



Contents lists available at ScienceDirect

Journal of Pediatric Nursing

journal homepage: www.pediatricnursing.org

Pediatric Endocrinology Nursing Society Department

Biopsychosocial Outcomes of Poor Sleep in Adolescents☆☆☆

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“Sleep is a vital biopsychosocial state, a naturally occurring process necessary for brain activity and body functions, psychological health and behavior, and individual, family and sociocultural norms” (Snyder & Chang, 2019, p. 160). Adolescence, defined as the second decade of life (World Health Organization, 2017), is a normal transitional period of physical, emotional, and social change. Puberty-mediated changes in sleep include a circadian time shift and phase delay with later sleep and wake times, and longer time to fall asleep. Suppression of melatonin release, needed for sleep promotion, reinforces later bedtimes and difficulty falling asleep (Crowley, Acebo, & Carskadon, 2007). On a social level, adolescents become increasingly independent from parents with enhanced reliance on the social network as they pass through the normal adolescent developmental task of identity versus role confusion (Erikson, 1994).

Sleep insufficiency in adolescents

Sleep insufficiency among adolescents is a worldwide public health concern (Gradisar, Gardner, & Dohnt, 2011). The American Academy of Sleep Medicine (Paruthi et al., 2016) recommendation of 8–10 h of sleep daily for teenagers for optimal health outcomes is rarely achieved. The percentage of high school students obtaining adequate sleep has decreased from 31.1% in 2007 to 25.4% in 2017 in the National Youth Risk Behavior Surveys (Centers for Disease Control and Prevention, 2020). Factors contributing to adolescent sleep insufficiency include unique developmental sleep patterns (Crowley et al., 2007), early school start times (Bowers & Moyer, 2017; Minges & Redeker, 2016), greater sleep variability between weekdays and weekends (Gradisar et al., 2011), and nighttime use of mobile phones and tablets (Bartel, Gradisar, & Williamson, 2015; Carter, Rees, Hale, Bhattacharjee, & Paradkar, 2016; Hale & Guan, 2015). Early school start times disrupt the normal physiologic sleep and wake delay associated with puberty, making it difficult for adolescents to arise with sufficient alertness to function during the school day. As a consequence of excessive daytime sleepiness, adolescents are prone to caffeine use to maintain alertness

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during the day (Calamaro, Mason, & Ratcliffe, 2009). Use of technology devices prior to sleep impairs sleep by time displacement with electronic media activities, suppressed melatonin release by blue light exposure, and positive or negative psychological stimulation by media content (LeBourgeois et al., 2017).

The combination of puberty-induced altered sleep patterns, external influences of early school start times and nighttime use of electronic media devices, places the adolescent at heightened risk for chronic sleep insufficiency and disruption of the normal biopsychosocial state. Chronic sleep insufficiency, including short sleep duration, poor sleep quality, and increased daytime sleepiness, is associated with negative health outcomes, with a predisposition for extension of these health outcomes into the adult period.

Biological consequences of sleep insufficiency

Biological effects of chronic sleep insufficiency are associated with negative cardiometabolic health effects. Cardiometabolic abnormalities in adolescence are a precursor to poor adult health outcomes. An increased incidence of pre-hypertension and hypertension, combined with obesity, is associated with short sleep duration and increased risk of cardiovascular disease (Bal et al., 2018). Chronic very short sleep duration of less than 5 h nightly has a significant association with an overweight and metabolically unhealthy state. Poor eating patterns with increased energy consumption, lower leptin levels, and higher ghrelin levels lead to increased hunger and appetite, increased fat storage, and weight gain (Felson, Lohner, Hollody, Erhardt, & Molnar, 2017; Li, Zhang, Huang, & Chen, 2017). Risks associated with obesity increase with the higher amounts of sleep insufficiency. These factors contribute to metabolic dysregulation and an increased risk of insulin resistance and type 2 diabetes (Dutil & Chaput, 2017).

Psychosocial consequences of sleep insufficiency

Academic performance and associations with sleep are well documented, with short sleep duration and the resultant daytime sleepiness leading to poorer academic performance in adolescents (Fuligni, Arruda, Krull, & Gonzales, 2018; Wheaton, Chapman, & Croft, 2016). Shorter sleep duration and poorer sleep quality may be accompanied by increased daytime sleepiness, greater sleep variability, and increased depressive symptoms contributing to worse academic performance (Short, Gradisar, Lack, & Wright, 2013). Adolescents with sleep insufficiency have an increase in risk-taking behaviors with enhanced risk of injury. Sleep deprived teen drivers, with excessive daytime sleepiness

have altered reaction times and diminished vigilance and are more likely to fall asleep while driving and sustain a motor vehicle crash (Hansen, Capener, & Daly, 2017). Other risk-taking behaviors associated with short sleep with include substance use, and drunk driving (Shochat, Cohen-Zion, & Tzischinsky, 2014), participation in sexual activity, increased physical aggression, and suicidal attempts (McKnight-Eily et al., 2011).

Conclusions and clinical implications

Adolescence is a critical time to promote healthy sleep habits to maximize good health as a window into the future for optimal adult health outcomes. Although biological outcomes of poor sleep are detrimental to good health, psychosocial outcomes can be equally destructive. Pediatric nurses are well-placed to advocate for healthy sleep habits in adolescents. to provide anticipatory guidance on healthy sleep for teens, and to model good sleep hygiene behaviors. Adolescents should be strongly encouraged to limit their use of small screen technology devices within the last hour prior to sleep and to refrain from use of these devices during the overnight period to minimize sleep disturbances and negative effects from technology device exposure. On a policy level, nurses can be instrumental in advocating for later school start times for adolescent students to maximize academic function at the most physiologic time of day. Although adolescents may not see value in sleep promotion during this time, it is critical for healthy biopsychosocial function.

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