

## **Bedtimes for Primary Schoolchildren**

A. Nicholson

Royal College of Surgeons in Ireland – Bahrain.

During the current pandemic both adults and children have become highly dependent on screens for both work and education with the result that we now communicate via screens more than ever before. This has enabled ongoing work and a very different type of learning to be possible in the ‘new normal’.

However, can I sound a note of caution as there is increasing evidence in relation to evening screen use in primary schoolchildren and its potential adverse effects on sleep quality and quantity.

Sleep patterns physiologically change from birth to early adulthood with the duration of sleep decreasing from approximately 14 hours at 6 months of age to 8 hours at 16 years of age.

The American Academy of Sleep Medicine<sup>4</sup> recommends that the duration of sleep should be at least 9 to 11 hours for children and 8 to 10 hours for adolescents. This effectively means that, assuming most households awaken at 7 am , primary schoolchildren (5 to 7 years old) should be in bed by 7.30 pm (30 minutes to settle), an older child (8 to 10 years ) by 8.30 pm and an 11 to 12 year old by 9.30 pm. These are broad estimates as some children require more or less sleep than outlined above.

Insufficient sleep is associated with several negative physical and mental health outcomes. Decreased sleep in primary schoolchildren may relate in part to a striking increase in electronic screen media use during late hours. Insufficient sleep is associated with unhealthy dietary habits (skipping breakfast for instance), fast food consumption and regular consumption of sweets.

In a large epidemiological study dating from 1905 to 2008, long-term trends in school-aged children show that, over the past century, sleep duration in children has decreased by one hour per night. The advent of almost universal smartphone technology has the likely effect of shortening sleep duration even further in school-going children. Also, the blue light emitted by smartphones and tablets simulates daylight and thereby inhibits melatonin production. Melatonin is key in helping us to both fall asleep and to stay asleep.

A large epidemiological study<sup>1</sup> among 10- to 12-year-old Greek children has shown that increased screen time was considered to be related to shorter sleep duration. Insufficient sleep duration leads on to unhealthy eating behaviours. There is a clear link between insufficient sleep duration and food consumption, appetite, satiety, and energy balance<sup>3</sup>.

Studies among German children and adolescents have shown that those with less sleep duration had significantly increased screen time than those with long sleep duration. Shortened sleep duration was found to be significantly associated with unhealthy dietary habits, screen time, overweight status and poor aerobic fitness.

Compared with television, which involves passive observation, interactive media such as video games and smartphones may be more disruptive of sleep. Smartphones and other internet-enabled devices are particularly concerning because they act as portals to a vast array of content.

Moreover, the presence of a small screen in a child's bedroom may affect sleep beyond use, because unlike televisions, small screens can emit audible notifications (such as text messages) when not in use. These alerts may not only delay sleep but also interrupt it, thereby reducing overall sleep quality. The proliferation of new devices has led to many children now being engaged with a screen for well over 4 hours per day outside of school hours.

Presence of a television in a child's bedroom and its viewing have been linked to shorter sleep duration with later bedtimes. Television viewing is a risk factor for weight gain, decreased academic achievement and behavioural problems. For adolescents in particular, insufficient sleep relating to smartphone use is associated with adverse mental health outcomes<sup>3</sup>.

For adolescents, additional mechanisms that may also undermine the screen–sleep relationship include direct displacement of sleep with screen time, the consumption of heavily advertised beverages containing caffeine, an evening exposure to bright, short-wavelength light interfering with circadian rhythm, the increased cognitive and emotional arousal after playing a video game, watching an exciting movie or sending chats or texts.

Three recent meta-analyses<sup>2</sup> concluded that short sleep duration is associated with increased risk of obesity in children. Accumulating evidence<sup>2</sup> indicates that inadequate sleep is a novel risk factor for obesity in childhood and later in life. However, consequences of inadequate sleep extend well beyond obesity. Improving sleep duration and quality may improve somatic and psychosocial health, school performance and increase risk-taking behaviours among youth. Sleep may also play a critical role in immunity especially to viral infections.

Sleep deprivation makes children more inattentive with adolescents showing diminished higher-level executive functioning skills according to self-reported questionnaires. Inadequate sleep quality and quantity are causally linked to sleepiness, inattention, and probably other cognitive and behavioural deficits that impact daytime functioning with implications for long-term development.

Among modifiable risk factors predicting child and youth depression, sleep deprivation is increasingly recognised as an important component of the complex and multifactorial causal pathway to depression.

In conclusion, smartphone use late in the evening is associated with lost sleep time and this has very significant consequences for both physical and mental health in children. Curtailing smartphone use is a real challenge given its popularity but is justified based on current evidence. It is now time to reclaim this lost sleep.

**Corresponding Author:**

Professor Alf Nicholson

Head of School and Vice President for Academic Affairs

RCSI Bahrain.

Email: [anicholson@rcsi.com](mailto:anicholson@rcsi.com)

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