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Child and adolescent sleep duration recommendations in relation to psychological and somatic complaints based on data between 1985 and 2013 from 11 to 15 year-olds[☆]

Annika Norell-Clarke^{*}, Curt Hagquist

Centre for Research on Child and Adolescent Mental Health, Karlstad University, SE-651 88, Karlstad, Sweden

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ABSTRACT

Purpose: To investigate the association between sleep duration, sleep initiation difficulties and psychological and somatic complaints.

Methods: We used three cohorts of cross-sectional Swedish questionnaire data, from the Health Behaviours of School aged Children (1985/1986, 2005/2006, 2013/2014, $n = > 18\,000$, aged 11–15). Specific complaints (e.g. pain) and total complaint load were used as outcomes of sleep duration, sleep initiation difficulties and the combination of them both.

Results: Sleeping less than recommended and sleep initiation difficulties were associated with increased odds of specific complaints and belonging to the group with the greatest complaint load. The combination of short sleep duration and sleep initiation difficulties were associated with higher odds than either sleep issue alone. No interaction effects between time and sleep variables were found regarding complaints.

Conclusions: The findings support recent sleep duration recommendations. Further, sleep issues warrant a broad health assessment as they indicate a high likelihood of other complaints.

Adolescents of today sleep less than they did as children and less than the adolescents before them did, with the average teenager sleeping 75 min less per night than teenagers 100 years ago (Leger, Beck, Richard, & Godeau, 2012; Matricciani, Olds, & Petkov, 2012). The decline over the teenage years is greater for schooldays than weekend days. As 100 years is too short for the decreased sleep to be explained by evolution, and there is little evidence supporting teenagers needing less sleep than younger schoolchildren, this phenomenon is commonly explained by a combination of other factors. First, as they get older, many adolescents are allowed to set their own bedtimes and may choose to sleep less than they should during school nights (Short et al., 2011). Second, there is a shift in the circadian rhythm during adolescence that makes teenagers favour later bedtimes and prefer sleeping in for longer in the mornings (Crowley, 2016), which in turn may be a poor fit with school start times (Minges & Redeker, 2016). Third, on the topic of schools, there are also increased constraints on adolescents' time with longer school days, evening activities and more time-consuming homework (Moore & Meltzer, 2008), which may decrease the time frame that can be allotted for sleep. Fourth, there has been the historically rapid introduction of personal electronic media use, which allows teenagers to engage in social media, watch films and TV, and play games during evenings and nights, without any natural stop times; habits which have been associated with later bedtimes (Bartel, Gradisar, & Williamson, 2015). Since 1985, the proportions of Swedish 11–15 year olds who go to bed late have increased and consequently the proportions of schoolchildren who attain the recommended amount of sleep has decreased during

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^{*} Corresponding author.

E-mail addresses: annika.clarke@kau.se (A. Norell-Clarke), curt.hagquist@kau.se (C. Hagquist).

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school weeks (Norell-Clarke & Hagquist, 2017).

Changes in sleep habits are concerning, as insufficient sleep in adolescence is associated with immediate as well as long-term adverse consequences for mental and somatic health (see Owens et al., 2014 for a summary). For example, experimentally induced sleep deprivation during a week for 14–17 year olds (6.5 h per night) was associated with subjectively more negative emotions and poorer ability to regulate emotions according to family members (Baum et al., 2014). Regarding long-term consequences, teenagers with sleep problems were more likely to report internalising problems such as depression, anxiety or somatic symptoms later on (R. E. Roberts & Duong, 2014; Touchette et al., 2012). The path between sleep deprivation and mental problems may be explained through emotion regulation: how our ability to deal with stressors and negative feelings are affected by lack of sleep (see Palmer & Alfano, 2017 for a review). Neurologically, for adults sleep deprivation means increased activity in the amygdala in response to negative stimuli, and decreased connectivity between the amygdala and the medial pre-frontal cortex, which would lead to less efficient emotion regulation. In other words: stronger feelings and less ability to handle them constructively (Yoo, Gujar, Hu, Jolesz, & Walker, 2007).

