on to the petition for later school start times around the nation.

Lynn M. Keefe, MD

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Sleep Recommendations for Children: A Need for More Data

We wish to comment on Matricciani et al’s interesting historical survey of recommended and reported sleep durations and the spirited rejoinder it elicited from Dr Owens and coauthors. We believe that both groups make important points, and we add perspective from our recent experimental findings.

Matricciani et al found that, over the last century, age-specific recommended sleep durations decreased by 0.71 minute/year, almost the same as the reported sleep duration decline of 0.73 minute/year. Importantly, recommended sleep was consistently ~50 minutes greater than actual (estimated) sleep. Matricciani et al note that these recommendations, although surely well-meaning, were not evidence based.

The rejoinder by Dr Owens and colleagues cites the emotional, behavioral, and cognitive impairments that can result from insufficient sleep. Their deep concern for children’s welfare is evident. The negative impact of insufficient sleep is well established. Nevertheless, the fact remains that there are no rigorous empirical data that establish the amount of sleep needed at various ages across childhood and adolescence. The amounts of sleep obtained in unconstrained conditions are not sufficient. As Matricciani et al suggest, we require dose-response experiments that vary sleep schedules and measure the effects on daytime sleepiness, vigilance, cognitive function, and affect. Ideally, these studies would be longitudinal to determine how this dose-response relation changes across childhood and adolescence.

Matricciani et al point out that population studies of sleep are often more feasible than direct sleep measurements with polysomnography. There is strong evidence that both are essential. Sleep is not a unitary condition but consists of cyclically alternating, qualitatively different brain states (non-rapid eye movement [NREM] and rapid eye movement [REMI]). Differential changes in these states across adolescence cannot be inferred from reported sleep times, but they are critical for understanding brain development and the function of sleep.

Combining population studies with parallel EEG recordings in a subset of subjects might be optimally informative. A useful example is provided by the cross-sectional population data of Olds et al and our (independent) longitudinal study of sleep durations from ambulatory EEG recordings in children’s homes. In their survey of 4032 Australian youngsters, Olds et al found that reported sleep durations on school night schedules decreased by 12 minutes/year across ages 9 to 18 years. Our longitudinal study measuring school-night sleep EEG across the same age range revealed a similar rate of decline (10.3 minutes/year). However, the 2 kinds of biological sleep changed differently: the decline in school-night sleep time entirely resulted from decreasing NREM sleep. REM sleep increased slightly but significantly. (As we demonstrated in our article, this result cannot be attributed to sleep restriction.) It is of further biological interest that REM and NREM sleep also exhibited different trajectories across adolescence under the (separate) extended sleep condition of our experiment.

In summary, it seems fair to conclude that more research is needed, that some should be population based and some laboratory based, and that these additional data will advance our understanding of both sleep biology and brain development. They will also provide a firmer and more rational foundation for public health recommendations.

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REFERENCES


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In Reply

We were interested to read the comments of Dr Owens and her colleagues on our paper. There has been considerable interest in this paper from the academic, research, and wider media community, many of which have incorrectly interpreted their inferences as our implications. To clarify, our paper did not state that:

- there is no need for sleep recommendations;
- current recommendations for sleep are wrong; or
- children do not require more sleep than they are currently getting.

Our paper also did not claim that no evidence exists to support current sleep guidelines.

We agree with Dr Owens and colleagues that sleep is important for the
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Irwin Feinberg and Ian G. Campbell

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