to provoke spontaneous engagement in more activity and may not provide a public health benefit [7]. More research in this field can bolster how active video games can be used to enhance activity levels and fitness in children, thereby serving as a public health tool rather than a hindrance. However, a recent review of the literature suggests that reducing screen time may not motivate adolescents and children to engage more in physical activity, and other research has shown that screen-based sedentary behavior and leisure-time physical activity are independent of one another. Television watching may displace other activities such as reading, however overall evidence for the negative impact of displacement is relatively weak [8]. In any case, displacement effects can differ based on amount of use and activities being displaced, for example, heavy internet use may interfere with participation in clubs and sports whereas moderate use has shown to be supportive of participation. This is a relatively consistent finding across the research, moderate internet uses, and shared media experiences, allow young people to build rapport with their peers. Over recent decades, extended screen time, such as television watching and using the computer, has been linked with obesity in children. One way in which this might happen is through eating while watching television, which has been associated with an increase in energy intake i.e. more calories or food eaten through two different processes [9]. The first is that this can delay normal mealtime satiation i.e. the feeling of fullness, and the second by reducing signals of satiety from foods that had been previously consumed i.e. children do not stop eating, even though they are already full. Watching television could serve as a distraction from satiety signals and draws attention away from typical control over food intake [10]. This does not into account the potential impacts of targeted advertising and marketing of high energy, low nutrient foods to children via technology. Further links with obesity and screen time tend to be less linear. For example, some literature points to the notion of a displacement effect

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Received: 24-Oct-2023, Manuscript No. NNP-23-121331; **Editor assigned:** 27-Oct-2023, Pre-QC No. NNP-23-121331 (PQ); **Reviewed:** 10-Nov-2023, QC No. NNP-23-121331; **Revised:** 16-Nov-2023, Manuscript No. NNP-23-121331 (R); **Published:** 23-Nov-2023, DOI: 10.4172/2572-4983.1000370

Citation: Kumar A (2023) Reduced Slow-Wave Sleep Replicated in Children to State Definitive Risk. Neonat Pediatr Med 9: 370.

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whereby time spent using technology causes harm proportional to exposure and detract from other potentially more valuable activities [11]. Stress can be measured through biological markers, such as cortisol, and also through subjective measures such as perceived stress of respondents. In response to stressful events, children may consume media to manage stress or mood, through seeking entertainment for example. Some studies show that playing games for example can help transiently decrease physical stress, and improve one's mood after playing. Further, social support in online and offline forums can help buffer how upset children feel during stressful life events [12]. When faced with a stressor, threat or a challenge, the human body responds through a series of events resulting in secretion of glucocorticoids such as cortisol which plays a role in preparing the body to react to a stressor. In healthy individuals, levels of cortisol follow a cyclic pattern and generally peak after waking followed by a pattern of steep drops at various stages in the day, with the lowest point before bedtime. Changes in this pattern or chronically high or low levels of cortisol can have negative effects on human physiology and psychological outcomes [13]. It is important to note that subjective stress levels do not necessarily mirror physiological stress levels. Long periods of Information and Communications Technology use i.e. three hours or more per day and type of media used might impact the cortisol response in children. In one study looking at Facebook use in teens aged before sixteen, cortisol profiles were associated with Facebook network size and Facebook peer interactions. In this study, there was a negative correlation between Facebook peer-interaction levels and cortisol, and higher levels of cortisol were associated with network size which was contrary to the hypothesis that network size would be inversely correlated with cortisol levels [14]. Further research suggests that adolescents who engage more with general media, use their phones more and have larger network sizes on Facebook may experience higher rises in cortisol after waking up associated with poor mental and physical health problems and rates of interleukin-6, an inflammatory marker, its overproduction is associated with poor health. Experimental and longitudinal work in this field is important to determine whether media use causes this biological response, or whether the response precedes media use. Research might be warranted in identifying whether activating features on mobile devices such Night Shift or night mode are effective in avoiding disruption in melatonin production [15]. These steps could be incorporated into good sleep hygiene practices, which include behaviors such as avoiding excess caffeine, engaging in regular exercise, maintaining a regular sleep schedule and eliminating noise from the sleeping environment. Evidence suggests that these glasses are effective in mitigating melatonin suppression in teenager; therefore their use for late-night studying or scrolling through social media feeds before bed might be warranted.

Conclusion

Therefore, implementing limits on when children and adolescents use technology i.e. not in the hours immediately preceding bedtime,

or providing children with protective equipment such as blue light-blocking glasses may help prevent sleep disruptions.

Acknowledgement

None

Conflict of Interest

None

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