Mental health has also changed over time; there has been an increase in the proportions of adolescents in the general population who report common psychological and somatic complaints such as aches and pains, low mood, irritability and nervousness (Bor, Dean, Najman, & Hayatbakhsh, 2014). In Sweden, this trend has been observed since the 1980s and the increase is especially striking for girls (Hagquist, 2015). Reports of common psychological and somatic complaints in adolescence can be used as a proxy for mental health problems, in that frequent sufferers are more likely to present clinical mental health issues later on in life (e.g. Bohman et al., 2012; Kinnunen, Laukkanen, & Kylmä, 2010). Together, the changes in sleep duration and mental health over time warrants an investigation of the association between sleep duration and psychological and somatic complaints, as insufficient sleep is a risk factor for mental health problems and the changes in sleep duration may be a cause of the changes in mental health in the adolescent population.

When focusing on problematic sleep in schoolchildren epidemiologically over time, the focus has often been on insomnia symptoms, conceptualised as difficulties falling asleep (e.g. Kronholm et al., 2015; Pallesen et al., 2008). However, recent advances in sleep epidemiology for adults highlight that only insomnia characterised by short sleep increases the risks of morbidity (Vgontzas, Fernandez-Mendoza, Liao, & Bixler, 2013), with the possible exception of depression (Baglioni et al., 2011). For children and adolescents, a study showed that sleep duration and difficulties falling asleep respectively predicted psychological and somatic complaints, although difficulties falling asleep shared a stronger association with psychological and somatic complaints than sleep duration did (Segura-Jiménez, Carbonell-Baeza, Keating, Ruiz, & Castro-Piñero, 2015). The study did not test if a combination of sleep initiation difficulties and short sleep duration was associated with psychological and somatic complaints. As sleep initiation difficulties may be a cause of short sleep duration, problems falling asleep should be controlled for when investigating the associations between sleep duration and health. Moreover, difficulties falling asleep and insufficient sleep may have different associations with mental health as demonstrated in a study on adolescents where sleep duration had a u-shaped association with mental health, whereas the association between sleep initiation difficulties and mental health was linear (Kaneita et al., 2007). Sleep duration is thus of great interest in relation to psychological and somatic complaints: alone and in combination with self-reported sleep-onset difficulties.

To the best of our knowledge, the association between child and adolescent sleep and psychological and somatic complaints has not been investigated in relation to the most recent sleep duration recommendations by the National Sleep Foundation (NSF). The recommendations by the NSF were the results of a multidisciplinary expert panel who assessed the articles from a systematic literature search on sleep durations in relation to health outcomes, which had been conducted by an independent panel (for more details, see Hirshkowitz et al., 2015). This resulted in empirically based recommended sleep duration spans rather than a definite amount of hours (e.g. 9–11 vs 9 h). Sleep recommendations for children and adolescents have changed over time (and always stated that children should sleep more than they have done at every historical time) but they have been based on “rules of thumb”, “opinions” and “loose observations”. A systematic review found that only one out of 35 previous pediatric sleep duration recommendations was based on any kind of empirical evidence, and that was a sample of “healthy children” (Matricciani, Olds, Blunden, Rigney, & Williams, 2012). Although the sleep duration recommendations have changed over time, children and adolescents’ sleep needs have likely remained the same. The lack of empirically sound guidelines to determine how much sleep an age group needs could cause incorrect conclusions on the proportions of those who attain sufficient or insufficient sleep. Moreover, we are less likely to understand how (or if) other variables are associated with different kinds of sleep durations.

1. Aims

The aim of this study was to investigate the potential associations between sleep duration, sleep initiation difficulties and psychological and somatic complaints in Sweden, and to investigate potential changes in the magnitude of associations between 1985 and 2013. Empirically supported sleep recommendations will be used to operationalise total sleep time, and the sample will be divided into two age-groups, as the recommendations are different for 11–13 year olds (9–11 h) and 15 year olds (8–10 h) (Hirshkowitz et al., 2015). We will investigate specific psychological and somatic complaints and total complaint load: the latter as measured by a composite scale.

Aim 1: To investigate if shorter sleep duration than recommended is associated with more frequent specific psychological and somatic complaints as well as a greater total complaint load. Based on previous research by Segura-Jiménez et al. (2015), and Vgontzas et al. (2013) on the associations between short sleep durations and negative health outcomes, we hypothesise that the abovementioned associations will be found.

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